

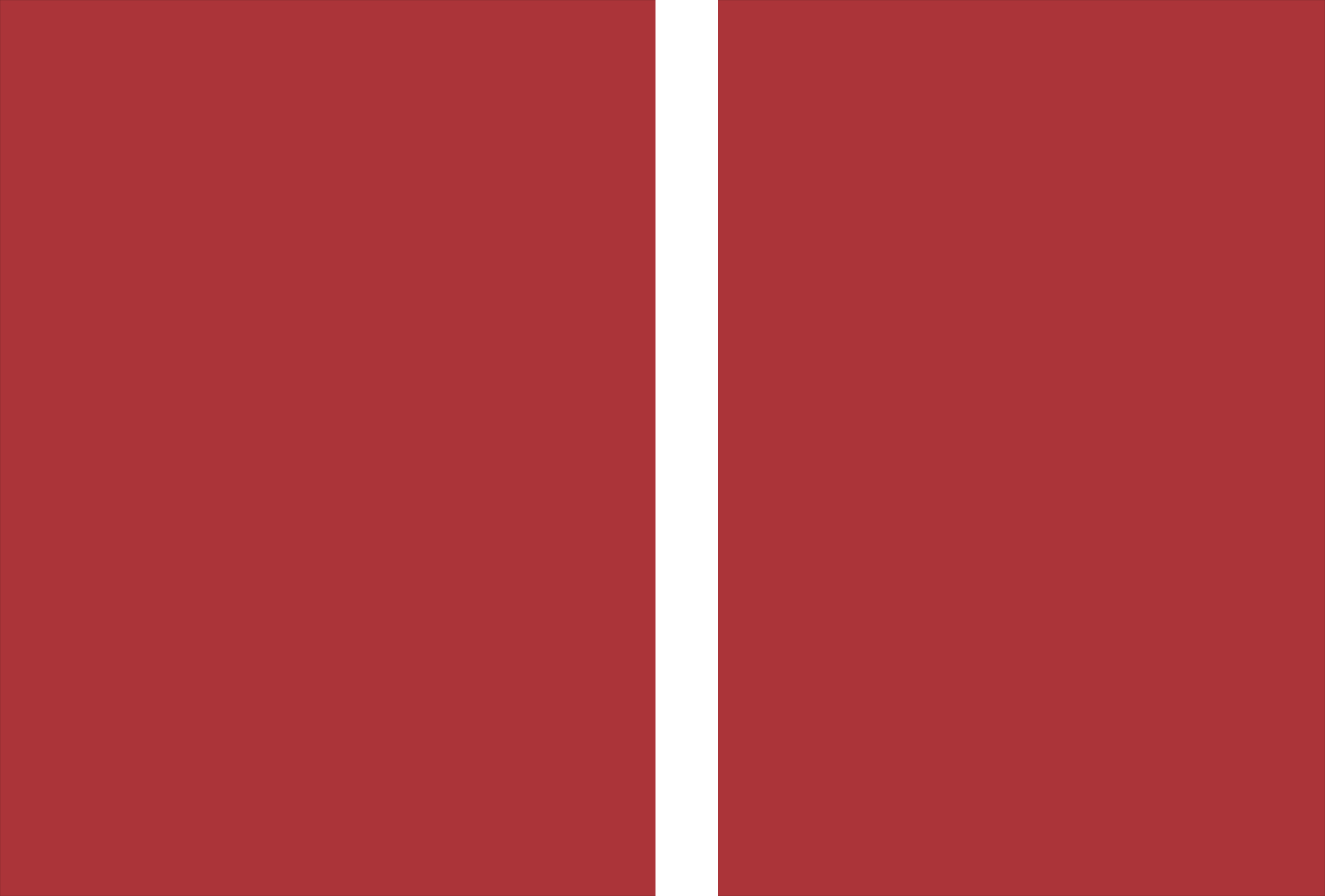


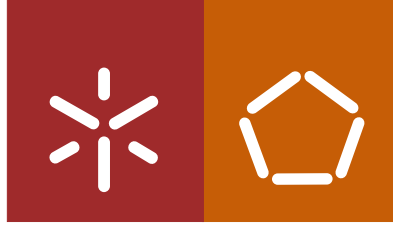
Universidade do Minho
Escola de Engenharia

André Mendes de Carvalho

**Operational excellence, culture and agility:
key concepts to manage technical industries**

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Tese de Doutoramento
Doutoramento em Líderes para as Indústrias Tecnológicas

Trabalho efetuado sob a orientação do
Professor Doutor Paulo Alexandre Costa Araújo Sampaio
e do
Professor Doutor Eric Scott Rebentisch

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Aos meus pais. Ao meu avô Luís.

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STATEMENT OF INTEGRITY

I hereby declare having conducted this academic work with integrity. I confirm that I have not used plagiarism or any form of undue use of information or falsification of results along the process leading to its elaboration.

I further declare that I have fully acknowledged the Code of Ethical Conduct of the University of Minho.

Excelência Operacional, Cultura e Agilidade: conceitos-chave para a gestão de indústrias tecnológicas

Resumo

A Excelência Operacional é usada recorrentemente na procura de melhores resultados operacionais. No entanto, e num mundo em constante mudança, a compreensão do seu impacto no longo prazo é ainda limitada. A literatura científica mostra que as relações da Excelência Operacional tanto com a Cultura Organizacional como com a Agilidade Organizacional estão bem estudadas. Apesar disso, ainda não existia uma perspetiva integradora dos três conceitos.

Perante esta lacuna, o projeto desenvolvido começa por apresentar um quadro teórico em que se promove essa integração. Para tal, foca o desenvolvimento de uma cultura orientada à excelência, e, num ambiente operacional altamente instável, inclui, no âmbito da criação de valor, a sustentabilidade das iniciativas de Excelência Operacional através do desenvolvimento de recursos e aptidões focadas na Agilidade Organizacional. No entanto, e ainda que este quadro teórico tenha sido desenvolvido sobre uma forte base concetual, o entendimento completo das relações entre os conceitos em estudo requer uma perspetiva prática que só pode ser adquirida em ambiente industrial. Assim, o desenvolvimento da teoria assentou, numa segunda fase, em dados recolhidos em organizações altamente técnicas e tecnológicas. Através de um total de 10 estudos de caso, foram avaliadas capacidades em termos de Excelência Operacional, orientação da Cultura Organizacional e Agilidade Organizacional, e estudadas as ligações entre estas (bem como com a performance organizacional). Os resultados mostram a existência de uma relação de influência, por meio de reforço positivo, entre os três conceitos. Mostram, também, como diferentes contextos organizacionais podem influenciar essas dinâmicas e o desenvolvimento de cada um dos conceitos e das suas relações.

Este trabalho apresenta uma nova abordagem que integra Excelência Operacional, Cultura Organizacional e Agilidade Organizacional, permitindo uma melhor compreensão do equilíbrio necessário para manter altos níveis de desempenho técnico e operacional em ambientes marcados pela mudança. Deste modo, e numa perspetiva mais ampla, alerta para a importância da Agilidade Organizacional e da Cultura Organizacional na gestão da Qualidade e Operações em organizações de natureza técnica e tecnológica.

Palavras chave: Agilidade Organizacional, Cultura Organizacional, Excelência Operacional, Gestão da Qualidade

Operational excellence, culture and agility: key concepts to manage technical industries

Summary

Operational Excellence is often used by organizations in search for improved performance results. However, and in an increasingly dynamic business environment, its capacity to make organizations successful in the long term has yet to be demonstrated. Literature shows how the relationships between Operational Excellence and either Organizational Culture or Organizational Agility have been well explored in the past. However, no integrative perspective on the three concepts had been advanced. In the face of this research opportunity, a theoretical framework is first proposed. Based on the existing literature, it offers an insight on how Operational Excellence initiatives may foster adaptability in organizations. To do so, such initiatives should look to promote an excellence-oriented culture that continuously seeks to offer value to the market – and in a highly unstable business environment, such value must include the capacity to be agile. If these conditions are met, the sustainability of Operational Excellence may more easily be achieved, with organizations being able to develop Organizational Agility capabilities.

Despite being built on a strong conceptual background, the complete understanding of the relationships between concepts requires a practical perspective that can only be collected in an industrial environment. Using a structured-case approach, a series case studies were performed in order to gather empirical evidence and to further develop the conceptual framework. A total of ten organizations were studied, and their capabilities in terms of Operational Excellence, orientation of the Organizational Culture, and Organizational Agility were assessed. Results show the relationship of influence between the three concepts under consideration, each one being connected with the others through positive reinforcement. It shows how Operational Excellence Programs have an important role in the development and scaling up of Organizational Agility capabilities, and highlights how different contexts may influence these dynamics.

This work presents a novel approach that brings together Operational Excellence, Organizational Culture, and Organizational Agility, allowing a better understanding of the balance needed to maintain high technical and operational performance levels while dealing with pressure to change. It connects and upholds the importance of Organizational Agility and of the cultural paradigm in the management of Quality and Operations in technical and technological organizations.

Keywords: Operational Excellence, Organizational Agility, Organizational Culture, Quality Management

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List of Abbreviations

CEO – Chief Executive Officer

CMMI – Capability Maturity Model Integration

COUHES – Committee On the Use of Humans as Experimental Subjects

CSF – Critical Success Factors

EEA – European Excellence Award

EDAM – Engineering Design and Advanced Manufacturing

EFQM – European Foundation for Quality Management

EQA – European Quality Award

ESSHS – Ethics Subcommittee for Social and Human Sciences

FCT – *Fundação para a Ciência e Tecnologia*

IT – Information Technologies

LTI – Leaders for Technical Industries

MBNQA – Malcolm Baldrige National Quality Award

MIT – Massachusetts Institute of Technology

NDA- Non-Disclosure Agreement

NIST – National Institute of Standards and Technology

OA – Organizational Agility

OC – Organizational Culture

OpEx – Operational Excellence

Org.- - Organization

Q - Question

RCA – Research Cooperation Agreement

SCA – Structured-case Approach

SPOE – Shingo Prize for Operational Excellence

TQM – Total Quality Management

USA – United States of America

UM – *Universidade do Minho/* University of Minho

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1. Introduction

1.1. Overview

Globalization, disruptive technology, social and economic change, broader education access, political instability, unpredictable events and new world orders: such words and terms are becoming increasingly more common, as the world seems to change at increased speed. Such changes are observed daily and have an impact on every aspect of our lives. Given its complexity, the current wave of change is not something that we can deal with by ourselves. Society, its structures and organizations, must lead the response, as any attempt to cope with change demands inputs from social, business and engineering sciences.

Having a central part in the economic and social configuration of modern societies, the industrial sector has a crucial role in this scenario. In the increasingly dynamic business environments where highly technical and technological firms find themselves, the need to develop tools and approaches to deal with change has become primary. This sector has been facing a situation where change seems to be the only constant feature. To cope with this reality, many industrial organizations have resorted to Quality frameworks in order to adapt and (re)gain competitiveness.

In fact, the use of Quality tools and models to respond to market changes – fostering differentiation, promoting competitive advantage and efficiency - has been quite regular over the past decades. Different tools and models have been developed and deployed throughout the years, stimulating improved performance, business results and innovation (Sila & Ebrahimpour, 2005; Hoang, Igel, & Laosirihongthong, 2006; Snee, 2010).

To a large extent, it was the success of these approaches that allowed the natural evolution in the field of Quality, and that lead to the pursuit of Organizational Excellence. In its scope, some of the most widely used approaches to manage change, seek improved operational performance, and search for continuous improvement are Operational Excellence programs. These programs seek, through the balance between human and technical factors, to promote structural changes that help to drive organizations to the next level in the ladder of performance improvement. For many years now, these programs have been mostly successful, deploying Excellence frameworks and aligning organizations with its criteria. Studies have shown that organizations deploying them achieve better outcomes than the market average (Hendricks & Singhal, 2008), increasing financial, productivity, and quality metrics (Chakravorty, Atwater, & Herbert, 2008; Hendricks & Singhal, 2008).

In recent years, new challenges and difficulties appeared. Many organizations branded as “excellent”, and given widespread attention as role models, have found themselves in difficult situations, sometimes having to fight for survival. Part of what was observed in such cases was that despite obtaining short- to medium-term results, Operational Excellence initiatives failed to achieve the goal of keeping organizations adaptable and competitive over time (Dale *et al.*, 2000; Dahlgaard-Park and Dahlgaard, 2007; Bertels and Buthmann, 2013).

These challenges led to the understanding that a new wave of change demands a different approach – one that allows organizations to deal not with short term, incremental change, but with continued, disruptive transformation. Such an approach should foster an enduring capacity to adapt to change, making organizations resilient in VUCA (Volatile, Uncertain, Complex and Ambiguous) business environments. Dominating a market by having the best products of its generation or an outstanding customer services proved in many cases not to be enough to guarantee success in increasingly changing environments. One of the criticisms that Operational Excellence programs frequently face is that they are used to promote a time-defined change, aiming to adjust to a new reality, but not promoting the necessary structural changes to develop agile capabilities and philosophies that will create a lasting capacity to adapt. In other words, these programs are often used to promote process improvement, eliminate waste and react to a well-determined challenge (financial or operational) but they do not focus on the development of organizational agility characteristics (Powell & Strandhagen, 2012).

Araújo and Sampaio (2014) support the idea that the real implementation of excellence models happens when they are fully integrated with the regular practices of the organization. If not used in this way, Operational Excellence programs, despite being modified in order to fit the organizational culture, do not actually promote a transformation at cultural level that is able to support new strategies, their objectives and values, as an inherent part of the organizational paradigm. New tasks and strategies are regarded as temporary and as having the sole objective of helping the company shift from one state to another, and are not absorbed into the operational and cultural matrixes of its work force.

Organizational Agility was defined as a new industrial paradigm to face the twenty first century (Nagel, 1991), and it is increasingly been considered as a key for success in contemporary ages (Bottani, 2009a). But while there are no doubts that an organization’s capacity to adapt to new business environments is one of today’s most important organizational competitive advantages, effective change management still poses a challenge for most organizations, with reports pointing to about 70 failed change programs in every 100 implementation attempts (Hacker & Washington, 2004).

It is in this sense that this research project is presented. Departing from Excellence initiatives and their successful impact on the performance of organizations, we aim to understand the opportunity and the necessary actions to make them sustainable throughout time, focusing on resilience and long-term success. For that, two important concepts are considered: Organizational Culture and Agility.

To truly discuss the sustainability of a management philosophy or industrial paradigm, it is essential to consider Organizational Culture: it will be essential in framing the organization's efforts to create value, driving behaviors and guiding the implementation of any new tools and frameworks (E. H. Schein, 1984; Reeves & Bednar, 1994). Similarly, and considering the requirements for success in the twenty first century, the concept of Agility is crucial: it provides a series of capabilities that are essential for the competitiveness of organizations in today's market (Vázquez-Bustelo, Avella, & Fernández, 2007). By bringing these three concepts together, we wish to understand if and how the implementation of Excellence programs can influence the Culture of the organization in the long term, embedding in it an enduring orientation towards Excellence. Furthermore, and in the face of today's unstable and complex markets, we wish to understand if this cultural orientation helps to develop the necessary Agile capabilities to adapt to new business environments.

1.2. Context

The importance of the social dimension of organizations for the achievement of superior level of performance has been well explored in literature. Cultural factors having been identified as key in the implementation of Excellence programs and initiatives, and in the promotion transformational change. There is enough evidence of interdependence between the concepts of Organizational Culture and Excellence (Irani, Beskese and Love, 2004; Evans, 2010), demonstrating the importance of promoting cultural fit for any efforts in the scope of Excellence to be successfully implemented in an organization. Furthermore, some of the organizations responsible for the development and promotion of the more structured approaches to Excellence – Excellence programs and their models – also highlight this relationship as key. The European Foundation for Quality Management states that Excellence programs will promote organizational development and allow the achievement of sustainable organizational results only when the principles and practices of Excellence are assimilated by the culture of an organization (European Foundation for Quality Management EFQM, 2017), and the Shingo Institute reinforces that excellence frameworks are not agents of transformation by themselves but rather tools to be used by people in an organization to promote change (Shingo Institute, 2014). Nevertheless, the truth is that this push for framing Excellence in the Culture of an organization has not been enough to

ensure the sustainability of these programs and initiatives over time. On the one hand, some organizations seem to treat achieving Excellence as a onetime event and subsequently fail to tread the path of excellence (Vadari & Parandker, 2011). On the other, even those committed to sustaining Excellence face a series of challenges. Brown (2013) identified six key challenges in sustaining and maintaining Excellence over time, many of which are deeply tied to the cultural side of an organization: (1) incorporating excellence in the daily work, (2) providing meaning, (3) driving excellence through knowledge and leadership, (4) managing employee engagement, (5) pursuing Excellence without the demand of high levels of extra works or resources, and (6) keeping consistent throughout the organization.

Due to these challenges, organizations are often unable to fully explore the potential of these programs in creating an organizational orientation towards Excellence - but more critically, they may be compromising the potential success of these programs in the long term.

In fact, a decrease in application numbers in some of the most important Excellence Awards has been observed. To better depict this scenario, three of the most used and well-known Excellence programs and respective awards were analyzed: the Malcolm Baldrige Quality Award (MBNQA), established by Government bodies in the United States of America in 1988 with the goal of recognizing organizations demonstrating “performance excellence” (American Society for Quality ASQ, 2017); the Shingo Prize for Operational Excellence (SPOE), created in the same year by the Shingo Institute at the University of Utah, USA.; and the European Quality Award (EQA; later the European Excellence Award, EEA), established in 1992 by a group of European companies to assess organizations on the “progress on their journey towards Excellence” (European Foundation for Quality Management EFQM, 2019c). All these programs function in a similar fashion: applicants follow a series of deployment and self-assessment guidelines organized into a framework – the Excellence Model – which is supported by a series of “principles” or “concepts”. Despite some differences in these principles/concepts, all frameworks support dimensions such as leadership, value creation, focus on people, or innovation (Table 1). When applying to any Excellence Award, organizations are assessed on their deployment and alignment with the principles and criteria behind that respective Excellence Model, namely on their usage of the systems, tools, and behaviors that support these principles. These assessments, based on a series of scales used for each criterion under study, translates the evidence collected in a certain organization into a point system that quantifies its maturity in deploying and following the criteria and principles of Excellence (T De Bruin, Freeze, Kulkarni, & Rosemann, 2005) – and which ultimately represent the level of excellence reached by that organization.

Table 1 - Principles or Concepts of Excellence, according to the Shingo Model for Operational Excellence, to the “Baldrige Excellence Framework” of the Malcolm Baldrige National Quality Award, and the European Excellence Model of the European Foundation for Quality Management (National Institute of Standards and Technology, 2013; Shingo Institute, 2016; European Foundation for Quality Management EFQM, 2017). While not all relate directly across different lists, several Principles/Concepts of Excellence are shared by two of more of these three Programs.

	Shingo Prize	MBNQA	EEA
Principles or Concepts of Excellence	Lead with Humanity	Visionary leadership	Leading with Vision, inspiration and Integrity
	Respect for Individual	Valuing people	Succeeding through the Talent of People
	Create Value for the Customer	Delivering value and results	Adding Value for Customers
	Create Constancy of Purpose	Focus on success	Creating a Sustainable Future
	Embrace Scientific Thinking	Management by fact	–
	Systems perspective	–	Think Systemically
		Managing for innovation	Harnessing Creativity and Innovation
	Assure Quality at the Source	–	–
	–	Ethics and transparency	–
	Flow and Pull Value	–	–
	Focus on Process	–	–
	Seek Perfection	–	Developing Organizational Capability
	–	Organizational learning and agility	Managing with Agility
	–	Student-centered excellence	–
–	Societal contributions	–	

Each of these programs had an auspicious start. The first edition of the MBNQA, in 1988, had 66 applicants, and only three editions later it achieved its best engagement results, with 106 applicants. Over the following years, it saw growing engagement, and despite fluctuations, it kept stable figures. However, more recently, the number of candidates has dropped drastically, leading to what

appears to be a gloomy scenario: applications reduced sharply in only three years (2010-2013), and numbers have remained low since then (Figure 1).

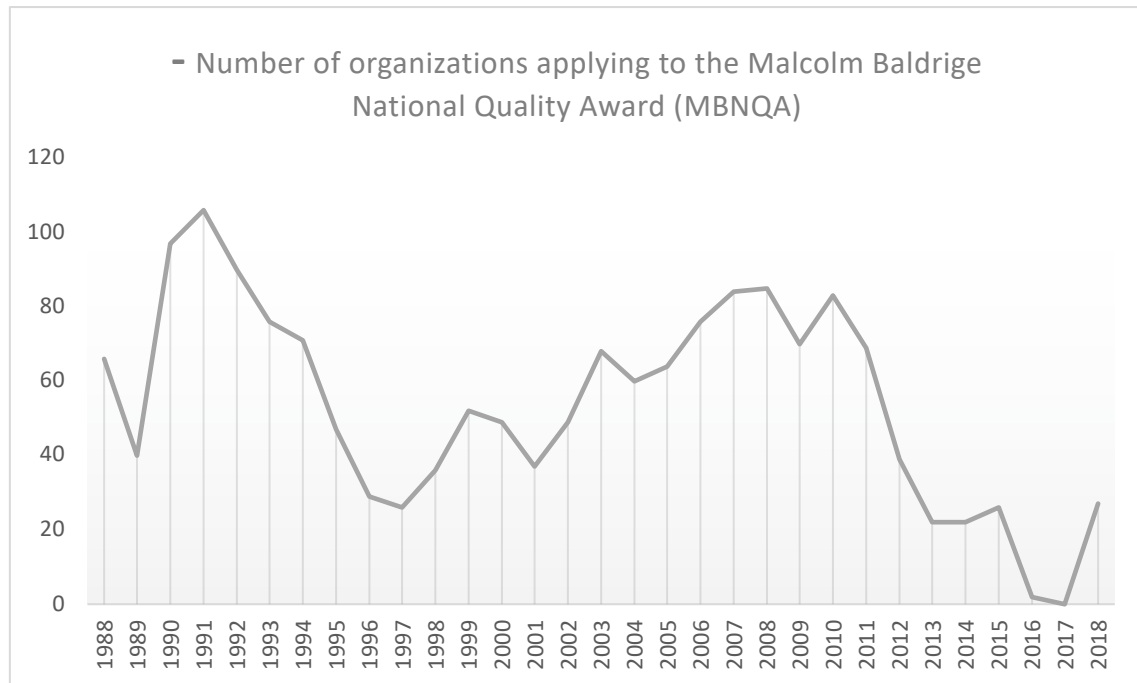


Figure 1 - Evolution of the number of applicants to the MBNQA, between 1988 and 2018, in all categories (National Institute of Standards and Technology, 2018).

More critically, the manufacturing sector – which initially sparked interest in the establishment of an Excellence framework in the United States – seems to be increasingly distant from the MBNQA – with no applications observed since 2013 (Figure 2).

This disengagement trend is not new. In fact, if it did not make the alarms soar before, it was probably because throughout the years the addition of new categories brought new applicants, helping to veil the problem. These categories brought vitality to the MBNQA (Hubbard & Klute, 2011), but were unable to stop the downward trend. They kept the program running smoothly for a few years – until, with no new sectors being added, the trend became exposed. Nevertheless, the application records by category show that, since the beginning of the award and over 30 years, the tendency has been present in most categories, with signs of disengagement becoming discernable after only a few editions.

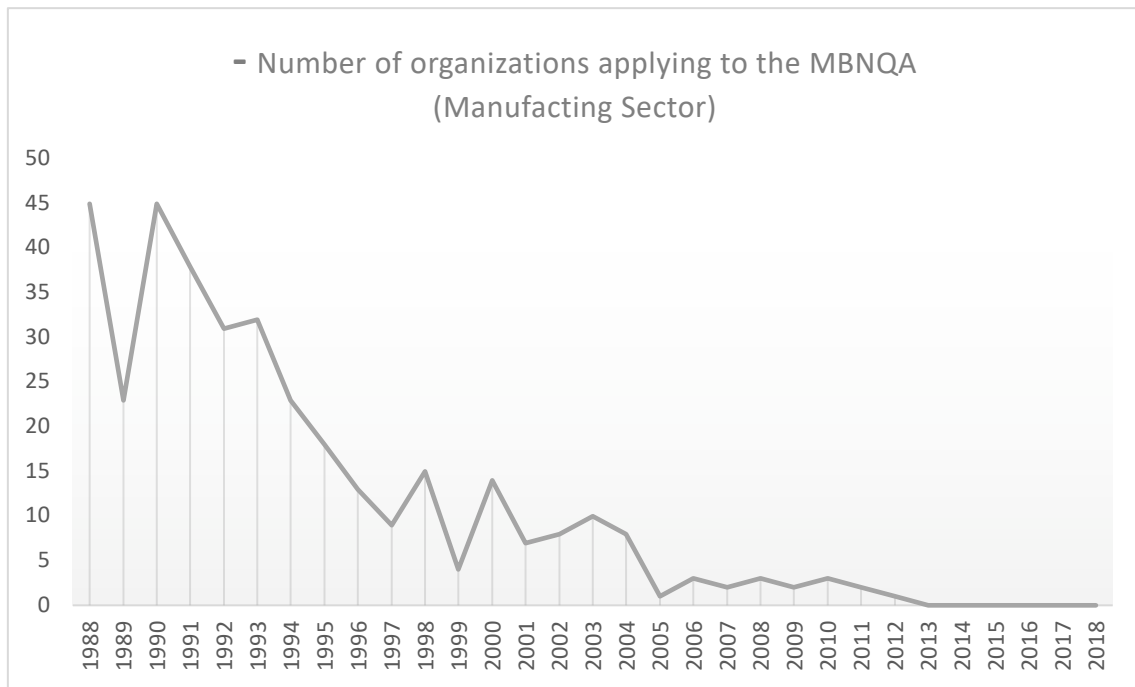


Figure 2 - Evolution of the number of applicants to the MBNQA, between 1988 and 2018, for companies in the manufacturing sector (manufacturing category) (National Institute of Standards and Technology, 2018).

By 2018, the manufacturing sector of the MBNQA sees yet again no applications - for the sixth year in a row (Figure 2). A comparable situation is found in the service category, where, for the second consecutive year, and for the fourth time in this award's history, there were no applicants (Figure 3). As and the remaining sectors - healthcare (14 applicants in 2018), education (5), nonprofit (6) and small business (2) – while they do pull the numbers up (Figure 1), truth is that they are no longer able to “hide” this reality.

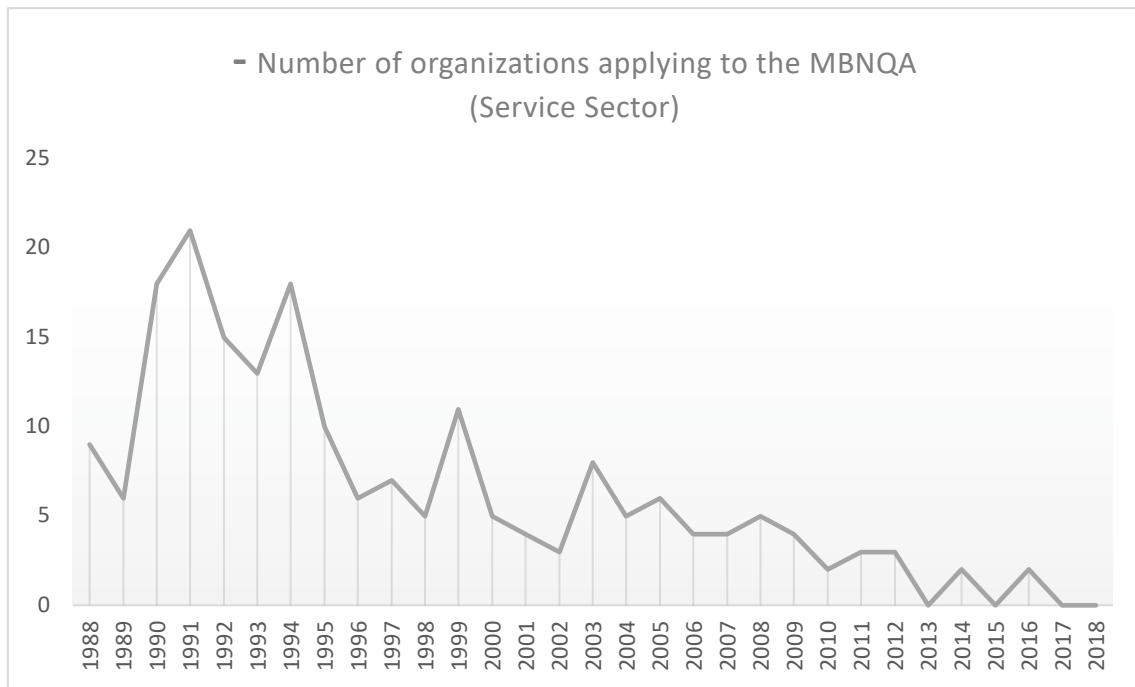


Figure 3 - Evolution of the number of applicants to the MBNQA, between 1988 and 2018, for companies in the Service category (National Institute of Standards and Technology, 2018).

The Shingo Prize for Operational Excellence – the only major program/award focusing on Operational rather than in the broader perspective of Business Excellence – offers three levels of recognition: the Shingo Prize, the Silver Medallion, and the Bronze Medallion. Despite having its inaugural edition in the late 1980's (like the MBNQA), the engagement evolution with Shingo Prize has been slightly different, with the program taking more time to meet its best participation/recognition levels – which happened in 2007, after 20 editions. Despite some variability in the number of organizations recognized each year, until 2007 there was a clear rising tendency. However, since then the number of organizations recognized has decreased sharply, with high variability and engagement levels similar to those two decades ago (Figure 4), and a decreasing trend for the past 3 years.

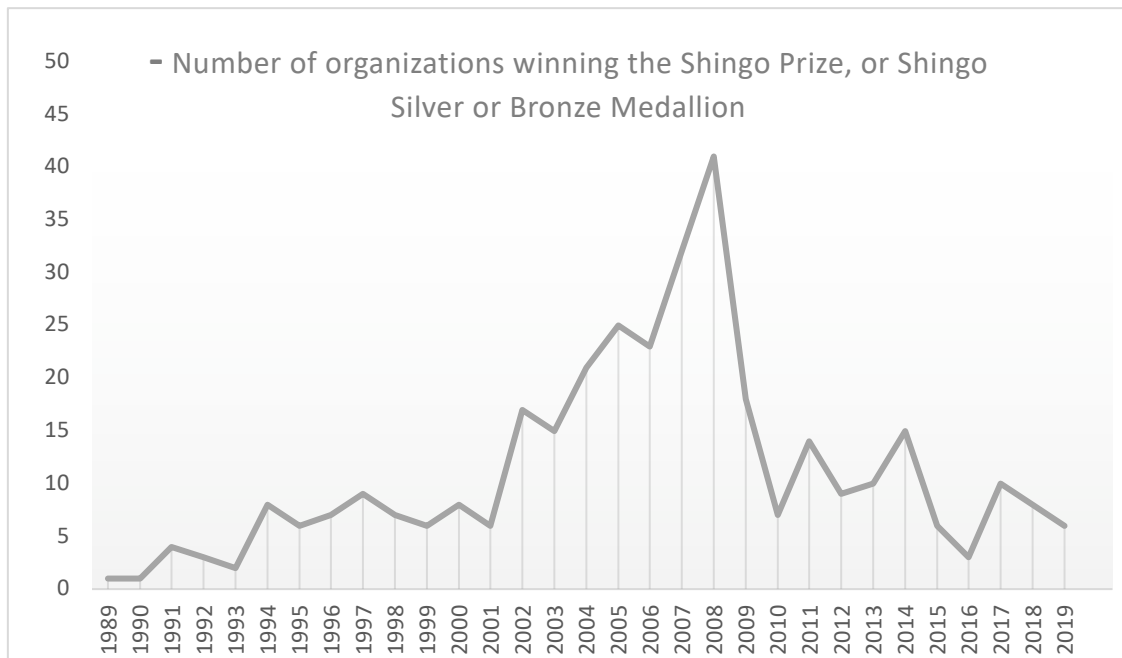


Figure 4 - Evolution of the number of winners of the Shingo Prize, Shingo Silver Medallion, or Shingo Bronze Medallion, between 1989 and 2019 (Shingo Institute, 2019).

Across the ocean, the European Excellence Award (EEA) is undergoing a somewhat comparable reality to the MBNQA. The two differ in a few dimensions, with the EEA covering a wider and multi-cultural geographical region and promoting recognition at different levels: Award winners, for those showing superior performance in all its Fundamental Concepts (see Table 1), Prize winners, for those excelling in one particular dimension, and finalists, those considered for a prize but yet unable to secure it. Nevertheless, similarities become clear as engagement is analyzed in detail. In a much similar storyline to the MBNQA, the EEA initially observed a steady growth - both in the total number of applicants and in the number of candidates. This trend lasted until 2000 when the number of organizations considered for high-level recognition decreased for the first time. Since 2008, the number of applicants has fluctuated. In 2018 there were 8 organizations reaching the final stage (Figure 5).

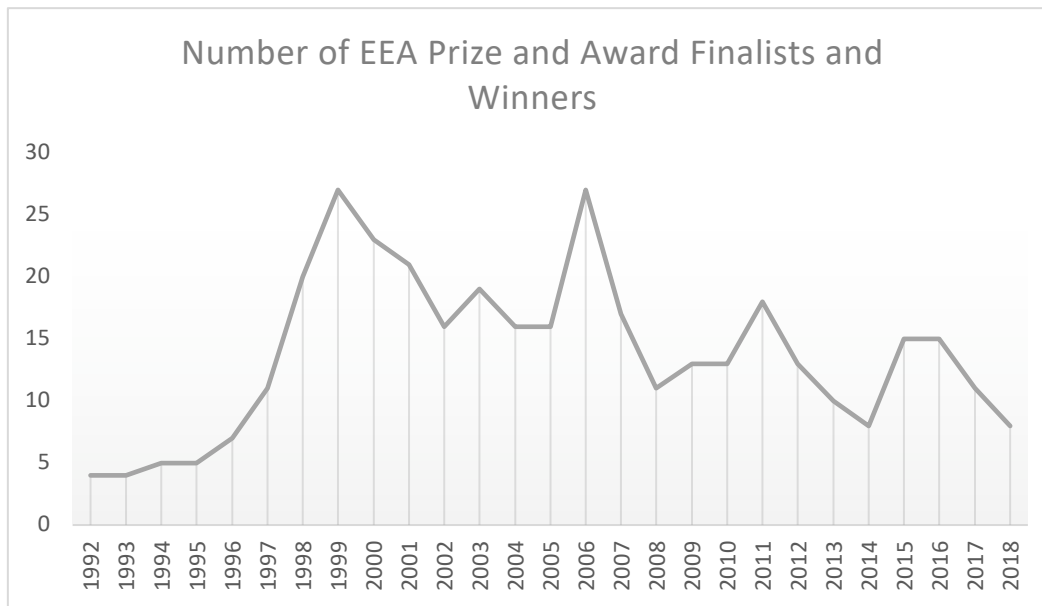


Figure 5 - Number of organizations reaching the final phase of the EFQM Excellence Award, between 1992 and 2018 (European Foundation for Quality Management EFQM, 2019b).

Although not as dramatic as the case of the MBNQA, a negative trend is visible since 1990 – just a few years after the establishment of the program. Moreover, the case becomes especially prone to comparisons as we look at the “origins” of the applicants. Although the EEA does not divide its applicants by categories, the available data on the winners and finalists over the last few years allows us to identify where they would fall if categorized. Table 2 shows the numbers for manufacturing and service organizations since 2012, which accounts for only 40% of the total number of applications.

Table 2 – Total number of EFQM’s Excellence Award Finalists and Winners, by year (2012-2018), and number of those organizations operating in the Manufacturing or Service sectors (European Foundation for Quality Management EFQM, 2019b).

Year	Total	Manufacturing & Service
2012	13	4
2013	10	2
2014	8	5
2015	15	8
2016	15	6
2017	11	4
2018	8	3
Total	80	32
% in Total	100%	40%

This active disengagement by industrial and operations organizations from Excellence programs, allied to a series of negative perspectives on these awards, are jeopardizing the use and impact of Excellence programs. In fact, a questionnaire done next to MBNQA-associated managers, examiners, and consultants shows strong agreement with the ideas that the perceived return on investment of the MBNQA is not enough for manufacturing organizations to apply; that it is not motivation enough and that applying and achieving the Award is too difficult, eating up time and financial resources; or that alternative avenues to quality improvement and cost effectiveness, such as Six Sigma or Lean Management, deviate the attention from the MBNQA (Bandyopadhyay & Leonard, 2016).

But this is not the only criticism that excellence programs and approaches face. Amongst other issues, they are accused of stagnating after some time, not being sustainable in the long term. In the face of this scenario, it is essential to understand the reasons being these constraints and limitations. Two ideas seem common on the literature, and may help to understand the challenges Excellence faces: the already mentioned, critical important of aligning Excellence with the Culture of an organization (Araújo & Sampaio, 2014; European Foundation for Quality Management EFQM, 2017), and the limitations of the existing frameworks of Excellence in considering elements, dimensions and criteria of Agility (Powell & Strandhagen, 2012), in promoting the ability to deal with change (Dervitsiotis, 2003; Brown, 2013b), and in maintaining the success in the long term (Jaeger, Matyas, & Sihn, 2014).

1.3. Objectives, innovation and relevance

Considering the results delivered in organizations around the world, it is a supporting perspective of this work that Excellence provides valid frameworks, principles and criteria for operational success. However, it faces a series of challenges and pressure to adapt to better face the challenges posed by a new industrial revolution and a world under constant change. In fact, this reality is critical – not only for Excellence programs, but to the field of Quality in general. The challenges and criticism that are now faced by Excellence programs and initiatives have been found in the past and present in the scope of other Quality tools, frameworks, or philosophies – shown, for example, on the criticism faced by Total Quality Management (Dahlggaard-Park & Dahlggaard, 2007) or the saturation and stagnation in the evolution of ISO 9001 usage (Sampaio, Saraiva, & Guimarães Rodrigues, 2011) - both approaches accused of promoting too much focus on tools and techniques (McAdam, 2000) and thus neglecting

the social side of an organization. If the social side of organization was always meant to be one of the focus of Excellence initiatives, neglecting the alignment with the culture of organizations is still a common issue in many Excellence-pursuing organizations (Vadari & Parandker, 2011). At the same time, limitations in promoting adaptability and considering of agile and change management principles – especially for the long-term – further jeopardize the ability of Excellence to be seen as valid and valuable framework by organizations worldwide.

This works sets to explore the organizational-level relationships between Operational Excellence, Organizational Culture, and Organizational Agility, in order to understand how to keep Excellence relevant in the present and for the future. This research project is motivated to understand the organizational dynamics produced by the relationships between these concepts, and to assess their impact in the life of technical and technological organizations. More particularly, two main objectives can be listed:

1. Understand if – and how – can the implementation of Excellence programs influence the Culture of an organization in the long term, creating sustained performance excellence and embedding in it an enduring orientation towards Excellence, and;
2. Comprehend if such cultural orientation helps to develop Organizational Agility capabilities, making the organization a more agile and fit to adapt to changes in its extended business environments.

Despite defining these two objectives in a sequential way, the novelty of this research project lies precisely in the integration of these three concepts. The importance of Organizational Culture for both Excellence and Agility has been considerably well explored. Similarly, the relationship between Excellence and Agility, and the advantages of their integration, has seen some good development. So far, however, research has been addressing these concepts in pairs, an no joint perspective has been presented.

As a result of this new perspectives, we wish to attain a few outcomes. The first one is to provide a better understanding of the organizational dynamic surrounding Excellence and its relationship both with the social side of the organization and with the surrounding environment. This understanding is not meant to be develop at a theoretical level only: instead, it is to be built also on evidence gathered from realistic contexts. This context is essential to understand the impact that this new perspective can really have in organizations. Accordingly, a minimum of 6 case studies was defined – with at least 3 case studies in Portugal and 3 and the USA – to take place in highly technical

and technological industries. The choice of these organizations had to do with the fact that they are the most exposed to change and social evolution, while operating in highly competitive markets.

The second one deals with the practical implementation of this perspective in industrial environments. Besides exploring the current reality surrounding these relationships in the partner organizations used as case studies, this project offers an opportunity to deploy the findings in industrial contexts. In that scenario, these organizations are in the frontline for developing and implementing new strategies and deploying the tools, methods and philosophies to promote a new organizational perspective where Excellence, Culture and Agility are integrated. Finally, the third deals with the revision and evolution of existing Excellence frameworks. Given the steady decrease in their usage, some of the promoters of Excellence programs and awards have initiated – in a more or less structured and official way – a discussion on the future form of their Excellence frameworks, with more frequent revisions (European Foundation for Quality Management EFQM, 2019a; National Institute of Standards and Technology, 2019). In the face of such scenario, this project aims to provide a fresh perspective and valuable information to help set the discussion on clear scientific data – and to help define the dimensions, criteria, and desired organizational capabilities to be considered in the future of Excellence.

1.4. EDAM/LTI Framework

The background for this research project is the Leaders for Technical Industries (LTI) Doctoral Program, developed within the Engineering Design and Advanced Manufacturing (EDAM) focus area of the MIT Portugal Program. This program was part of an international consortium bringing together the Portuguese Foundation for the Science and Technology (FCT) and several Higher Education Institutions from Portugal and the Massachusetts Institute of Technology (USA), building bridges for scientific development and reaching to civil society, industry and education partners.

The “Leaders for Technical Industries” Doctoral Program, in particular, aimed at training graduates to promote an engineering systems approach to the challenges and constraints of the world, and at the development of new paradigms that are able to promote technological and scientific breakthroughs. Projects developed within the LTI framework are oriented towards the development of innovative solutions for the contemporary complex decision-making processes that are the rule in industry, reaching from engineering to economics, from management to social aspects.

Accordingly, there is a strong alignment with these objectives in this work. The challenges posed by a changing environment have a deep impact on the survival of organizations. Industrial organizations need to make vital decisions to be able to change, adapt and meet the needs and

requirements of its stakeholders. This demands the capacity to successfully implement tools and strategies to be innovative and to keep track of the latest technology and information systems. But it also demands strong social support, as such efforts cannot be done without a highly technical and skilled workforce that is committed with these strategies and that feels a true engagement with them.

The results and findings of this research project will allow a better understanding of a series of sociotechnical dimensions that are vital in the management of highly technical and technological organizations. Decision-making is not limited to selecting the best solution, it is a process that demands a clear understanding of the realities surrounding an organization, and of the necessary capacities to engage with them. Consequently, this understanding is essential to better inform organizations and support their choices.

This work promotes the integration of engineering, business, and social sciences aspects, drawing attention on how technical processes such as product and technology development, manufacturing planning or quality engineering approaches are deeply dependent on the cultural and social framework of organizations to achieve long-lasting success. In accordance with the LTI context, this work was led with a truly integrated systems perspective, always minding the complexity of proposing sustainable solutions for technical organizations in highly unstable business environments.

1.5. Structure of the thesis

The remainder of this document is structured as follows: first, the concepts of Excellence, Organizational Culture and Agility are reviewed and, with basis on the existing literature, they are framed, detailed, understood and defined (chapter 2). Accordingly, each concept is revised with basis on its origins, evolution, state-of-the-art and characterizing organizational capabilities. Following that, theory formulation is outlined in chapter 3. For that, existing literature on the relationship duos between the concepts under study is reviewed, and the research opportunities are discussed. As these opportunities are recognized, the proposed theory is developed, the research questions are drawn, and a conceptual model to support the theory is presented. Finally, the methods for further theory development, with basis on practical testing, based on a set of case studies, are presented in chapter 4.

The practical development, with the collection of practical evidence and analysis, is then reported in chapter 5. Each case study is described, and a reflection is promoted on the capabilities identified for each concept and the impact they had in the joint development and relationship between Excellence, Organizational Culture and Agility. Chapter 6 presents a cross-case analysis, where the

results the different case studies are presented and comparatively, and major findings of this analysis are reported, and a discussion is promoted, both over the results and regarding their alignment with the existing literature. Finally, the conclusions are presented in chapter 7.

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2. Conceptual Background

2.1. Introduction

2.1.1. Theoretical background and conceptual characterization

This literature review has two main objectives. It aims to understand if and how the implementation of Excellence programs can influence the Culture of an organization in the long term, embedding in it an enduring orientation towards Excellence. Then, it tries to establish if such cultural orientation helps to develop the necessary Agile capabilities to help organizations adapt to highly unstable and volatile business environments.

To attain these goals, it is necessary each to define, and to characterize the concepts under study. Accordingly, this chapter focuses on individually reviewing the existing literature covering Operational Excellence, Organizational Culture, and Organizational Agility from a historical and evolutionary perspective.

Three stages were defined to help guide such review and to frame the research queries used in it. Each stage helps to analyze a different dimension of the literature. The first two stages cover the (1) origins and (2) the current knowledge around each concept, the last one (3) is more concerned with their detailed definition, aiming at characterizing the organizational capabilities that facilitate and support the practical development and deployment of that concept in an organizational context. These stages were defined as follows:

1. **Origins** – A review on introducing and framing the broader scientific area surrounding each concept, analyzing its origins and early development.
2. **Evolution and current state** –The concepts' state-of-the-art, and the recent evolution leading to this current state.
3. **Characterization** –The organizational capabilities linked to each concept, essential both for their clear definition and to guide their practical development and identification in an organizational context.

These three stages were approached with a similar methodology. However, there are some notes requiring mention on the classification used for the third stage. These notes follow in subsection 2.1.2. The different types of reviews considered, the methods used for this conceptual background literature review, and the review process are presented next in section 2.2

2.1.2. Organizational capabilities: enablers and critical success factors

While addressing the third phase of this review, a broad set of capabilities – practical abilities of an organization and its people – that help to characterize (and in an industrial context, to measure, develop and deploy) Excellence, Organizational Cultural, and Agility were identified. It was found that these capabilities are often the object of different perspectives, and subject to continuous update (Gunasekaran, 1998, 1999; Bottani, 2009b); and that, depending on the authors and sources, similar capabilities are often listed under different names (Kanji, 1998; Matawale et al., 2013). Consequently, a distinct classification was found to be necessary. The classification of the organizational capabilities that characterize these concepts is not clearly standardized or defined. Starting with Excellence, there are examples of authors and frameworks listing enablers as the higher level of classification (Gotzamani, Tsiotras, Nicolaou, Nicolaides, & Hadjiadamou, 2007; European Foundation for Quality Management EFQM, 2012), while others establish enablers as a second or lower level of classification, grouping them inside other entities such as initiatives (Gilgeous & Gilgeous, 1999), or criteria of Excellence (Bou-Llusar, Escrig-Tena, Roca-Puig, & Beltrán-Martín, 2009). In the case of Agility, while some works also define enablers at an upper level and group a series of other capabilities, such as critical success factors, within them (Gunasekaran, 1999; Vinodh, Devadasan, Vasudeva Reddy, & Ravichand, 2010), it is still possible to find enablers as part of subgroup, framed within the scope of attributes (Bottani, 2009b) or dimensions (Gligor & Holcomb, 2012). Finally, in Organizational Culture, the situation is not much different. While it is possible to identify the use of enablers in the discussion of the creation of a cultural orientation (Vogus, Sutcliffe, & Weick, 2010; Herrick & Pratt, 2012), it is also necessary to understand their relation with cultural elements (E. H. Schein, 1984) or manifestations (Hofstede, Neuijen, Ohayv, & Sanders, 1990).

Furthermore, other classifications such as critical success factors are common (Kanji, 1998; Al-Alawi, Al-Marzooqi, & Mohammed, 2007; Zairi & Alsughayir, 2011; Matawale et al., 2013) Critical success factors were initially defined, in the field of Information Systems, as detailed elements to help organizations focus, creating “discriminating” and “selective” factors that “must be done exceedingly well for the success of the company” (Daniel, 1961). Several authors highlight critical success factors in their capacities to be detailed and descriptive approaches to the functions, activities, and measures used to improve and deploy strategies and organizational capabilities (Rockart, 1979; Cooper & Kleinschmidt, 2007; Mangla, Govindan, & Luthra, 2016).

In the face of this reality, it was necessary to establish an order of classifications for these capabilities. Following the common usage, both in industry and academia, of the term “enabler” as the

broader level of classification both in Excellence and Agility, that same usage was established for this work. Similarly, the term “critical success factors” was adopted for the second level of classification/definition.

In this sense, in this work, the “enablers” represent the higher level of characterization and organize a group of organizational capabilities according to their process area. At the same time, “critical success factors” function as more precise units of analysis, defining more clearly each of the organizational capabilities that constitute an enabler. These organization capabilities will play a critical role in describing and comparing the activities of an organization.

2.2. Methodology

This chapter reviews the background of the three broader concepts under study in this work: Excellence, Organizational Culture, and Agility. In order to fully understand them, it is important to review the existing literature on their history and evolution and to identify the organizational capabilities that allow its practical development and deployment in industrial settings.

Accordingly, and at this stage, the necessary literature review is more oriented towards the exposition of the facts, covering the literature and identifying its most relevant works, than towards the construction of a theory or argument. That, as we will see next, is the starting point for the next chapter. In this chapter, however, the focus is on understanding the past and present, providing a general understanding of the concepts under study before departing to explore new grounds and promoting the development of new arguments and theory based on them.

Several literature review typologies are available for this current task. Each one offers a set of advantages and limitations, and different scopes, methods and objectives. In order to identify the best fit for our current review objectives, a few types were analyzed:

Narrative/ Historical review – the narrative or historical review is presented as a methodology for reviewing, summarizing and interpreting what has been written on a certain topic (Grant & Booth, 2009; Sylvester, Tate, & Johnstone, 2013). The focus is on examining the literature through a period of time, from its origin to the current state-of-the-art (Labaree, 2019).

Descriptive/ Mapping review – the primary goal of a descriptive review is the identification, in the existing literature, of any patterns or trends (King & He, 2005; Paré, Trudel, Jaana, & Kitsiou, 2015). Tends to have both a content analysis and a frequency analysis (Paré & Kitsiou, 2017), i.e., tends to characterize the quantity and the quality of data (Grant & Booth, 2009). Another important

difference from the narrative/historical review is that descriptive reviews often make more use of systematic and transparent methods (Paré & Kitsiou, 2017).

Argumentative/ Critical review – critical or argumentative reviews examine the literature to support or refute and argument (USC), providing critical perspectives on the existing literature by analyzing a field's strengths, weaknesses and limitations (Paré & Kitsiou, 2017). The purpose of this type of review is typically to help develop new viewpoints (Labaree, 2019) and conceptual innovation (Grant & Booth, 2009).

Systematic/ Aggregative review – defined as the evaluation and interpretation of the available research that is relevant to a particular research question or area (Kitchenham, 2004; Paré & Kitsiou, 2017). Aggregative/systematic literature reviews aggregate, analyze and summarize the sources that meet certain criteria (Paré & Kitsiou, 2017), providing often recommendation based on the identification of what remains unknown or uncertain from the existing research in the field (Grant & Booth, 2009). They follow a transparent and well-defined methodical process that ensures the quality of a vast array of sources and the consistency between them (Budgen & Brereton, 2006; Colicchia & Strozzi, 2012; Paré & Kitsiou, 2017; Laureani & Antony, 2019).

Based on the objectives defined for this chapter, the narrative/ historical type seems to be the one offer: the intent of this first review is to cover the existing literature on the concepts of Excellence, Organizational Culture, and Agility over time, from their inception, following their evolution, and to their current state. The identification of patterns and trends, although adding value, is not a key objective. There is, however, one other valuable input from the Descriptive type: the integration with systematic literature review methods and the emphasis on the review process. A defined, repeatable and consistent research process is vital to ensure the quality of the literature review. Although the use of an aggregate/ systematics literature review could be an option, its focus on well-defined and often narrow research questions (Liberati et al., 2009) does not offer a perfect match to a review that clearly intends to be historical and explorative, and that aims, itself, to help define the research question. Nevertheless, an improved focus on process is a clear advantage for any literature review effort.

Finally, the argumentative/critical type was also considered. Although not matching the goals of this first literature review, it is well aligned with the objectives of the review that supports, in the next chapter, the development of theory.

2.2.1. Research process

Following this rationale, we opted for the narrative/ historical type but placed reinforced focus on the research process. According to Templier and Paré (2015), there are six generic steps involved in conducting a literature review:

1. Formulating the research objectives;
2. Searching the literature;
3. Screening for inclusion;
4. Assessing the quality of primary studies;
5. Extracting data;
6. Treat data.

Although presented sequentially, the authors argue that there is an iterative nature to these processes, each step or the entire process being repeatable or redefined while the review is ongoing. In order to structure and reinforce the quality of the review process, promoting transparency and allowing its repeatability, these steps were used to help define and guide the review of literature in this work.

1. Formulating the research objectives

The first step was the definition of the objectives for this review. With the three search phases (origins, evolution and current state, and characterization) having been established, it was necessary to define the search queries and keywords to be used in reviewing the literature for each phase. These keywords have to meet the research objectives, and help ensure the maximum relevance and the broadest set of perspectives possible – thus avoiding an incomplete search or any bias to transpire into the review work. Table 3 shows the research objectives and search queries for each of the stages previously defined.

Table 3 - Concepts explored in each stage of the literature review, including their objectives, and search queries and key words.

	Concepts	Search queries and key words	Objectives
Origins	Excellence Agility Organizational Culture	Origins + <i>Concepts</i> <i>Concepts</i> + development <i>Concepts</i> + definition	Introducing and framing the broader scientific area surrounding each concept, analyzing their origins and early development.

Evolution and current state	Operational Excellence Organization Agility Cultural Orientation	<i>Concepts</i> + evolution <i>Concepts</i> + state of the art <i>Concepts</i> + (literature) review	Defining and reviewing each concepts' state-of-the-art, and the recent evolution leading to this current research trends.
Characterization	Operational Excellence Organization Agility Cultural Orientation to excellence	<i>Concepts</i> + characteristics Concepts + enablers Concepts + critical success factors Concepts + elements	Identifying and understanding the organizational capabilities that characterize each concept.

2. Searching the literature

The second step in conducting a literature review was the actual search of the existing literature. There are three typical approaches for framing this search:

- i. The exhaustive review of the literature
- ii. A selection of works that are representative of most work in the field
- iii. The identification of prior works that are agreed to have become central/seminal in the field.

Given the objective of understanding, in depth, the origins, evolution, and current state of each of the topics under study, and to clearly and detailed define them, the first approach was used.

Nevertheless, and considering the need to summarize the findings of this review, and provide an illustrative understanding of the evolutions in the field, both some seminal works and some representative works were identified and presented. It is important, however, to note that this inclusion was only made when there were guarantees that this addition did not lead to any bias, and that representative works were used in a complementary way with other sources.

For searching the literature, academic databases were used – namely Scopus, Web of Science, and Science Direct. Mendeley was also used, together with the literature review tables (see point 5), to manage the selected sources.

3. Screening for inclusion – adding more sources

After the first search of the literature was concluded, the collected information was reviewed and analyzed to assess their representativity. The geographic origin of the works was also assessed, as well as the date – not in a perspective of revising the initially defined interval of publication, but rather to ensure that a fair distribution of the sources throughout time was maintained. This assessment included an analysis to the variety of sourcing databases, and efforts to ensure different perspectives

were considered (within a certain scientific field, between different scientific areas, and between academic and practice/non-scholar works). While efforts to promote balance in all these criteria were taken, two gaps were identified which demanded particular attention:

- **Inclusion of recent works and new research trends:** the initial screening for sources was made with basis on scientific works with high impact and citation rates, and mostly from databases such as Scopus and Web of Science. While these criteria guaranteed levels of quality and relevance to the field, they also left outside the scope of this research a series of works that, either for their newness or for their different perspectives, could provide valuable inputs to the review of the literature and its analysis. Accordingly, and in order to reflect the findings of both works on new/ongoing organizational phenomena or redirecting established lines of research, the initial review was enlarged with publications from scientific conferences, meetings, and journals that were not previously found and considered. For that, the databases and search engines used were also reviewed. One of the databases/search engines added – the one with the most impact in the search for literature – was Google Scholar. Google Scholar allows the identification of a series of complementary sources, as it provides access to a wider variety of publications (Kulkarni, 2009). While Web of Science guaranteed proofed, high-quality scientific works, Google Scholar is valuable for its wider collection, including books and proceedings (Mikki, 2009). Accordingly, added sources included books, journal articles and proceedings within the research fields of quality engineering and management, operations management, industrial engineering and engineering management, computer science, organizational sciences (business and management) and behavioral sciences. The selection was made with basis on the critical analysis of their quality and fit against the identified gaps, namely their newness (recent works) or promotion of new/different perspectives.
- **Inclusion of non-scholar perspectives:** While the previous step allowed the consideration of sources coming from the business literature, the vast majority of the works considered were still scientific. While this is normal, as those sources are to be undoubtedly the basis of a literature review, the truth is that in fields where practice matters so much – such are the cases of Excellence and Agility, where frameworks developed for and used by industrial organizations have a great impact on research topics – it is important to consider the

inputs from practitioners, consultants, corporate organizations and professional societies and groups around the world. Accordingly, an effort was made to broaden the search and include a greater variety of sources from outside academia. This led to the inclusion of insights coming from featured events, opinion and practitioners' articles, corporate reports and web sites, allowing a more inclusive understanding of the current professional perspectives in the fields of Management (Culture), Quality, Business and Operational Excellence, and Agility. Examples of added sources include publications on Excellence models, their concepts and assessment criteria; and on Agility frameworks and their metrics and measures.

4. Assessing the quality of primary studies

After collecting a broad set of sources, and identifying and closing the gaps regarding the representativity of each of the fields under study, the next step was to assess the quality of the selected sources. Accordingly, and at this stage, a deeper review of each article was performed.

A first analysis included a review of the abstract, findings and discussion and conclusions – or in case of non-academic sources, the review of the highlights or summary, objectives and conclusions. Articles that failed to clearly address the research objectives – putting the emphasis on different concepts, highlighting relationships others than those between the concepts under study, or presenting scopes that were either too broad or too narrow to add value to the literature review – were dropped at this stage. After this first screening, the remaining sources were analyzed again, with a complete reading of the works or relevant chapters/sections, and verified against a checklist for the assessments of quality. Criteria for this second review considered the relevance towards the research goals, the sources and the scientific areas, and the impact or influence of the publication in the field. This step allowed the identification of duplicate and redundant works and helped to avoid a biased selection of articles. In this sense, there were efforts to ensure multiple publication sources for the reference material and, when possible, to highlight contradictory points of view and avoid selecting multiple works agreeing with one single hypothesis or opinion.

5. Extracting data

In the face of a reviewed set of sources, the next step involved extracting data and structuring it, allowing not only its summarization but also its classification and structuring for quick access and use during the final phase. At this stage, selected sources were listed in a literature review table, which classified them by subject and summarized their details and most important findings. Each source had

its own data entry in these tables, which covered the following information: title, authors, publication date, objectives and/or research questions, main findings, and important notes or ideas. These three last data categories highlighted and summarized the main contributions of each work for this historical/ narrative literature review. For some highly relevant works or when a short summary was not enough to convey all relevant ideas, a note for going back to the sources or reading the full text was added.

6. Treat data

The last step of the literature review was, naturally, converting all collected information and its analysis into one body of text that transmits the desired objectives for that review – in this case, the historical coverage and characterization of the concepts of Operational Excellence, Organizational Culture, and Organizational Agility. This step included summarizing, aggregating, organizing and comparing the evidence extracted from the selected sources (Paré & Kitsiou, 2017). This went beyond the simple listing of relevant findings. It attempts to integrate different contributions in a way that transmits to the reader a clear perspective on the existing knowledge on the concepts.

The remainder of this chapter is the result of this entire review process (Figure 6) – but, more visibly, it is the product of this last stage.

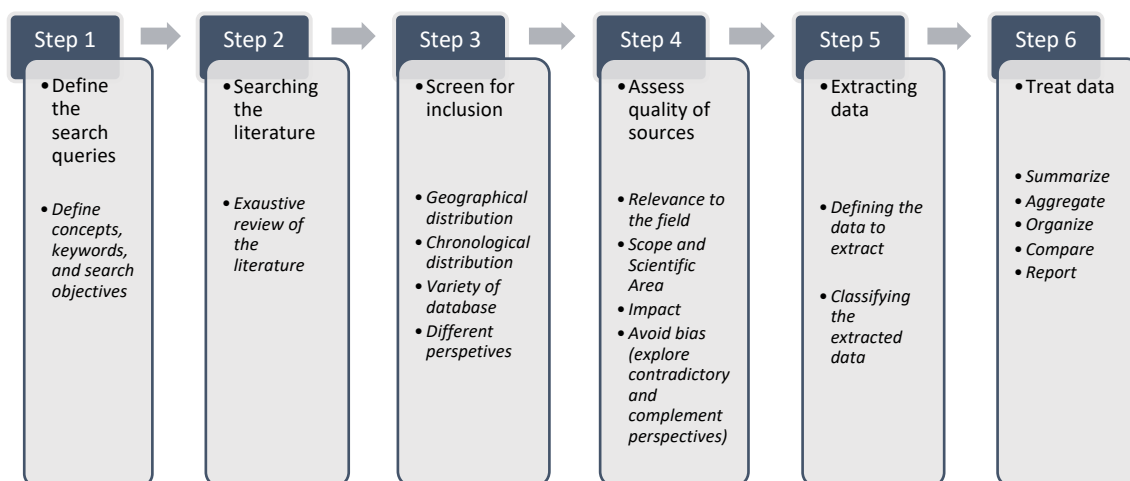


Figure 6 - Flowchart representation of the review process, and highlighting the main tasks of each step.

2.3. Operational Excellence

2.3.1. Origins of Excellence

Several authors argue that the origins of Excellence lie within the Total Quality Management (TQM) movement (Calvo-Mora, Leal, & Roldán, 2005; Bou-Llugar et al., 2009; Wen, Lv, Chen, & Dai, 2016). However, the debate on the relationship between the two concepts has produced different opinions at least since the early 2000's. Some authors considered TQM and Excellence to be the same initiative under different names (Wade, 2000). Others viewed them as separate concepts McAdam (2000). A third option was yet proposed, a more integrated perspective stating that the two concepts are different, but which fit and should co-exist (Adebanjo, 2001). Since then, several authors have addressed this relationship, treating the two concepts separately but providing strong evidence of their relationship. Many have analyzed Excellence models and frameworks against the criteria and general frameworks of Total Quality Management (P. M. Lee, 2002; J. Oakland, 2005; Hafeez, Malak, & Abdelmeguid, 2006; Mele & Colurcio, 2006; Santos-vijande & Alvarez-gonzalez, 2007). In general, their findings suggest that most dimensions and enablers of Excellence still feature many of the principles and objectives of TQM - or even previous quality efforts such as standardization (Dale et al., 2000; Fonseca, 2015). Bou-Llugar et al. (2009) conclude that the achievement of TQM principles is possible as one of the results of the implementation of this framework. In the same way, Calvo Mora et al. (2015) set the EFQM Excellence Model as a valid methodology to design, implement or improve TQM capabilities. In fact, and even after several revisions have been made to Excellence initiatives – including the incorporation of new aspects that TQM did not consider – correlation between the two terms is still found (Gómez, Martínez Costa, & Martínez Lorente, 2017).

It is argued that a more precise separation between the two concepts mainly occurred when it was understood that a new approach was needed to overcome the resistance and growing criticism against TQM programs (Adebanjo, 2001; McAdam, 2000). Criticism highlighted the prescriptive, mechanistic and tool-oriented perspective of TQM (Dahlgaard-Park & Dahlgaard, 2007) and its inability to stress the importance of social factors for successful implementation (Adebanjo, 2001). In what is seen as a tendency to underline bad news over good ones (Corrigan, 1995), much criticism accumulated during the decade, with publications from academics, practitioners and consultants mentioning TQM's supposed high costs, poor results, and limited reach (Hendricks and Singhal, 2000; Boulter, Bendell, and Dahlgaard, 2013). By the end of the decade, and in the face of reports pointing to a TQM failure rate around 75% (Cao, Clarke, & Lehaney, 2000), Excellence gained a new dynamic.

Perhaps due to these circumstances, the concept of Excellence was initially seen as being poorly defined (Dale et al., 2000), its principles often subject to debate (Boulter, Bendell, & Dahlgaard, 2013). Interest in Excellence was spawned by the 1982 book “In Search of Excellence: Lessons from America’s Best-Run Companies”, written by Tom Peters and Robert H. Waterman (Snowden & McSherry, 2017). The book shared insights from more than 40 American high-performing (“excellent”) companies but provided no concise definition of Excellence or a framework that organizations aiming to implement the concept could use. Nevertheless, it sold more than 3 million copies in the first four years, being considered an “instant classic” – and many of its insights are still seen as valid today (Reid, Short, & Ketchen, 2018).

Only with time – almost one decade – did the concept of Excellence become better structured, as governments and national and international quality management bodies started to develop Excellence frameworks and awards. In 1988 the National Institute of Standards and Technology (USA) established the Malcolm Baldrige National Quality Award (MBNQA), and the Shingo Institute (USA) started awarding the Shingo Prize for Operational Excellence (SPOE). A little later, in the early 1990’s and across the ocean, the European Foundation for Quality Management presented the European Excellence Model and its corresponding Award (EEA). Despite being developed by different organizations, and in different regions of the world, different Excellence models converge in many of their principles and criteria (see Chapter 1). Furthermore, they commonly uphold the importance of balancing both technical and social factors in the pursuit of sustainable improvement, giving special attention to people and the influence they have on the success of an organization. This evolution seemed to address some of the known limitations of TQM. Excellence initiatives, less prescriptive and more adaptable to the reality of organizations, gained traction.

Today, literature identifies three levels of Excellence: the more focused level of Process Excellence, focusing on process performance improvement (Bichescu, Bradley, Smith, & Wei, 2018; Martinez, 2019); Operational Excellence, which deals with back-to-back processes and operations (Naftanaila, Radu, & Cioana, 2013; Edgeman, 2018); and the broader concept of Business Excellence, which encompasses the previous and also includes relations with all stakeholders and an organization’s business and financial results (D. Lu, Betts, & Croom, 2011; Jaeger, 2018). This work, while focusing mostly on organizational capabilities in highly technical and technological processes (such as manufacturing processes, value chain processes, operations, information systems or quality management), is directed towards Operational Excellence, thus leaving aside the broader business and financial assessment of these organizations.

Within the scope of these different levels of Excellence, there are today more than 100 Excellence initiatives worldwide – under different names, such as “frameworks”, “models”, “programs”, “prizes” or “awards”. Nevertheless, most of them follow the same structure and principles of the oldest, most well-established initiatives: the MBNQA, EEA, or the SPOE (Talwar, 2011). The success of these initiatives were in large part due to the evidence that organizations that deploy them achieve better outcomes than the market average, increasing financial, productivity, and quality metrics (Hendricks & Singhal, 2001; Chakravorty, Atwater, & Herbert, 2008 Boulter et al., 2013). Nevertheless, it is important to clarify that the simple implementation of a Business or Operational Excellence framework is not a guarantee of long-term success or performance improvement (Escrig & De Menezes, 2015). As the promoters of excellence models themselves claim, only when the enablers and criteria of Excellence are embedded in the culture of the organization it is possible to attain the full potential of these frameworks (European Foundation for Quality Management EFQM, 2018).

Research has corroborated the perspective that the soft factors of Excellence and Quality Management are essential for the success in the deployment of these frameworks. Escrig and De Menezes (2015) argue that the “People” enabler is the one with the most impact on attaining improved performance. Furthermore, Corredor and Goñi (2011) argue that the motivation behind the implementation of these frameworks is critical, with early adopters clearly obtaining performance gains as a result of their efforts to adapt the framework to their reality – something that late adopters fail to do, being mostly driven by marketplace trends rather than a motivation for performance improvement. Several more authors have studied the relationship between Excellence and the social side of organizations. Due to its interest for this study, the relationship between Operational Excellence and Organizational Culture is further explored in the next chapter.

2.3.2. Operational Excellence

Despite the sizable number of available Excellence awards and frameworks, and the existence of frameworks and prizes dedicated exclusively to Operational Excellence (OpEx), the truth is that it has been mainly discussed within the broader context of Business Excellence (D. Lu et al., 2011). Naftanaila et al. (2013) see OpEx as an operational level philosophy, but with substantial implications at a strategic level – which may help understand its inclusion within the broader business perspective. Others point that OpEx is traditionally more focused on the working practices of Lean Management and Continuous Improvement - which provides it with a more practical and operational orientation (Powell & Strandhagen, 2012). Companies pursuing Operational Excellence look to maintain high production and

service performance levels, and many look to preserve quality and regulatory quality while reducing their operational costs and satisfying customer needs (Bigelow, 2002). Many contributions to Operational Excellence come from the fields of Operations and Supply Chain Management. Earlier works on the importance of promoting OpEx along the value chain focused on integration and on the operational improvements that it allowed. Rungtusanatham, Salvador, Forza, and Choi (2003) studied the reasons and benefits for organizations pursuing performance improvements beyond their borders and looking for Excellence by establishing links along the supply chain. Kannan & Choon Tan (2007) share this perspective, stating that the impact of “operational quality management” on the success of a supply chain can be achieved through the leveraging of relationships with suppliers and customers. More recently, and in the face of increasing complexity in the value chains, the role of Operational Excellence is increasingly seen as being critical in the management of these supply and value systems (Edgeman, 2018). More than just integration for financial and operational reasons, organizations now look at OpEx as a form of promoting improved flexibility (Christopher, Harrison, & van Hoek, 2016; Sáenz, Revilla, & Acero, 2018) and sustainability (Cherrafi et al., 2017). Nevertheless, the topic of Operational Excellence does not confine itself to supply chain and operational challenges, and has historically seen integration with a broad variety of topics such as organizational learning and knowledge management (Johnson, 1997; Olhager & Persson, 2006), teamwork, creativity and innovation (Feurer, Chaharbaghi, & Wargin, 1996; Shehadeh, Al-Zu'bi, Abdallah, & Maqableh, 2016).

Considering the origins of Excellence within the field of Quality, it is no surprise that since the early days there has been a clear relationship between Operational Excellence and the use of Quality tools and methods (Zinkgraf, 1998; J. S. Oakland, 1999). Naming a few examples, Samson and Terziovski (1999) studied the relationship between Total Quality Management practices and operational performance; Basu (2005), the role of tools and techniques in leveraging companies to the path of Excellence through the use of Six Sigma methods; and Asif, Fisscher, de Bruijn, and Pagell (2010) the integration of Quality Management Systems as a methodology for Operational Excellence. While this relationship is often seen in an integrative perspective, at the practical level, there have been a few contradictory findings. Some authors argue that Quality initiatives and Excellence frameworks compete for the same space within an organization (Russell, 2000). In a questionnaire promoted next to MBNQA stakeholders (business owners, managers, award examiners reviewers, and consultants), a majority agreed or strongly agreed that the fatigue provoked by continuous Quality Management Systems audits moved manufacturing organizations away from further Excellence pursuit, and that methods and philosophies like Six Sigma and Lean Management diverted attention from Excellence awards – even

when they clearly support those initiatives (Bandyopadhyay & Leonard, 2016). These findings add to other perceived limitations that have been pointed to Operational Excellence frameworks and awards in recent years, especially regarding their sustainability across time. Powell and Strandhagen (2012) argue that Excellence, in the face of a changing marketplace, needs to evolve to consider principles of Agile Manufacturing to meet demands such as increasingly customized products and shorter life cycles. Jaeger, Matyas, and Sihn (2014) argue that OpEx is primarily about efficiency, effectiveness and optimization, but lacks an enlarged perspective that brings long-term operational success into a central role. Organizations in such an unstable business environment need to change the perspective, from one of conventional Excellence to one of sustainable Excellence (Dervitsiotis, 2003).

Despite the very significant number of success stories, there is evidence that Excellence-bound organizations also fail. Sometimes Excellence initiatives stagnate after some time (Bertels & Buthmann, 2013), at other times even organizations that were once considered “excellent” end up failing (Dale et al., 2000; Dahlggaard-Park & Dahlggaard, 2007). Such cases reinforce the perspective of this research project, showing how challenging it is to maintain and deploy excellence-bound strategies throughout time, and how important it is to seek strategies to continuously be able to deal with change in the external business environment.

2.3.3. Enablers and critical success factors of Operational Excellence

The usage of the term “enablers” in the scope of Excellence is associated with the Excellence Model of the European Foundation for Quality Management (EFQM), which has its structure divided precisely between enablers and results. Amongst the listed enablers are (1) leadership, (2) people, (3) strategy, (4) partnerships and resources, and (5) processes, products and services (European Foundation for Quality Management EFQM, 2012). Several authors have departed from these frameworks, analyzing these enablers and exploring in-depth the organizational capabilities related to them. Oakland (2005) argues that the non-prescriptive nature of the EFQM Model makes it a prime framework for understanding Quality and Excellence, but at the same time impractical as an implementation tool. Accordingly, the author presents a new model for implementation, providing a prescriptive tool that includes 7 dimensions falling within the scope of EFQM’s enablers: 4 hard issues [(1) planning, (2) performance, (3) people and (4) process] and 3 soft dimensions [(5) culture, (6) communication, and (7) commitment]. Hafeez, Malak, and Abdelmeguid (2006) review the literature, and based on seminal works on the field of Quality Management, set a series of 18 factors that are to be viewed under the enablers and results advocated by the EFQM. The authors list (1) single-loop

learning, (2) problem solving, (3) benchmarking, (4) action learning, (5) continuous improvement, (6) learning cycle, (7) data management, (8) culture, (9) organization structure, (10) communication, (11) shared vision, (12) performance management, (13) leadership, (14) management responsibility, (15) empowerment, (16) rewards/recognition, (17) team learning, and (18) training and education. Finally, and in another effort to better describe the enablers of Excellence, Gotzamani et al. (2007) identify a comprehensive list of a total of 85 critical success factors that help to measure and define these five enablers.

Similarly, several authors have presented different and more defined listings of organizational capabilities related to Excellence. Despite the different nomenclature, these listings often include common ideas such the (1) commitment of top leadership and management (Liker, 2004; Brown, 2013b; Jaeger et al., 2014), (2) strategic planning and alignment (Jaeger et al., 2014), (3) employee engagement and empowerment (Chodkowski, 1999; Dobni, Ritchie, & Zerbe, 2000; Liker, 2004; Jaeger et al., 2014), (4) value creation and management of stakeholders' expectations (Kanji, 1998; Liker, 2004; D. Lu et al., 2011), (5) reward and recognition (Hafeez et al., 2006; Abdullah, Uli, & Tari, 2008), (6) effectiveness and efficiency in processes and operations (Kanji, 1998; D. Lu et al., 2011), (7) organizational communication (Brown, 2013b; Luo, Shi, & Venkatesh, 2018), (8) organizational learning (Kanji, 1998; Evans, 2010; Luo et al., 2018), and (9) strategy planning and development (D. Lu et al., 2011; Jaeger et al., 2014; Suarez, Calvo-Mora, & Roldán, 2016).

At the same time, there are also more specific takes on Operational Excellence capabilities. In the face of the mounting complexity of supply chains, a few authors look for the necessary capabilities to deal with the flow of both materials and information. Lin and Tseng (2016) highlight participation strategies and information technologies as fundamental to support customer satisfaction and organizational performance. Luo, Shi and Venkatesh (2018) argued for the importance of (1) integration and collaboration, (2) education and training, (3) dynamic supply chain alignment, (4) advanced information and (5) communication. In parallel, others have studied the capabilities related to information systems and information flow. Organizations worldwide face increasing pressure to adapt to the latest technological trends while learning how to work with massive amounts of data. Decisions have to be made increasingly fast, but dealing with the large inputs of raw data may be counterproductive, if not done in a smart, well-founded way. Accordingly, data reliability, information quality and fact-driven decision-making (Batini, Cappiello, Francalanci, & Maurino, 2009; Kenett & Shmueli, 2016) become vital capabilities to ensure information and decision quality.

As already mentioned, OpEx does not promote a prescriptive approach, rather focusing on exploring the existing capabilities in an organization and the opportunities to integrate with existing systems and tools (Shingo Institute, 2016). Appropriately, previously implemented Quality tools and initiatives, such as Quality Management Systems, continuous improvement, Lean management or process improvement methodologies are success factors under the scope of Operational Excellence (Russell, 2000; Oehmen, et al. 2012; van der Wiele, Williams and Dale, 2000; López-fresno, 2012). The sustainability of these programs demands an alignment and integration with the existing organizational practices and capabilities, as well as the development of vocabulary and way of thinking that allows effective communication both inside and outside the organization (López-fresno, 2017). Furthermore, organizations need to continuously assess where they stand on the path to Excellence, revising their key strengths and potential limitations (López-fresno, 2017), promoting continuous self-assessment (Hides, Davies, & Jackson, 2004; Brown, 2013) and benchmarking (Moriarty, 2011).

Finally, it is important to note that several organizations – companies, consultancy firms, etc. – have their own takes on the factors enabling Operational Excellence. As a few examples, the Chevron Operational Excellence Management System (Chevron Corporation, 2010) presents its OpEx factors structured into five dimensions – (1) process safety, (2) environment, (3) personal safety, (4) health, reliability and (5) efficiency. To Chevron, Operational Excellence is the systematic management of these dimensions and is a critical driver for business success and a key part of the enterprise strategy to achieve Excellent performance. For another practical perspective, the Opex Groep (2011) defined a set of ‘OpEx Building Blocks’ that should be ‘worked’ in an Operational Excellence program implementation, namely (1) leadership, (2) product, (3) process, (4) manpower, (5) organization, and (6) behavior. Finally, the Shingo Institute (2016) lists multiple organizational capabilities to support its four dimensions: (1) cultural enablers, (2) continuous improvement, (3) enterprise alignment, and (4) results. A few of the supporting concepts within each dimension include people development, empowerment and involvement; stable processes; reliance on data and facts, and strategy alignment. The Shingo Institute further publishes in its Assessment Criteria booklet some of the systems to be put in place to achieve these concepts (Shingo Institute, 2016).

The enablers and critical success factors of OpEx are listed and structured in Table 4.

Table 4 - Enablers and Critical Success Factors of Operational Excellence.

Enablers	Critical Success factors	References
Leadership and Management Commitment	Sustainability of excellence initiatives; Leadership development; Silo reduction.	Liker (2004); Hafeez, Malak, and Abdelmeguid (2006); Lu, Betts and Croom (2011); Opex Groep (2011); European Foundation for Quality Management (2012); Brown (2013); Jaeger et al. (2014); López (2017).
Workforce Engagement	Suggestions and ideas programs; Managing the potential for engagement; Motivation, reward and recognition.	Chodkowski (1999); Dobni, Ritchie, and Zerbe (2000); Liker (2004); Lu, Betts and Croom (2011); European Foundation for Quality Management (2012); Jaeger et al. (2014); Lin and Tseng (2016).
Learning Organization	Training Plan and Individual Development; Mentoring and Coaching; Recruitment and succession plan; Talent Management.	Kanji (1998); Hafeez, Malak, and Abdelmeguid (2006); Evans (2010); European Foundation for Quality Management (2012); Shingo Institute (2016); Luo, Shi and Venkatesh (2018).
Workforce needs and expectations	Satisfaction & perceptions over benefits; Health, Safety & Hygiene; Teamwork.	Liker (2004); Oakland (2005); Chevron Corporation (2010); Opex Groep (2011); European Foundation for Quality Management (2012); Shingo Institute (2016).
Value Chain	Supply Chain Integration; Focus on value creation; Customer relationship management; Stakeholders involvement in process design.	Kanji (1998); Liker (2004); Lu, Betts and Croom (2011); Lin and Tseng (2016); Luo, Shi and Venkatesh (2018).

Product and Market Development	Design for manufacturing (or usability); Stakeholder participation in product design; Cross functional integration; Market development.	Opex Groep (2011); Lin and Tseng (2016); Shingo Institute (2016); Luo, Shi and Venkatesh (2018).
Quality Systems	Quality assurance and error proofing; Maintenance Engineering; Quality Management.	Russell (2000); van der Wiele, Williams and Dale (2000); López-fresno (2012); Shingo Institute (2016).
Management, control and optimization	Process Revision; Lean Management; Process control and optimization; Scheduling and capacity management.	Kanji (1998); Liker (2004); Hafeez, Malak, and Abdelmeguid (2006); Chevron Corporation (2010); Lu, Betts and Croom (2011); EFQM (2012); Oehmen et al. (2012); Shingo Institute (2016).
Process assessment and data validity	Data Reliability and Fact Driven Decision; Benchmarking; Self-assessment.	Hides, Davies and Jackson (2004); Oakland (2005); Hafeez, Malak, and Abdelmeguid (2006); Batini et al. (2009); Moriarty (2011); Kenett and Shmueli (2016); Shingo Institute (2016).
Strategy Alignment	Systems thinking; Focus on Organizational Excellence; Organizational strategy alignment.	Opex Groep (2011); European Foundation for Quality Management (2012); Jaeger et al. (2014); Lin and Tseng (2016); Shingo Institute (2016); López (2017).
Strategy Development	Strategic objectives definition; Strategy development; Process orientation.	Lu, Betts and Croom (2011); European Foundation for Quality Management (2012); Opex Groep (2011); Jaeger et al. (2014); Suarez, Calvo-Mora, & Roldán (2016); Luo, Shi and Venkatesh (2018).

Strategy planning and deployment	Deployment action plan; Contingency planning; Resource allocation.	European Foundation for Quality Management (2012); Jaeger et al. (2014); Shingo Institute (2016); Luo, Shi and Venkatesh (2018).
Organizational Communication	Strategy communication; Communication processes.	Oakland (2005); Hafeez, Malak, and Abdelmeguid (2006); Brown (2013); Shingo Institute (2016); López (2017); Luo, Shi and Venkatesh (2018).

2.4. Organizational Culture

2.4.1. Introduction to Organizational Culture

There are several well-known definitions of Organizational Culture. Some of the most popular include Williams, Walters and Dobson statement “the way we do things here” (1993, as cited in Maull, Brown, & Cliffe, 2001) and Edgar H. Schein’s (1984) description of “set of shared assumptions that have been developed by a group over time as a positive response to problems”. Such definitions demonstrate how important Organizational Culture is, not only in providing guidelines for tackling problems but also in reducing anxiety in the face of new challenges, being widely accepted and taught to new members as the correct way of acting. In this sense, Reeves and Bednar (1994) state that the Organizational Culture will influence people’s perceptions of every single aspect of their work. However, and in the scope of understanding of the concept, a more complete definition is necessary.

The term Organizational Culture has been defined in the literature since the 1950’s (Kroeber & Kluckhohn, 1954). However, it wasn’t until the 1980’s that it was widely introduced into business organizations and saw relevant scientific debate. Different scientific fields have disputed the origins of Organizational Culture. Robbins (1983) stated that Culture has been understood as one issue of Anthropology, while Lewis (1996) argued that it is an interdisciplinary phenomenon with contributions from Sociology, Anthropology and Social Psychology. However, it was within the Business literature that it gained track. In their famous book “Corporate Cultures: The Rites and Rituals of Corporate Life”, Deal and Kennedy (1982) described Organizational Culture as a complex set of shared values, beliefs, assumptions and symbols that are reflected in behaviors and norms of an organization. Edgar H. Schein (1984) further explored Organizational Culture and dissects it by identifying three levels with

different conscious awareness and visible presence. According to Schein, the most tangible level of is the one of “artifacts and creations”, which represents the visible side of a Culture, including such things as architecture, decoration, dress codes, but also behaviors, working patterns or documentation. These artifacts, although providing us with information that is very easy to obtain, do not allow the immediate understanding of a Culture: while they expose patterns and behaviors, they do not permit an understanding of the reasons behind them. Such an understanding demands explanations that lie in the deeper, lesser-conscious levels of a Culture: its “values” and “underlying assumptions”. The “values” are in the middle level in a Culture, supporting the behaviors while trying to provide a rational explanation for them. They bridge between the “artifacts and creations” and the “underlying assumptions”, but many times they can be misleading, as people will tend to rationalize their behaviors into values which they believe to be noble, but that might not accurately capture the true supporting values. This means that exposing the real values that support the Culture of an organization might be difficult since they will not be accessible through a simple inquiry to any staff member or observation. Even in situations where they are openly mentioned and discussed, a critical perspective is needed to assess their validity and rationalization. Finally, in the deepest level of a Culture lie the “underlying assumptions”, the least aware part of an Organizational Culture and the most difficult to access and understand. Assumptions settle as time goes by, and previously rational values become taken for granted and begin to be seen as undisputed truths. They become unconscious and are rationally unperceived by the vast majority of people in an organization, and act almost as survival guidelines. Accordingly, this is the level that creates more resistance to change and the one that is more difficult to discuss openly.

A similar multi-layer perspective is presented by Hofstede, Neuijen, Ohayv, and Sanders (1990), in their onion-shaped model. The authors list the elements of a Culture as being its (1) values, (2) rituals, (3) heroes, (4) symbols, and (5) practices. While elements (1) - (4) are represented in rings that go from the core out, the 5th element, practices, cuts through the onion diagram and interacts with all levels – representing the importance of practices for the sustaining of all other cultural elements. Despite sharing some of the same elements as defined by Schein (1984) and promoting some in-depth understanding of the concept of Organizational Culture, this model does not consider Schein’s approach to the different levels of awareness in a Culture. The study included quantitative measures collected in 20 organizations from the Netherlands and Denmark, which helped to characterize the elements of Organizational Culture and quantify some of its dimensions. Furthermore,

it demystifies the idea of a “good” vs “bad cultures”, highlighting the uniqueness of every Culture in its similar elements (Hofstede et al., 1990).

The discussion on the existence of “good” and “bad” – or “strong” vs “weak” – cultures received much attention in 1980’s. Some authors debate the need (or not) for a “strong” Culture as a point of leverage, with Peters and Waterman (1982) and Deal and Kennedy (1982) referring cultural “strength” as a cornerstone for success. On the other hand, Lawrence Schein (1989) and Saffold (1988) consider that it is more a matter of promoting cultural fit rather than a “strong” Culture. This view is complemented by Denison (1990) and Cameron and Quinn (1999), who identify four typical types of Organizational Culture that develop in the most common market situations (Table 5 and Table 6), and set the arguments for the search of a fit between the Culture and the environment.

Table 5 - Four basic views of organizational culture (adapted from Denison, 1990).

	Stability	Change
Internal	Consistency	Involvement
External	Mission	Adaptability

Table 6 - Categorization of organizational cultural type (adapted from Cameron and Quinn, 1999).

	Stability	Change
Integration	Hierarchy	Clan
Differentiation	Market	Adhocracy

Despite growing interest in the topics of Organizational Culture (Delloite University Press, 2017), most research regarding Organizational Culture in recent years has offered little innovation. Current topics still include the impact of Organizational Culture in the success of organizations (Groysberg, Lee, Price, & Cheng, 2018), its importance for the workforce (Schwartz, Bohdal-Spiegelhoff, Gretczko, and Sloan, 2016), or its significance for the deployment of new ideas and strategies (Siakas and Siakas, 2007). In this work, and given the interest in dealing with change, one particular area is highlighted: the management, evolution and shaping of an Organization Culture.

2.4.2. Shaping an Organizational Culture

There have been several works on the impact of Culture in the performance of an organization (Deal & Kennedy, 1982; Barney, 1986; Sadri & Lees, 2001; Chan, Shaffer, & Snape, 2004). There were efforts to characterize and identify "winning" Cultures, and to promote cultural change in order to develop specific pre-defined characteristics. These views, however, faced a significant challenge: the fact that Organizational Culture is not something that can be easily changed or manipulated (Ouchi & Wilkins, 1985; Barney, 1986). E. H. Schein (1995) explains that Cultures develop over time, having a strong influence from the founders and leaders of an organization, and being mostly shaped by the organizational answers to the surrounding environment. As the organization responds to the different stimuli from the outside, the strategies and actions that proved to be successful are repeated, becoming set as the correct way to act (Schein, 1995). These responses provide a framework for action and reduce the anxiety of dealing with new challenges. People feel safer and more confident by acting within familiar lines and thus tend to search for Cultural stability (Schein, 1984). Consequently, changing an Organizational Culture is a complex challenge.

Barney (1986) argues that if a Culture is to be a source of competitive advantage, it cannot be completely manageable since it alters the concept of being valuable, rare and inimitable. Despite this idea, a few authors have addressed its capacity to be manageable to some extent (Quinn & McGrath, 1985; Armenakis, Brown, & Mehta, 2011) or at least shaped and steered into a particular orientation (Homburg & Pflesser, 2003; Gebhardt, Carpenter, & Sherry, 2006).

The idea of cultural orientation has been around for a while. Borch (1957) or Foxall (1984) define cultural orientation as an underlying philosophy that guides a business in all of its activities (M. P. Miles, Russell, & Arnold, 1995). Cultural orientation consists of a transformation in some of the patterns and practices of a Culture in search of further alignment with a certain idea (Mehra, Joyal, Rhee, 2011). Gebhardt et al. (2006) describe orientation as resting fundamentally on cultural values and present a process for creating a new cultural orientation in an organization. Although focusing on market orientation, their work presents a thorough description of the process of cultural transformation. The authors present a four-stage process to create a market orientation that promotes (1) the initiation of the cultural transformation, (2) the reconstruction of the culture, (3) the institutionalization – or formalization – of the changes and, finally, (4) the maintenance of the new culture. The *initiation* stage is based on the recognition of the need for change, and preparation for that change. The need to change is normally sparked by external events – including new competitors and business models, or changing technology – with an impact on internal performance. As a response to

such events, the change process is initiated –generally led by a group of influential, dissatisfied stakeholders. This process includes the establishment of a broad plan for change, with the definition of the new (to be established) guiding principles.

When this change plan is ready for deployment across the organization, the *reconstitution* phase is initiated. This stage is marked by efforts to demarcate the organization from the previous Culture, namely through the deployment of the new set of cultural elements. Once the new values and norms are established, the organization will need to reconnect with the market, providing practical meaning for the new way of working. This links to Schien's (1984) idea of providing successful responses to the market and developing an operational framework for the workforce. While doing this, the organization must also manage the alignment of its associates, eliminating the sources of resistance and promoting collaborative strategies that engage the associates.

With the conclusion of the reconstruction stage, changes are expected to be set – the organization now has a new way of working. However, these changes remain somewhat informal, as they have not been systematized. In the third stage – *institutionalization* – the organization must standardize and embed them into the organization structure. This includes the formalization of changes and power shifts, the training of the workforce, and the promotion of rewards for aligned behaviors. Finally, and with the transformation efforts mostly complete, the organization starts to focus on the *maintenance* of the new Organizational Culture. New employees need to be both screened for their match with the Culture and practically initiated in it. At the same time, and considering that the workforce tends to make personal interpretations of the Culture [again relating to Schein's (1984) ideas of espoused values, which are rationalized rather than accurate projections of the culture], the organization must continuously work on the associate's global understanding of the culture, avoiding the creation of clashing subcultures. Accordingly, this maintenance stage must be understood as an ongoing part of the life of organizations.

While there is no comparable, in-depth process dedicated exclusively to the creation of a culture of Quality or Excellence, a suggested procedure for changing a company's culture in the scope of Quality and Excellence is promoted by Dahlgaard, Chen, Jang, Banegas, & Dahlgaard-Park (2013), based the four steps:

- i. Setting goals and strategies for building up a new culture (*Plan*).
- ii. Education, training & communication (*Do*).
- iii. Identify gaps based on feedback from training and everyday practice (*Study*).

- iv. Establish/implement activities for closing the gaps (*Action*).

Several works in the topic align with this same process. Warne (1987) highlights a series of critical success factors that fit it, including the definition of Quality goals and responsibilities, the creation of a cultural commitment to Quality, and the idea of sustaining an orientation over the long run. Furthermore, the author refers that sustaining a Quality orientation demands the commitment of the entire organization – with top leadership and management committed to using that orientation as a part of the company's strategy, and having a Culture that is conducive of the commitment of everyone. Also, and although not following the same structure, the action within step finds much alignment with the actions proposed by Gebhardt, Carpenter, and Sherry (2006).

Rather than discussing the process, most works on the promotion of a cultural orientation towards Quality or Excellence tend to focus more on highlighting the enablers and critical success factors that allow that orientation to be developed – and in defining characteristics and metrics to follow in the assessment of such cultural orientation (M. P. Miles et al., 1995; Mehra, Satish ; Joyal, Aaron D.; Rhee, 2011). In the next subsection, we explored these characteristics in the scope of identifying the enablers of an Excellence-oriented culture.

2.4.3. Enablers and critical success factors of an Excellence-oriented Organizational Culture

When considering elements and critical success factors, the study of an Excellence-oriented Culture will necessarily be tied to the study of the core elements of an Organizational Culture. This section explores how those elements are aligned with Excellence, rather than the existence of specific enablers that would exist only in a Culture that is oriented to Excellence.

As discussed previously, there are several works on that characterization of an Organizational Culture – with a considerable influence also in defining its elements and critical success factors. Kotter and Heskett (1992) see it as being composed of the shared values and beliefs (the “invisible side” of an organization) and the behavioral norms. Culture represents an ideology of the organization, which includes beliefs, values and norms (Trice & Beyer, 1993), and lays on a set of shared philosophies, assumptions, values, expectations, attitudes and norms (Wilkins & Ouchi, 1983). In their “onion diagram” model of organizational culture, Hofstede, Neuijen, Ohayv, and Sanders (1990) proposed the following five main elements (“manifestations”) of organizational culture: values, rituals, heroes, symbols and practices. To some authors, however, the concept of “values” is the same as of “beliefs” (Kotter & Heskett, 1992), and the concept of “artifacts” includes the “symbols” (Schein, 1995). There

is a strong support to these views in several more recent interesting research results. Inspired by the work developed by Edgar Schein, Homburg and Pflesser (2000) proposed a multilayer model of organizational culture supported in shared fundamental values, norms, artifacts and behaviors. Scott, Mannion, Davies, and Marshall (2003) regard the Organizational Culture concept as denoting a wide range of social phenomena, including organization's (1) dress code, (2) language, (3) behavior, (4) beliefs, (5) values, (6) assumptions, (7) symbols of status and authority, (8) myths, (9) ceremonies and (10) rituals, which contribute to define the organization's character and norms. In contrast, Muscalu (2014) limits his view over culture to three key elements: (1) beliefs, (2) behaviors and (3) practices. Although there are different perspectives over the definition of Organizational Culture and its elements, truth most of them are equivalent in meaning and end up coming together, and present organizational culture as a set of guiding principles that will influence every behavior, action and working relation.

These elements are the fundamental pieces that form the complex puzzle of Organizational Culture. In order to identify their orientation with Operational Excellence, it is necessary to consider how aligned they are with it. In this sense, practices, principles, behaviors, artifacts and creations are considered as enablers of an excellence-oriented Culture only to the extent to which they are aligned with Excellence. The scales used to measure this alignment are presented in Appendix III.

Examples of the use of these elements to measure the alignment of an Organizational Culture are presented in a few scientific works and professional tools explicitly dedicated to the enablers of a Quality-oriented or an Excellence-oriented Culture. Most of the time, these enablers remained centered around the promotion of an organization-wide commitment, and in sustaining it over time (Warne, 1987; Mohr-Jackson, 1998; Mehra, Satish ; Joyal, Aaron D.; Rhee, 2011). One framework where they are visible is in the "Behaviors Assessment Scale" of the Shingo Model for Operational Excellence. This assessment scale focuses on helping organizations become "more oriented toward driving principles and Culture" of Excellence, by providing the metrics for assessing such a Cultural orientation (Shingo Institute, 2016). This assessment framework, amongst other examples, looks at critical success factors as the frequency, duration, intensity, and scope of behaviors towards Operational Excellence. It also considers the values and practices, and the use of tools, systems and other artifacts of an Organizational Culture. In this work, and because this framework has proved to be efficient in helping assess Excellence-oriented behaviors (Salaiz, 2003; Edgeman, 2018), this scale had a strong influence on the development of our cultural orientation assessment framework.

As a summary of this review, Table 7 lists all enablers and critical success factors considered in assessing a cultural orientation towards Excellence.

Table 7 - Enablers and Critical Success Factors of an Excellence-oriented Organizational Culture.

Enablers	Critical Success factors	References
Principles	Values and beliefs; Norms; Vision and mission.	Schein, (1984); Hofstede (1994); Homburg and Pflesser (2000); Mannion, Davies, and Marshall (2003); Muscalu (2014); Shingo Institute (2016).
Practices	Use of quality tools; Engagement with quality and excellence initiatives; Commitment to quality and excellence; Commitment to organizational culture.	Schein, (1984); Hofstede (1994); Warne (1987); Mohr-Jackson (1998); Mehra, Joyal, Rhee (2011); Shingo Institute (2016).
Behaviors	Role of leaders; Role of managers; Role of associates; Frequency; Duration; Intensity; Scope.	Warne (1987); Mohr-Jackson (1998); Homburg and Pflesser (2000); Salaiz (2003); Aaron and Rhee (2011); Muscalu (2014); Shingo Institute (2016); Edgeman (2017).
Artifacts and Creations	Built environment, layout and decoration; Internal communication and media; Stories, symbols and heroes.	Schein, (1984); Hofstede (1994); Mannion, Davies, and Marshall (2003); Shingo Institute (2016).

2.5. Organizational Agility

2.5.1. Origins of Agility

Agility is most commonly discussed in the scope of software and product development systems, and under the particular scope of Project Management (Beck et al., 2001; Edivandro C. Conforto, Salum, Amaral, da Silva, & de Almeida, 2014). However, its usage in production and operations management dates from the early 1990s, when Nagel (1991) defined an “agile organization” as one capable of meeting rapid changing needs through a manufacturing system able to shift quickly and adapt in real time to respond to customer demands. Since then, several researchers have focused their work on understanding the concept of Agility, proposing a few definitions. Goldman,

Nagel, and Preiss (1995) defined an agile organization as one that is capable of operating profitably in a competitive environment of continually and unpredictably changing customer habits. Dove (1995) proposed Agility to be a compromise between cost, time, quality and scope.

During the last few decades, different perspectives on Agility evolved in parallel – even if considering only the fields of manufacturing and operations. Kidd (1996) defined Manufacturing Agility as an approach to actively lead companies towards innovation by looking at changes as opportunities, and exploring them by entering new markets or creating new products. Yusuf, Sarhadi, and Gunasekaran (1999) defined Manufacturing Agility as a successful exploration of competitive bases through the integration of reconfigurable resources and best practices in knowledge, combined to provide customer-driven product and services in a fast-changing market environment. Focusing on the importance of people and the Culture for the successful implementation of Manufacturing Agility (MA) practices, Vokurka and Fliedner (1998) highlight its dependency on the context, with MA needing to adapt to the specific differences, strengths and weaknesses of organizations. Accordingly, implementing true Manufacturing Agility will demand large changes comprising the entire organization, including its business and workforce relations. On the same topic Gunasekaran (1999) states that it is necessary not only to manipulate the structure and culture of the company but also to consider the impact on its partners and, consequently, on the market itself. Every company must thus be able to identify and manage its culture, business practices and technology in order to become agile.

This perspective leads us to another research topic within the field of Agility – the idea of promoting Agility through extended networks. Earlier works revolved around concepts such as virtual enterprise and networks with physically distributed manufacturing (Burgess, 1994; Gunasekaran, 1999; Yusuf, Sarhadi and Gunasekaran, 1999). In such networks, partners work together, sharing competencies and resources to meet customer needs in different locations, supported by enablers such as concurrent engineering, integrated information systems, rapid prototyping tools, and e-commerce (Gunasekaran, 1999). Complementary, the focus on business process redesign was also deemed as essential to efficiently achieve Manufacturing Agility (Burgess, 1994).

The promotion of Agility along the value and supply chains also became frequent (Blome, Schoenherr, & Rexhausen, 2013; Gligor, Holcomb, & Stank, 2013). Bottani (2009b) sees Agility as fundamental for the survival of organizations in a turbulent business environment, helping companies deliver the right product at the right time to customers. Fliedner and Vokurka (1997) argue that Agility includes external as much as internal initiatives, allowing the development of new perspectives and the identification of customers and suppliers beyond their normal markets and roles. Such an approach

allows improving performance throughout the supply chain, developing Agility for all involved stakeholders. Agility works by using the external perspective to change the internal functioning of organizations. An agile organization can detect changes in its business environment and to provide focused and rapid responses to its stakeholders by reconfiguring its resources, processes and strategies (Mathiyakalan et al., 2005).

As the interest in Agility grew, literature started to focus on how to make different perspectives fit and be deployable together in organizations. The term Organizational Agility started to be used together (or as an alternative) to Manufacturing Agility or Agile Networks and Operations (Meade & Sarkis, 1999; Gunasekaran & Yusuf, 2002). Even works focused on only one dimension started to underscore this need for integration. As an example, Vazquez-bustelo et al. (2007) argue that an important feature of Agile Manufacturing is the idea of integrating different dimensions and practices.

As organizations began to understand that cost, sales orientation or efficient mass production were no longer the sources of competitive advantage – and that they could no longer keep their production models of manufacturing large volumes for attaining economies of scale, and the lowest cost per product – the concept of Organizational Agility started to gain traction in big companies and consultancy firms (McKinsey & Company, 2015; Appelbaum, Calla, Desautels, & Hasan, 2017).

2.5.2. Organizational Agility

Following this evolution, it is no surprise that most definitions of Organizational Agility resemble the early, boarder definitions of Agility. Ganguly, Nilchiani, and Farr (2009) define an agile organization as one that can adjust to any unexpected changes in the environment, reacting both quickly and effectively to changing markets. Considering the increasingly uncertain and complex environments in which most organizations now operate, Lee, Sambamurthy, Lim, and Wei (2015) argue that Organizational Agility is crucial for competitive success because it reflects a company's ability to sense and respond to market changes. Nevertheless, it is crucial to understand that Organizational Agility should not be seen as being only reactive: it should also be proactive, by sensing, perceiving and anticipating future changes (Zhang & Sharifi, 2000).

Different relationships will influence the ability of an organization to develop and deploy Organizational Agility – many of which are technological. Zain, Rose, Abdullah, & Masrom (2005) argue for the importance of the relationship between Information Technology acceptance and Organizational Agility, presenting results that show that (1) information quality, (2) top management support, the (3) attitude towards using Information Technologies (IT), and (4) actual systems usage have a significant

effect on the promotion of Agility. Similar conclusions are supported by Lu and Ramamurthy (2011), as they determine, based on a questionnaire of senior business and Information Systems executives, that IT capabilities are essential for the achievement of Organizational Agility, helping both in capturing the market and in promoting operational change.

In a broader perspective, Appelbaum, Calla, Desautels, and Hasan (2017) conclude that different organizational elements such as (1) strategy, (2) organizational structure, (3) organizational capabilities, (4) employees, and (5) leadership all play a role in influencing Organizational Agility. The authors argue that a high level of Agility is essential in today's dynamic business environments, with the relationship between Organizational Agility and business performance being central. Several authors reason that Organizational Agility has a clear impact on the competitive advantage of an organization (Almahamid, Awwad, & McAdams, 2010; Y. Lu & Ramamurthy, 2011; Appelbaum et al., 2017).

The human and social elements of an organization will also have a substantial impact on the development of Organizational Agility. Implementing and creating a truly agile organization will demand significant changes in tools, business practices and workforce relations. It is necessary not only to manipulate the structure and culture of the company but also to consider the impact on its partners and, consequently, on the market itself. Every company must thus be able to identify and manage its culture, business practices and technology in order to become agile (Gunasekaran, 1999). Likewise, it has been argued that in order to successfully pursue Agility, there needs to be an effort to frame it within the cultural framework of the organization (Crocitto & Youssef, 2003; Hermansen & Caron, 2004). Alavi, Wahab, Muhamad, and Shirani (2014) criticized the excessive focus that many studies on Agility give to technical factors, often disregarding cultural integration. Accordingly, there needs to be effective communication between different organizational units and levels, and guaranteed access to quality information (Crocitto and Youssef, 2003).

The development of Organizational Agility will be dependent on its relationship and integration with a series of different organizational elements. To understand how these relationships are to be addressed, it is essential to understand in detail which capabilities must be developed and exploited to facilitate them. Accordingly, the enablers and critical success factors that will foster organization-wide Agility are reviewed listed in the following subsection.

2.5.3. Enablers and critical success factors of Organizational Agility

Organizational agility enablers are favorable conditions – internal or external factors – that promote the proper application of specific practices of Agility (Conforto et al., 2014), provided leverage to achieve specific capabilities (Bottani, 2009a). Agility is context-dependent, and there is a need to consider the Culture of an organization in its implementation (Crocitto and Youssef, 2003).

Organizational Agility enablers cannot be dissociated from this cultural side, as they need to consider the context in which they are being set in order to allow for sustained development and deployment. Accordingly, enablers of Organizational Agility consider technical, technological and social factors.

Earlier works on the enablers of Agility are related to the idea of Agile Manufacturing. In one of the first works considering clearly mentioning “enablers” of Agility, Gunasekaran (1998) lists (1) virtual enterprise formation, (2) physically distributed teams and manufacturing, (3) rapid partnership formation, (4) concurrent engineering, (5) integrated information systems, (6) rapid prototyping tools and (7) electronic commerce. Exposed to the changes in the business environments, Agility enablers have evolved throughout the years and gained a broader, organizational perspective. About a decade after, Vázquez-bustelo, Avella and Fernández (2007) proposed the following enablers of Agility: (1) management support, (2) autonomy, (3) cross-functionality of the workforce, (4) job rotation, (5) training and education, (6) decentralized decision making and (7) rewards/recognition to encourage innovation and adaptability. Two years later, Bottani (2009b) proposed seven agile enablers: (1) supply chain management, (2) concurrent engineering, (3) project management, (4) hardware, (5) information technology, (6) team building and (7) knowledge management. More recently, Harraf, Wanasika, Tate and Talbott (2015) provided a list of 11 pillars essential for enabling Organizational Agility: (1) Culture of innovation (chapter 3), (2) empowerment, (3) tolerance for ambiguity, (4) vision, (5) strategic direction, (6) change management, (7) communication, (8) market analysis and response, (9) operations management (chapter 3), (10) structural fluidity, and (11) learning organization.

Perspectives on agile enablers can also be found in other areas or presenting narrower scopes. Doz and Kosonen (2008) provide the foundations for the success of strategic Agility: (1) leadership unity, (2) strategic sensitivity, and (3) resource fluidity. Crocitto and Youssef (2003) mention that (1) the agile mindset of the leadership, (2) Organizational Culture, and (3) employee reward systems create a relationship between people and technology and enable Organizational Agility. The authors further argue that (4) effective communication and (5) access to quality information are essential to ensure the success of the human side of Agility. From supply and value chain agility, important additions related to process flexibility, sensitivity and information systems are added. Van Hoek,

Harrison, and Christopher (2001) mention (1) market sensitivity, (2) scale sensitivity, network (3) integration and (4) cooperation, (5) virtual integration and (6) process integration. Lin, Chiu and Chu (2006) identify (1) collaborative relationships, (2) process integration, (3) information integration, and (4) sensitivity. More recently, and promoting a review on the literature on the topic, Gligor and Holcomb (2012) list (1) responsiveness, (2) change as an opportunity, (3) flexibility, (4) customer enrichment, (5) mobilization of competences, (6) integration, (7) organizational structure, and (8) speed as essential dimensions for supply chain agility.

Contributions to the definition of the enablers of Agility have also come from different scientific areas. Despite the earlier establishment of Manufacturing Agility, some authors still see organizational agility as the adaption to production and operations of the methods used in project management or product and software development. Dikert, Paasivaara and Lassenius (2016) propose a series of enablers for an agile transformation based on software development activities and team, but provide valuable contributions that can be used in the broader scope of Organizational Agility: (1) agile mindset, (2) team size, (3) autonomy and (4) experience of the team members. Although in the scope of project management and development activities, Almeida, Conforto, Silva, & Amaral (2012) promote a broad literature review that covers areas of Agility such as software, product development, project management, supply chain Agility and manufacturing Agility. As a result, 13 enablers are identified: (1) organizational structure, (2) Organizational Culture, (3) entrepreneurship, (4) organizational learning, (5) agile work environment, (6) use of agile methods, (7) reward for the use of agile, (8) focus on speed, (9) team dedication, (10) team cross-functionality, (11) resource competitions, (12) strong leadership support, and (13) decentralized decision making. Conforto, Salum, Amaral, Silva, and Almeida (2014) explore how other industries outside software may adapt the enablers of agile project management. The authors found, based upon a study involving 19 organizations of different industrial sectors, that several enablers of agile project management are present in many of other organizations, namely: (1) organizational structure type, (2) organizational culture, (3) entrepreneurial culture, (4) learning organization, (5) agile-style work environment, (6) acceptance of agile methodologies, (7) adequate reward for agile use, (8) emphasis on speed, (9) performance measuring, (10) knowledge management systems, (11) multidisciplinary teams, (12) resource competition, (13) strong executive support, and (14) decentralized decision making. A common tendency in literature has been to group the enablers into categories. Chen, Damanpour, & Reilly (2010) while focusing mostly on the critical antecedents (pre-existing capabilities that work as critical success factors) for improved new product development speed, also add important information to the listing of agile capabilities. The authors

identify four key areas where these critical success factors will fall: (i) strategy, (ii) project, (iii) process, and (iv) team. “Strategy” includes mostly (1) top management support, (2) goal clarify and (3) emphasis on speed – all relating to the mindset and orientation of the organization and with agile strategic planning. “Project” includes (4) newness and (5) complexity, while critical success factors for “process” contain (6) process formalization and (7) concurrency, (8) iteration and (9) organizational learning. Finally, critical success factors for “team” will include its (10) leadership, (11) experience, (12) dedication, (13) diversity and (14) integration, (15) empowerment and (16) location.

In the face of a large number of critical success factors in the definition of Agility, some authors have presented enablers as higher-level entities that comprise different criteria, attributes or success factors of Agility. Gunasekaran, in 1999, revises his previous work on agility enablers and groups them into four main categories: (1) strategies, (2) technologies, (3) people and (4) systems. Similarly, Vinodh et al. (2010) present a more comprehensive list of concepts, arguing that agility capabilities can be structured into three different levels. The authors list five agile “enablers” as the first level, twenty agile “criteria” in the second level, and various agile “attributes” in the third. The five enablers and the criteria they include are:

- i. Management responsibility agility – includes (1) organizational structure, (2) devolution of authority and the (3) nature of management.
- ii. Manufacturing management agility – includes (4) customer response adoption, (5) change in business and technical processes, and (6) outsourcing.
- iii. Workforce agility – considers (7) employee status and (8) involvement.
- iv. Technology agility – includes (9) manufacturing set-ups, (10) product life cycle, (11) product service, (12) design improvement, (13) production methodology, (14) manufacturing planning, (15) automation type and (16) IT Integration.
- v. Manufacturing strategy agility – considers (17) quality, (18) productivity, and (19) cost and (20) time management.

Based on this review, Table 8 presents the different enablers and success factors of Organizational Agility.

Table 8 - Enablers and Critical Success Factors of Organizational Agility.

Enablers	Success Factors	References
Orientation and Work Environment	Agile mindset; Collaborative work; Adequate reward for the use of agile tools and methods.	Crocitto and Youssef (2003); Vázquez-Bustelo et al. (2007); Chen et al. (2009); Bottani (2009b); Vinodh et al. (2010); Almeida et al. (2012); Dikert, Paasivaara, & Lassenius (2016); Appelbaum et al. (2017).
Human Resources	Development and deployment of new capabilities; Knowledge management; Job rotation systems.	Vázquez-Bustelo et al. (2007); Doz and Kosonen (2008); Vinodh et al. (2010); Dikert, Paasivaara and Lassenius (2016); Appelbaum et al. (2017).
Process and Project Team	Team dedication; Autonomy and empowerment; Integration and Cross-functional teams and projects. Team experience.	Vázquez-Bustelo, Avella and Fernández (2007); Doz and Kosonen (2008); Chen et al. (2009); Almeida et al. (2012); Conforto et al., (2014); Dikert, Paasivaara and Lassenius (2016).
Organizational structure	Promoting a horizontal structure; Decentralized decision-making; Interdepartmental collaboration.	Vázquez-Bustelo et al. (2007); Vinodh et al. (2010); Almeida et al. (2012); Gligor and Holcomb (2012); Conforto et al., (2014); Harraf, Wanasika, Tate and Talbott (2015); Appelbaum et al. (2017).
Manufacturing (development) flexibility	Automation; Speed; Flexibility and reconfiguration.	Gunasekaran (1999); Chen et al. (2009); Vinodh et al. (2010); Almeida et al. (2012); Conforto et al., (2014).
Process flexibility	Process concurrency; Process integration; Frequent revision cycles.	Gunasekaran (1999); Lin, Chiu and Chu (2006); Bottani (2009b); Chen et al. (2009); Vinodh et al. (2010); Gligor and Holcomb (2012); Conforto et al., (2014).
New Product and Process Development	Newness; Complexity; Balance of project management methods.	Bottani (2009b); Chen et al. (2009) Almeida et al. (2012); Conforto et al., (2014).

Technology and Information Systems	Use of technology. Virtual enterprise. Readiness for connectivity and digitalization.	Gunasekaran (1999); van Hoek et al. (2001); Zain et al. (2005); Lin, Chiu and Chu (2006); Vázquez-Bustelo et al. (2007); Bottani (2009b); Vinodh et al. (2010); Lu and Ramamurthy (2011); Gligor and Holcomb (2012).
Agile strategic planning	Leadership unity; Fact-based decision making; Product succession planning.	Crocitto and Youssef (2003); Doz and Kosonen (2008); Chen et al. (2009) Vinodh et al. (2010); Almeida et al. (2012); Conforto et al. (2014); Dikert, Paasivaara and Lassenius (2016); Appelbaum et al. (2017).
Change Management	Strategic sensitivity; Effective initiation and prioritization of change efforts; Resource fluidity.	van Hoek et al. (2001); Lin, Chiu and Chu (2006); Doz and Kosonen (2008); Lu and Ramamurthy (2011); Gligor and Holcomb (2012); Harraf, Wanasika, Tate and Talbott (2015); Dikert, Paasivaara and Lassenius (2016).
Agile information and communication strategy	Intensified communication; Easy access to information; Open information sharing.	Crocitto and Youssef (2003); Lin, Chiu and Chu (2006); Lu and Ramamurthy (2011); Conforto et al. (2014); Harraf, Wanasika, Tate, Talbott (2015).

2.6. Summary

This chapter presented a board literature review focusing on understanding the background of the three main concepts under the spotlight in this research project: Operational Excellence, Organizational Culture, and Organizational Agility. Understanding both the history of these concepts and the practical capabilities that make their deployment in organizational context possible is essential to sustain any theory development from now on. However, and before advancing, it is necessary to understand how these concepts, now well-defined, relate.

Although the integration of the three is a novel approach, they have been explored, in pairs, in the past. In the next chapter, the existing relationships between these concepts are explored, followed by the devolvement of the proposed theory and research questions.

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3. Theory Development

3.1. Introduction

As seen in the introductory chapter, the relationship between Operational Excellence and Organizational Culture has been long set as vital for the successful deployment of Excellence initiatives. However, it has also shown that often, this relationship is not developed to a point where the sustainability of these initiatives is ensured. The ability of excellence-pursuing organizations to maintain a level of performance excellence over time, adapting to new market trends and requirements, has thus been limited. This ability becomes even more critical as the level of turbulence in the market increases, and change becomes part of the daily life of a society. Organizations no longer strive only for efficiency, effectiveness and superior performance, but also for the development of Organizational Agility capabilities. In the face of this scenario, this project studies the relationships between Operational Excellence, Organizational Culture, and Organizational Agility in an effort to understand if and how can these three concepts be explored together to (1) create a genuinely enduring orientation to Excellence in the culture of an organization, and (2) comprehend if such cultural orientation helps to develop Organizational Agility capabilities, making organizations more agile and fit to adapt to a changing business environments.

In the previous chapter, an historical/ narrative literature review was developed, focusing on understanding and defining each one of these concepts. Consequentially, it is at this point necessary to explore the literature on the existing relationships between these concepts. It was previously identified that although the integration of the three concepts is a novel approach, there has been research focusing on the existing relationships in duos. Accordingly, three main outputs derive from this literature review: a summary on the relationship between Operational Excellence and Organizational Culture, Organizational Agility and Organizational Culture, and Operational Excellence and Organizational Agility.

The literature review process followed in this chapter is in all ways similar to the one presented in Chapter 2, with the advantage of, being built on that experience and knowingly before-handed its identified limitations, allowing to reduce the number of iterations and repetitions of this process. Another critical difference is the type selected for this literature review. Having in consideration the different scope and, primarily, the different objective of this literature review, the historical/narrative type did not offer the ideal approach to a literature review that aims to help develop the theory and the research question. Accordingly, and having in mind the goal of examining the literature (Labaree,

2019), providing critical perspectives on the existing strengths, weaknesses and limitations (Paré & Kitsiou, 2017), and allowing the development of new viewpoints (Labaree, 2019), the critical/argumentative review type was used. Accordingly, the review outlined ahead focus not only on reviewing what was written on these relationships but also in identifying the opportunities for new theory development.

3.2. Previous research on Operational Excellence, Organizational Culture, and Organizational Agility

3.2.1. Organizational culture and Operational Excellence

The relationship between Organizational Culture and Operational Excellence has long been explored in literature. The main line of research has been the influence that Organizational Culture has on the success of any Excellence initiative, including how to promote the right balance between the Culture of an organization and the use and deployment of the new tools, frameworks and principles used to implement and develop Operational Excellence.

In “In Search of Excellence”, Peters and Waterman (1982) highlight the importance of understanding that tools are means and not ends, referring that most “Excellent” organizations make good use of the tools by keeping their use simple and avoiding the replacement of human thinking by these instruments. According to Dahlggaard-Park and Dahlggaard (2007), the first step in the implementation of any Quality or Excellence strategy should be to “build quality into people”. The idea originates from Deming (1993), as he lists some of the factors that need to be considered, and more importantly, understood by those proposing to do it: human nature, human needs, motivation, human psychology, and environmental and contextual factors. Araújo and Sampaio (2014) agree, stating that Excellence is not made of tools but rather of Organizational Cultures, its values and its people, and that it cannot be viewed as a standard approach, making its full implementation only possible when it is fully aligned with the daily practices and behaviors of the company. Similarly, the Shingo Institute (2016), promoter of the Shingo Prize for Operational Excellence, states that Excellence frameworks and Quality tools are not agents of transformation by themselves, but rather instruments to be used by the people in an organization to pursue performance improvement.

Some authors refer to this alignment between Quality or Excellence with the Organizational Culture as “cultural fit” – and highlight the importance of ensuring this cultural fit prior to any implementation efforts (D. Lewis, 1996; Maull et al., 2001; Irani et al., 2004). Before the implementation, it is necessary to know the dominant Culture, and to manage it to allow the integration

of Excellence frameworks (Aziz & Morita, 2016) – thus allowing the creation of an Excellence-oriented culture.

There are two sides to the promotion of a cultural fit. One is the adaptation of the Excellence initiative – either an Excellence program or the tools and methods used to deploy the principles and criteria of Excellence – to the reality of the organization. The other is the shaping of the existing culture in order to align it with the principles of Excellence. The first relates more with the idea that there is no standard for Excellence, and that no tools or frameworks, will be able to ensure the achievement of superior results and performance (Escrig & De Menezes, 2015), and then to the need to integrate Excellence initiatives and the existing culture (Araújo & Sampaio, 2014) . The second highlights the importance not only of knowing the Culture but to actively shape it throughout time, building the principles and criteria of Excellence into the Culture of the organization, and allowing its sustainability (Brown, 2013b).

The need to integrate an Excellence initiative to the reality of an organization finds support in several sources – both from academia and the business an industrial world. Dahlgaard, Chen, Jang, Banegas, & Dahlgaard-Park (2013) argue on the importance of integrating management tools and techniques and the Organizational Culture using Excellence models. Its importance is upheld precisely by the promoters of some of the most well-known and frequently used Excellence models. The Shingo Institute declares that tools are instruments to be used by people in an organization rather than the cause of transformation themselves (Shingo Institute, 2016). In the same line, the European Foundation for Quality Management (EFQM) sustains that its model and supporting criteria can only achieve their full potential if truly aligned with the Culture of an organization (European Foundation for Quality Management EFQM, 2017).

Several authors have set to explain the importance – and the challenges – of aligning Excellence initiatives with an Organizational Culture. Ferdowsian (2016) argues that the operationalization of Excellence is based on the development of a “culture of Excellence”. With more detail, Escrig and de Menezes (2015) evaluated the deployment of so-called Excellence best practices in different organizations, concluding that there is no evidence that a specific combination of best practices will distinguish organizations applying Excellence frameworks. However, the authors highlight the importance of the “People” criterion, sustaining that it was found to make a difference in attaining improved performance levels. Similarly, some authors suggest that best practices may not be able to guarantee improvements in performance by themselves (Voss, 2005; Doeleman, ten Have, and Ahaus, 2014).

Abdullah, Uli and Tari (2008) argue that “soft factors” such as management commitment, employee involvement, training and education, and reward and recognition have a significant influence on quality improvement and the achievement of “excellent” status. In the same lines, Calvo Mora et al. Calvo-Mora, Ruiz-Moreno, Picón-Berjoyo, & Cauzo-Bottala (2014) argue that an open, flexible and continuous improvement focused culture, a committed leadership, and an effective management of human resources have a significant impact on excellence management systems. Suarez, Calvo Mora, and Roldán (2016) state that little benefits will come to an organization that is simply focused on the “hard factors” of Excellence – such as process improvement or resource and alliance management – if there are no efforts to promote the alignment and the support of the management and the workforce. Vora (2013) also argues for the case of leadership having an essential role in the successful pursuit of excellence – and starts to steer us to the idea of Excellence through sustainable change management. Excellence initiatives promote organizational, business and structural transformations (Dervitsiotis, 2003; Brown, 2013b), and such changes expose even more the crucial importance of leadership drive and support, and consistency, transparency, and engagement of the entire organization for achieving success (Vora, 2013). This, naturally, includes the change and development do the culture to absorb the principles of Excellence better.

Despite a large number of works sustaining the importance of the “soft factors” in the implementation of Excellence, many organizations still promote an approach that neglects this cultural base – and that becomes more obvious through its implication in the suitability of Excellence initiatives. The topic of using the implementation of Excellence programs as leverage to address change in an enduring way is still limited, and the limited proof is available concerning the ability of ‘best in class’ companies to strive in the long term. Furthermore, and rather than promoting this “sustainable change management” perspective, some organizations focus on partially changing their culture as a process of organizational learning and adaptation to the Excellence assessment criteria. One clear example of this is observable in the work of Evans (2010), where the author aims to understand the learning capabilities of an organization in the development of a “Performance Excellence Culture”. However, the measures used in order to assess this Culture are based only in the Malcolm Baldrige National Quality Award (MBNQA) framework, and although there is performance improvement and a cultural evolution, the truth is that it presents a very limited perspective, where change happens in the scope of the Baldrige assessment criteria and focused on the pursuit of the award.

There seems to be a clear difficulty in creating enduring excellence, and many times, programs seem to be used to promote single-change projects rather than influencing or leading the long-term

organizational strategy and culture. One explanation for this difficulty lies in the fact that the main concern in organizations is often implementing such programs, but they end up neglecting its sustainability, with a series of factors deeply related to the social side of an organization (Brown, 2013a). This human or social side should be addressed beyond the simple search for cultural fit during the implementation process and be consistently worked upon to make excellence part of the everyday work mind-set. However, what often occurs is that after the implementation process is concluded, this side of organizations is disregarded, leading to a lack of engagement with many of the workers, from the shop floor up to the different management levels, and higher probabilities of failure (Dahlgard et al., 2013).

Although the EFQM stresses that the model is based on eight fundamental concepts (European Foundation for Quality Management EFQM, 2017), its deployment will vary depending on the interpretation and understanding of the model, and the existing management paradigm often determines the nature and direction of the interpretation. Like any other approach, Excellence programs and initiatives will also be “translated” through the cultural filters of an organization and adapted to the reality it faces. But what eventually happens, as shown in Evans (2010) is that organizations absorb the criteria and “learn to behave” in line with the assessment criteria, focusing on how to improve their score towards the achievement of and improved assessment score.

These behaviors have a lot to do with the motivations behind the pursuit of Excellence. According to Sharma and Kodali (2008), there are three main reasons for organizations to engage in an Excellence initiative: organizational improvement, the pursuit of recognition (focus on winning an award) and research/development (focus on developing new understanding or developing new integrative solutions). Although the improvement road is the one that organizations are expected to take, as it is understood and expected that organizations that move to Excellence journey already have a mature understanding and experience of Quality (Adebanjo, 2001; Claver, Molina, & Tari, 2002). However, a great deal of attention and focus is given to winning the award and getting external recognition. And by focusing on the award, companies are not supporting their Excellence approaches in the culture, and long-term sustainability is impacted. Several organizations still treat achieving Business Excellence in this scope, focusing on Excellence initiatives as a one-time event, subsequently failing to tread the path of excellence (Vadari & Parandker, 2011) – especially because, as Corredor and Goñi (2011) noted, the fact of winning an award does not invariably lead to performance gains.

In conclusion, the way an Excellence initiative is implemented – and the motivation behind this implementation – will have strong influence on the sustainability of Excellence initiatives. In order to

successfully implement and sustainably promote Operational Excellence initiatives, its principles and objectives must be fully integrated with the regular practices of the organization. The excellence-related literature is almost unanimous in stating that the implementation of excellence models and quality improvement programs has plenty of advantages for organizations. But to be long-lasting, excellence needs to care for this social side beyond the implementation phase. Often, the issue of creating a Cultural orientation to Excellence is addressed solely from the point of view of adaptation to a well-defined set of criteria. As a result, a considerable gap is left in understanding on how to do these two concepts and their resultant change impact the ability of an organization to react to sudden and further change demands – and with deep impact in the sustainability of Excellence initiatives.

3.2.2. Organizational Culture and Organizational Agility

If Organizational Culture has a strong influence on Operational Excellence, the same is true in regards to Organizational Agility. Early works on this relationship start to be found a few years after the concept of Organizational Agility was defined (Nagel, 1991). Vokurka and Fliedner (1998) established Agility as a context-dependent concept, and Gunasekaran (1999) concluded that developing a truly agile organization demands large changes within an organization's workforce relations. Similarly, Gunasekaran and Yusuf (2002) claim that companies wishing to become agile need to find the right combination of strategies, Culture, business practices and technology.

Nevertheless, the study on the relationship between Organizational Agility and Organizational Culture has its limitations. One of the most common critiques to the approaches to promote Organizational Agility is the lack of consideration, whether by authors, companies or frameworks, of the “soft factors” in the promotion of Agility in an organization (Crocitto & Youssef, 2003). In the same lines, Alavi, Wahab, Muhamad and Shirani (2014) criticize the excessive focus that many studies on Agility give to technical, “hard factors”, leaving the issues related to the workforce behind.

Nevertheless, there are a number of works looking at the cultural aspects of the implementation of Agility. Crocitto and Youssef (2003) explore the influence of social and human behaviors on the achievement of Organizational Agility, linking the capacity to be agile with the creation of a Culture that empowers and rewards employees, and that supports agile practices linked with innovation, communication, quality tools, and the use of new technologies. According to the authors, it is by incorporating in an organization a “culture of change” that is pervasive at every level, and by creating a new paradigm on how data and personal relationships will flow, that companies be able to address alterations in the markets or even actively promote them. This “culture of change” is seen by Sherehiy,

Karwowski, and Layer (2007) as an environment supportive of experimentation, learning, and innovation, where people of all organizational levels are fearless of change. In this perspective, Agility calls for changes in the management style currently being followed in the organization (Ramesh & Devadasan, 2007). Because of these changes, it is natural that challenges to large-scale agile transformations arise, as typically not everyone in an organization will be willing to change. These challenges are rooted in various reasons – from general resistance to change to skepticism towards the new ways of working (Dikert et al., 2016). To be able to face these challenges, Hermansen and Caron (2004) consider that an agile supportive Organizational Culture is only enabled when a “holistic enterprise understanding” is made explicit and accessible to the whole organization. The authors highlight the necessity for the creation of a management environment that supports the achievement of Organizational Agility by, among others more technical characteristics, promoting this “understanding” and enabling an informed and culturally responsive workforce.

Based on these works, we can say that the implementation of Organizational Agility is dependent on an aligned Organizational Culture. Accordingly, and rather than an orientation (as was the case of Excellence), the relation between Culture and Agility is more focused on finding the right support to deploy agile principles, criteria, and methods (Sherehiy et al., 2007). This does not mean that there is no cultural change – especially when Agility itself is deeply tied to change. Even the adoption of agile practices demands changes in the Organization Culture (Misra, Kumar, & Kumar, 2010). However, and more than an alignment with the elements of Organizational Culture (such as in the case of the creation of a new orientation), the idea is to promote a broader understanding of Agility and the development of the necessary skills to support it (Hermansen & Caron, 2004). Every company must thus be able to identify the necessary talent and develop a support for Agility in its Culture, promoting new business practices, and using new technology in order to become agile (Martin, 2015; Rigby, Sutherland, & Noble, 2018). At this point, it is essential to remember the importance of Organizational Culture in providing emotional stability for the workforce of an organization (E. H. Schein, 1984). If Organizational Agility is to demand high flexibility and new working paradigms from the people in an organization, then it is essential to manage the perceptions and capabilities of its leadership and workforce, so that the levels of anxiety are controlled, allowing everyone in an organization to recognize the importance and value sustaining this change. Accordingly, it is no surprise that, while reviewing the literature, there seem to be two main constituents in the creation of an Organizational Culture that is supportive of Organizational Agility: leadership and workforce Agility.

Regarding workforce Agility, Sherehiy, Karwowski and Layer (2007) highlight the importance of developing a workforce which has a positive attitude towards change, new ideas and new technology – a workforce capable of supporting the extension of the concept of Manufacturing Agility towards Enterprise (or Organizational) Agility. Worley & Lawler (2010) highlight the importance of creating a workforce that is receptive to change. To do that, it is important to identify talent and retain the right people, promoting a Culture that values growth and personal development. The authors, however, sustain that much remains to be done (and understood) regarding how organizations deal with the history and Culture of the organization when trying to fulfil the requirements of Agility. Still on workforce Agility, Sherehiy & Karwowski (2014) identify the determinants that influence the level of workforce Agility, concluding that different agile strategies have a different influence. The development of attributes such as autonomy and cooperative relationships are found to have a strong positive impact, while job demand and job uncertainty have a significant negative effect on the level of Agility of the workforce. Similarly, Alavi et al. (2014) have studied the factors that promote an agile workforce. Criticizing the excessive focus put on technical factors, the authors identify the organizational structure and organizational learning capabilities as the main antecedents of workforce Agility and determine a positive correlation between organizational learning and Organizational Agility. Furthermore, they state the importance of stimulating workforce Agility on the basis of knowledge and willingness to learn, which will then allow a quicker response from the people to the changing conditions of the external environments. Finally, other authors have listed different factors that contribute to workforce Agility, again highlighting ideas such as employee involvement (Sumukadas & Sawhney, 2004; Nasomboon, 2014), talent management (Gochman & Storfer, 2014; Martin, 2015; Rigby et al., 2018), and training and the development of technical skills and competencies (Breu, Hemingway, Strathern, & Bridger, 2002; Iravani & Krishnamurthy, 2007; Muduli, 2013).

Several works have also been published on leadership Agility. Joiner & Josephs (2007) define leadership Agility as the ability of the leaders and managers of an organization to be flexible, responsive, adaptable and proactive during times of uncertainty and change. Horney, Pasmore, and O'Shea (2010) describe leadership Agility as a business imperative for Volatile, Uncertain, Complex and Ambiguous (VUCA) business environments. The authors describe agile leaders as those capable of (1) providing guidance across time zones, cultures, and organizational barriers, (2) take risks, investing in talent, knowledge and innovation, (3) maintain focus on employee engagement and (4) make collaboration amongst stakeholders an indivisible part of the Organizational Culture. Additionally, De Meuse, Dai, & Hallenbeck (2010) argue that in the face of a “dynamic, complex, and uncertain

business environment”, leadership skills are subject to continual obsolescence and displacement. To be effective, leaders must be flexible and adapt their behaviors to the environment, developing learning and quickly learning from experience.

More than understanding what defines leadership Agility, it is important to understand that it has a strong influence on the condition of an organization. Nasomboon (2014), for example, finds that leadership commitment strongly affects organizational performance and employee engagement – having thus a strong impact on workforce Agility. Leadership can also positively influence the development of knowledge and practices needed to support organizational learning (McKenzie & Aitken, 2012), building critical skills and identify and develop the talent to support Agility (Kelly, 2012; Rigby et al., 2018). Along with the development of the workforce, strategy deployment is also critical to support the creation of the alignment and “understanding” of Organizational Agility. Doz and Kosonen (2008) highlight the importance of leadership – through leadership unity – in ensuring Strategic Agility. According to the authors, the ability of the leadership team to make decisions fast and implement them without top-level politics or disagreements is vital for the success of an agile organization. This unity is essential to shift business models, and to make that shift successful. For that, leaders need to promote dialogue and transparency, integrating, aligning and caring for the people in the organization (Doz & Kosonen, 2010). Furthermore, leadership is central to managing tensions arising from Strategic Agility. It is up to the leadership to manage and integrate apparently incongruent or paradox objectives and elements that exist in an organization. In the face of this reality, leaders need to view Strategic Agility as a continuous balancing between competing demands and requirements, and, more importantly, need to encourage this thinking throughout the organization (Lewis, Andriopoulos, & Smith, 2014).

In short, the achievement of Organizational Agility is deeply tied to the human side of an organization – even if this relationship has seen limited exploration (Alavi et al., 2014). An agile organization requires strong leadership commitment, a talented and experienced workforce, and a receptive Culture (Rigby et al., 2018). The receptiveness of the Culture will be dependent on the first two components – leadership and workforce. It is up to leadership to create an environment that supports innovation, communication, and teamwork and employee learning (Crocitto & Youssef, 2003), creating an understanding of Agility within the workforce, which, in turn, will be essential to sustain and develop a Culture that is supportive of Agile (Hermansen & Caron, 2004).

3.2.3. Operational Excellence and Organizational Agility

The relationship between Excellence and Organizational Agility has been studied mainly within the broader efforts to explore the behavior of Excellence-pursuing companies towards change. With the identification of some limitations regarding the sustainability of Excellence in the long-term, several works promoted perspectives bringing change management to the orbit of Excellence. These perspectives, although not always developed in the scope of Organizational Agility, provide an important framework for its alignment with Excellence, offering context for the integration of the two concepts.

Identifying several changes in the world, with a strong impact in the business environments, Dervitsiotis (2003) states that there is a need for organizations to develop capabilities for sustainable Excellence in order to survive. To do this, they need to operate in a dual-mode, between Conventional Business Excellence and Sustainable Business Excellence, shifting between the two according to the external business environment: focusing in continuously improving in times of stability, but turning to “survival” mode when turbulent events occur. For that, they need to develop new attributes and capabilities that support resilience and self-transformation. Although not clearly mentioning Organizational Agility, the author highlights the importance of the organization developing complex adaptive systems, promoting a series of identified Organizational Agility enablers such as development of flexible manufacturing systems, new strategies to promote innovation and adaptability, the promotion of employee empowerment, and the and the pursuit of a new organizational mindset. Kalyani and Prakashan Sahoo (2011) also present an outlook promoting a series of agile capabilities to manage change in the scope of Organizational Excellence. More focused on human resources strategies, the authors support the need for any change program to be based on the people in an organization – and include changing their mindset, developing behaviors and managing their motivational levels. To do that, they list knowledge management, the development of new capabilities, and the ability to attract and retain talent as success factors for organizations wishing to sustain change as a core competency. Vora (2013) focuses on the achievement of Business Excellence through sustainable change management. Three pillars are identified to promote this sustainable perspective in the management of change: (1) an enlightened leadership to provide change direction, (2) the development of project management capabilities to manage technical aspects of change, and (3) excellent talent management for implementing the change. On the first pillar, leadership is responsible for driving change efforts, creating the right mindset and attitude, and empowering people, encouraging them to embrace change and reduce their fears and resistance to change. The second pillar focuses on the application of knowledge, skills, tools, and techniques to project activities to meet

requirements, and relates more with the development of the technical aspect of change. Finally, the third pillar is mostly focused on the people in the organization, and in the development of their capabilities. The author states that talent is essential for the management of change, and if it is not properly managed, all change efforts risk failure. While many of these ideas fall within the scope of Organizational Agility, either as enablers or critical success factors, truth is that the author does not mention whether Agility or adaptability in the document.

There are, however, a series of works that present this relationship clearly and directly, while still framed in the pursuit of excellence in times of change. To outline a system to react to the changing demands of customers quickly, Vinodh, Devadasan, Vasudeva Reddy, and Ravichand, (2010) explore the relationship between Excellence and the implementation of Organizational Agility. Considering the volatile conditions that prevail in the globalized world, the authors set Agility as an indicator of Organizational Excellence. In that sense, they establish that any effort to measure Organizational Agility and its evolution is closely linked to the measurement of Excellence. Accordingly, the implementation of a “total agile design system” will demand an assessment to the current organizational capabilities, and its success will be measured in the ability to measure and improve Organizational Excellence after implementation.

In a different perspective, Jaeger, Matyas, and Sihn (2014) propose a new framework for the development of Operational Excellence in the scope of change and sustainability. They suggest a new framework focused on Operations Excellence, a concept that enlarges the perspective around Operational Excellence to include long-term operational success. To achieve this in a sustainably, the authors highlight a citation by Gleich and Sauter (2008), setting Operational Excellence as a key in developing these organizational resources and capabilities, creating the necessary enablers of adaptability. This perspective aligns with the vision shared by Powell and Strandhagen (2012), as they state that Operational Excellence is traditionally more focused on working practices of Lean Management and Continuous Improvement, and argue for the need of, in an evolving market place, considering principles of Agile Manufacturing to meet the demands of increasingly customized products and shorter life cycles. By addressing the similarities and common points of lean manufacturing, Agility and quick response manufacturing, the authors promote an integrated perspective that leverages the best of each paradigm to pursue a 21st century perspective on Operational Excellence that addresses the changes in the marketplace.

More recently, in a study concerning the telecommunications sector in Egypt, Wageeh (2016) found evidence that Organizational Agility factors have a positive impact in Organizational

Excellence, proving a relation of the two concepts. The author explores the different types of Organizational Agility - Sensing Agility, Decision-making Agility, and Acting Agility – and assesses their impact on the level of Excellence of organizations. The study finds that all three types of Agility have a positive impact on Excellence, with a statistical significance relationship being established between the two.

Finally, there have been efforts to develop frameworks of Excellence in the scope of the highly unpredictable business environments – the so-called Volatile, Uncertain, Complex, and Ambiguous (VUCA) environments. Suciu, Adina and Petrescu-Prahova (2011) explore the challenges of change management in a VUCA scenario, claiming that in such an unstable context, organizations need to look for ways to effectively become more agile. While framing Agility as a mix of change management, risk management and, above all, innovation, the authors recognize the importance of frameworks such as the Malcolm Baldrige National Quality Award (MBNQA) to support the pursuit and development of Agility. Increased importance is given to social factors – comprising everyone from top leadership to the workforce – and the impact they have in developing and sustaining these capabilities by integrating an organizational social network analysis into the Baldrige assessment process. Comparably, Saleh and Watson (2017) present a model for Business Excellence in VUCA business environments. Considering the impact these conditions have in the performance of an organization, they set Agility as the primary response to the volatility of the markets. The authors highlight that when the business environments are changing rapidly, companies need to think and react to customer needs quickly and flexibly, focusing on Agility and developing agile capabilities. To do this, three dimensions are identified for sustaining Agility and answering the market shifts: Leadership Agility, Strategy Agility (including change management, dynamic capabilities, innovation and creativity, and follow up using Agile key performance indicators), and People Agility (Including flexible human resources, team resilience, and training and development).

There is also evidence of this relation in the scope of some of the most well know Excellence frameworks by including or giving renovated emphasis to Agility within their central concepts. At this point, both the European Foundation for Quality Management (EFQM) Excellence framework and the MBNQA have included Agility as part of their central concepts. While at the beginning of the 2000's the EFQM fundamental concepts featured "Managing by Processes", by 2019 we find "Managing with Agility" being listed (European Foundation for Quality Management EFQM, 2017). Likewise, the MBNQA has, for a long time, considered "Agility" or "Agility and organizational learning" in its core concepts. However, this incorporation seems to have had limited practical implications, and it is not

clear in the model or in their Excellence criteria how Agility is to be pursued, deployed or sustained. This limited approach has not been able to come through to the manufacturing community, nor did it come close to mark the focus on integrating Organizational Agility as a structural part of Excellence programs.

There are conditions to do this integration smoothly – if not considering it as a plain necessity for successful development of Agility. A few works have explored the requirements for the development of Organizational Agility capabilities, setting it as necessary to build them on previously developed organizational capabilities. In that sense, previously developed enablers and critical success factors of Operational Excellence could provide the necessary bases for the building of Organizational Agility. In this perspective, Vokurka and Fliedner (1998) propose an extension to Ferdows and De Meyer's (1990) version of the sand cone model for achieving competitive priorities and set Organizational Agility as being built on quality, dependability and flexibility. Similarly, Zhang and Sharifi (2000) also regard Agility as an achievement that stands in the use of approaches, tools and capabilities previously developed by an organization, which are then to combined and integrated with new “agile practices”.

In conclusion, the relationship between Excellence and Agility has been often explored as part of broader organizational dynamics – considering not only the broader perspective of Organizational or Business Excellence, but also in the scope of other dynamics such as change management, and under the scope of the study of change and adaptability. However, a number of works directly relating Excellence and Agility, allied to the characterization of the concept of Organizational Agility, and the identification its enablers and success factors, allows to establish a clear connection between the pursuit of superior operational performance (Operational Excellence) and the of Organizational Agility capabilities to ensure its sustainability in unstable business environments. Furthermore, the perspectives supporting the need for previous organizational capabilities to develop Agility, and the interest of Excellence frameworks and awards in Agility uphold this relationship.

3.3. Theory Formulation

3.3.1. Research objectives and findings of the critical review of the literature

As outlined in the previous chapters, the objectives of this research project are (1) to understand if and how can the implementation of Operational Excellence (OpEx) initiatives promote an Excellence orientation in the Culture of an organization in the long term, and (2) establish if such orientation helps to make the organization more agile to changes in the business environment. In the face of these

objectives, and following the findings of the literature reviews so far, a broader research question which synthesizes the project's scope, structure and goals could be defined as:

RQ: Do companies incurring in sustainable Operational Excellence initiatives have more capacity to be Agile, through the transformation of their Organizational Culture?

It is important to dissect this broader question, exploring the theory around it and taking a step by step approach to understanding better how these relationships are built throughout time. In this scope, a critical literature review was conducted in this chapter, focusing on the existing knowledge on the relationships between Excellence, Culture and Agility.

Several vital ideas for the development of the theory resulted from this review. Regarding Operational Excellence and Organizational Culture, it became clear that there is a two-way direction influence between the concepts, with the need for Excellence initiatives to be fitted to the Culture of the organization, and with that same Culture being worked upon in order to better align with the principles of Excellence. Evidence of this relationship is more evidently seen in the implementation phase. However, and assuming a sustainability-focused approach, it would be expected that the relationship would work the same, the difference being that it would repeat in cycles, with new Excellence initiatives being deployed in alignment with the culture, but pushing at the same time for its evolution and for further Excellence-orientation and room for new Excellence efforts.

As for the pair of Organizational Agility and Organizational Culture, the literature addresses the relationship between the two in a different way. Although sustaining that Agility is context depended and heavily reliant on the support of the leaders and associates of an organization, research so far promotes an idea of cultural support rather than the creation of a Cultural orientation to Organizational Agility, as was the case with OpEx. Instead, several works support the creation of an "understanding" of Organizational Agility to be spread out across the organization. Although the need for changes at cultural level is not disregarded in these works, the cultural transformations do not seem to demand such a deep transformational effort as the one sustained in the literature regarding the relationship between Excellence and Culture. Furthermore, and very importantly, these different relationships are not conflicting and seem to allow integration. If the literature supported the creation of a cultural orientation both in the cases of Operational Excellence and Organizational Agility, it would be a conflicting result. However, the creation of a cultural orientation to Excellence does not seem to impede the development of an "understanding" of Organizational Agility. This perspective is based on a strong research line that supports the alignment and integration between Operational Excellence and Organizational Agility. Several authors argue for the need to consider Organizational Agility and its

capabilities as vital characteristics of any organization wishing to attain Excellence in today's markets. There is no evidence on the literature of any constraints to the joint pursuit of both Operational Excellence and Organizational Agility, and no indication of any limitations in dealing simultaneously with the different ways Organizational culture influences each one of them. Accordingly, there is a good ground for exploring the joint relationship of these three concepts, further exploring their interrelations, and for the promotion of an integrative theory around them.

The literature review efforts conducted so far have allowed the characterization of each of the concepts, and the identification of the extent to which the relationships between Operational Excellence, Organizational Culture, and Organizational Agility are currently understood. At this point, to fully pursue the research objectives of this project, and based on the findings of these reviews, it is necessary to formulate an initial theoretical proposition to frame these relationships and to be tested with further research. This theory, at this moment, is supported only on the literature, representing an almost hypothetical scenario for the functioning of these relationships. In order to validate them, further studies, including practical and field studies, are necessary. However, and before advancing to the further development and validation of the theory in the field, it is important to expose the rational thinking behind this theory and define clear research questions that will both transmit the objectives of this project and help to guide the remaining/further research efforts. Accordingly, the next section applies this perspective, presenting the first efforts for the development of theory, and setting these questions.

3.3.2. Theory Development and Research Questions

The relationship between Organizational Culture and Operational Excellence has emphasized the importance of promoting a cultural fit for the successful implementation and deployment of Excellence initiatives. This cultural fit can be promoted in two ways. The first is by adapting the Excellence efforts before implementation (Aziz & Morita, 2016). The second is through organizational learning capabilities, and by promoting the alignment of the Culture with the requirements, principles and criteria of Excellence (Evans, 2010). However, and as demonstrated in the literature, neither of these approaches has been enough to provide a clear understanding or path to success beyond the implementation phase.

Such long-lasting engagement means both initiatives that remain valid throughout time and new efforts being pursued to deepen the engagement with Excellence. There are several changes to sustaining Excellence in the long term (Bertels & Buthmann, 2013; Brown, 2013b). If an organization

is committed to the journey of Excellence, any Operational Excellence initiative should be seen as an ongoing project without a defined finish date or assessment result goal. Despite this perspective, and although there are clearly successful examples of the implementation of Excellence programs and in their use in improving performance (Boulter, Bendell, Abas, Dahlgard, & Singhal, 2005; Hendricks & Singhal, 2008), there is limited knowledge on how can organizations use Excellence to reap benefits in the long term.

It is at this point that the relationship between Operational Excellence and Organizational Agility becomes crucial. If Operational Excellence efforts are to be seen in a perspective of promoting continuous performance improvement, then they should be able to help organizations transform themselves and become more easily adaptable, being able to recognize the changing requirements on the business environments and to do the necessary shift to answer them. The need to keep competitive in the face of sudden and unexpected changes in the business environment sets the ground for the pursuit of Organizational Agility (Yusuf et al., 1999). Agility can help companies prosper in different ways: improving process and product development times, streamlining project management or providing customers with customized products or services. Although some organizations may fear the disruption brought by Organizational Agility, it must not be seen as a threat: pursuing it also means balancing more rigid approaches with improvisation capabilities that foster competitiveness. Creativity and innovation are critical to success in a scenario of rapidly changing business environments (Edivandro Carlos Conforto, Rebentisch, & Amaral, 2016). However, there are still severe limitations in the capacity of the organizations that pursue Operational Excellence to develop the necessary Organizational Agility-related capabilities to promote change in an enduring way, and as a response to external inputs from business environments. Since many of the excellence-bound approaches remain glued to the perspective of time- or goal-framed change, it is urgent to understand if and how the establishment of an operational excellence program can promote in an organization an increased ability to change and become more adaptable. In order to transmit this need into a practical research objective, the following question is defined:

Q1: Is the implementation of an Operational Excellence program able to induce in an organization an enduring capacity to adapt to new business environments?

With Culture being such a key concept for the successful implementation and development of Operational Excellence, it is important to consider its influence in this relation. Culture is a very specific and intrinsic issue in each company, and a company's "behavior" will always be the reflection of that culture. It influences every aspect of the daily life of an organization, including codes, norms, values ad

even behaviors (E. H. Schein, 1984). It is so rooted in the subconscious of associates that it can be tracked into all processes and decisions and ends up defining the company's relationship with itself and with the world. When a sudden change leads to drastic reactions that do not match the established organizational culture, employees tend to resist because they fail to recognize in these sudden strategies the cultural traits that represent the successful framework they are used to. In this sense, and although the positive results of promoting alignment between Organizational Culture and Operational Excellence programs have been proved throughout the world, there is still limited evidence to support if and how this relationship can be promoted in the long term.

Culture cannot be fully managed (Barney, 1986), as it is a unique and unrepeatable character of each organization. However, it can still be managed to a certain extent, and shaped in the long-term by creating a cultural orientation (Homburg & Pflesser, 2003; Gebhardt et al., 2006). The development of a cultural orientation to Excellence, based on sustainable Operational Excellence initiatives, would be the way to do this. Success in the long-term is possible only if an organization works continuously to orient its cultural towards excellence, developing it over time in search of alignment with the principles of Excellence and the continuous search for value creation. It should have different cycles that allow adapting to the changes in the environment, providing the organizations with new ways to deliver value. Accordingly, it is important, at this point, to understand also if these cycles are able to influence of the Culture of the organization over time, increasingly orienting it and setting evolutionary “cultures of excellence”.

If this is true, organizations aiming to sustain OpEx in the long-term should plan and deploy a series of interventions focused on developing this cultural orientation. Each step would focus on creating a stronger alignment between the prevailing Culture and the principles of Excellence, exploring the existing associations and enlarging, at each time, the fit between the culture and the principles and criteria of excellence. From a process perspective, it is an iterative effort that develops, step by step, the Organizational Culture and aligns it with Operational Excellence (Figure 7). This process starts in the early implementation days, when the organization works to create a cultural fit, and follows throughout time, expanding the alignment and ensuring sustainability. Accordingly, there would be a culture before each iteration, and a different culture after it – an increasingly excellence-oriented culture.

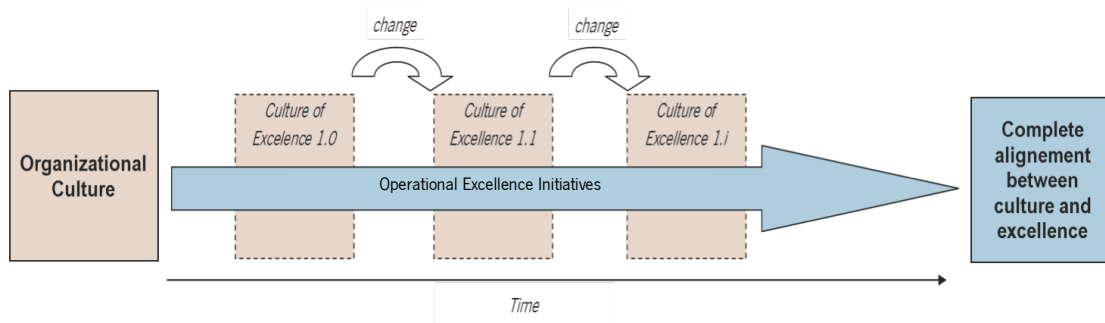


Figure 7 - Proposed evolutionary process of an Excellence-oriented culture. Each change cycle (or iteration) will lead to a different “Culture of Excellence”, promotes further alignment between the Organizational Culture and the principles and criteria of Operational Excellence (adapted from Carvalho, Sampaio, Rebentisch, Carvalho and Saraiva, 2019).

To test this rationale, the focus needs to be put on the Culture of an organization, as it will have a strong influence on the organization's ability to change, and in the sustainability of Operational Excellence. In this sense, we need to shed light into the relationship between Culture and Excellence and understand the dynamics of influence between them. Hence, Research Question 2 is outlined:

Q2: Is the implementation of an Operational Excellence program able to induce in an Organizational Culture an enduring orientation towards Excellence?

These two questions allow us to further deepen our understanding of the relationships between Operational Excellence and both Organizational Culture and Organizational Agility. Furthermore, they allow us to test the conclusion withdrawn from this literature review: that there is a positive, supporting outcome spawning from the Excellence-Culture and the Excellence-Agility relationships. However, it is important to set the ground to understand the outcomes of the integrated relationship between the three concepts. For that, it is necessary not only to validate both these first two questions but to develop an understanding of the characteristics of a Culture that allows this relationship to thrive. For that, and having in mind the elements of an Organizational Culture, it is important, first, to be able to characterize this Excellence-oriented culture. Accordingly, a third research question is set:

Q3: What are the characteristics of an Excellence-oriented culture?

At this point, it is essential to recall that Organizational Agility is context-dependent. Accordingly, it is important to consider that implementing and creating in an organization an enduring capacity to change and adapt will demand the support of the organizational structure, the leadership and the workforce. Accordingly, it is necessary to be conscious of those implications in the Culture of the

company, and to identify the characteristics that make the cultural support possible (Gunasekaran, 1999).

While the previous research question focuses on the integrated perspective of Operational Excellence and Organizational Culture, it is also fundamental to understand if and how an Excellence-oriented Culture can foster continuous and sustained improvement, to the point of making an organization capable to quickly and efficiently adapt to new business environments. More precisely, it is important to analyze which features of an Excellence-oriented most contribute to Organizational Agility:

Q4: What features of an Excellence-oriented culture contribute to inducing in an organization an enduring capacity to adapt to new business environments?

With this fourth question, the integrated perspective on the relationships between Operational Excellence, Organizational Culture, and Organizational Agility gains form. In short, the proposed theory argues that Operational Excellence initiatives, if sustained in the Culture of an organization and promoted in a long-term perspective, will influence that Culture and orient the organization towards Excellence. As a result, the organization will seek ways to adapt to the changes in its business environments, developing capabilities to deal with them and remain competitive. In this perspective, it is expected that the organization develops a good understanding of Organizational Agility and develops enablers and critical success factors related to it.

From this literature review and theory development, this project gains clear research paths to promote the testing and further understanding of the relationships between these concepts. Nevertheless, and before advancing to the field to develop it further, an effort was made to represent these four questions together, providing structure and visual support to the relationships drawn from literature and to the questions themselves.

3.4. Conceptual Model

In this perspective of presenting visual support for the principles behind the research proposal, a conceptual model depicting the relationships between concepts was developed. The idea of this model, formed by three building blocks, is not only to represent the relations between the concepts under study but also to help visualize and better understand the reach of each of the research questions.

Starting with research question 1 (Q1), the aim is in understanding if and how an operational excellence program is capable of leading to the increased agility in organizations, allowing an organization to succeed in a long-lasting way through the development and deployment of Organizational Agility capabilities. Organizational Agility is the ability to adapt to changes and to use

them as opportunities to gain competitive advantage (Arteta & Giachetti, 2004). In the face of today's fast changing market, any organization aiming at being excellent should be able to do so. In this sense, our perspective is that an operational excellence initiative should set among its goals the development of agile-related capabilities and the systematization of the ability to change. Accordingly, this research question intends to establish a relationship of influence between sustainable Operational Excellence initiatives and the achievement of Organizational Agility (Figure 8).

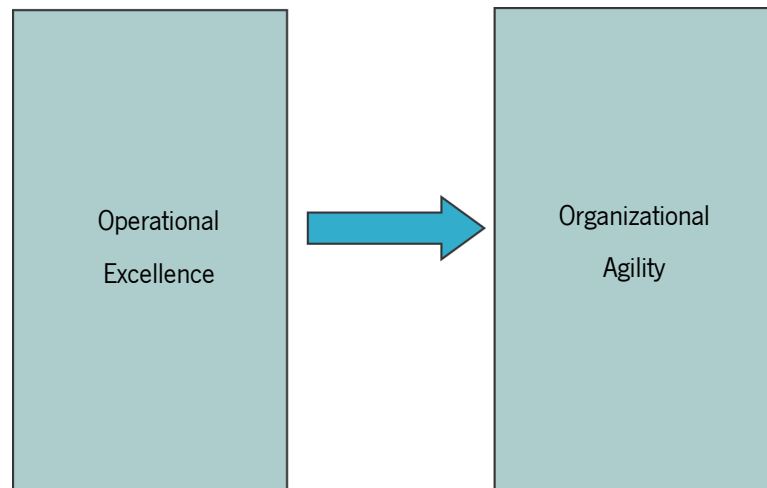


Figure 8 - Proposed relationship between Operational Excellence and Organizational Agility: In the face of today's fast changing business environments, organizations pursuing Operational Excellence need to include in those efforts a focus on Organizational Agility (adapted from Carvalho et al., 2019).

However, before advancing towards agility and adaptability, it is necessary to clarify how to sustain Operational Excellence initiatives and manage them in the long term, namely in regards to their relation with Organizational Culture. To ensure this sustainable perspective, the Operational Excellence program must continuously strive for alignment with the Organizational Culture. If the strategic choices representing and deploying Excellence do not fit the prevailing Culture, chances are there will be resistance from the workforce. As a consequence, these initiatives may fail to develop into practices. That would mean not only the failure in sustaining the Operational Excellence initiative but also – and following the proposed theory – limit the quest for Organizational Agility. Considering the influence of Operational Excellence programs in iteratively transforming and orienting the Culture (Figure 7), it is essential to bring the perspective of cultural evolution to the model. Accordingly, the blocs represented in Figure 9 intends to represent the dynamics of this change process, which are addressed in research questions 2 (Q2) and 3 (Q3).

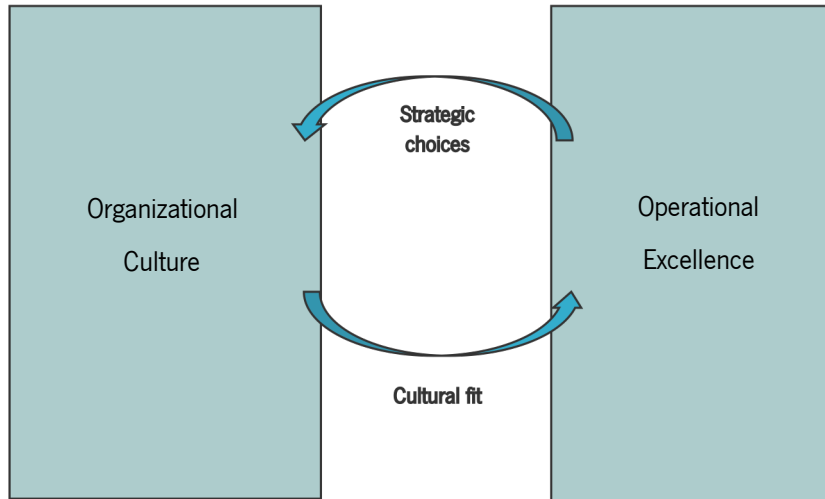


Figure 9 - Proposed relationships in the process of cultural orientation towards sustainable Operational Excellence: as new Operational Excellence initiatives and strategies are deployed the Organizational Culture will be increasingly oriented to the Principles of Excellence. This will happen across several iterations, in a cyclical process (adapted from Carvalho et al., 2019).

It is through this development of a cultural orientation towards sustainable operational excellence that organizations would be able to develop, an enduring capacity cope with change and become agile. In this sense, it is necessary to understand if and how can cultural elements help an operational excellence initiative remain sustainable and valid over time by developing agile capabilities. This phenomenon, addressed in research question 4 (Q4), is represented by the full view of the conceptual model, in Figure 10. The cultural support for this capability is considered within the Excellence-oriented culture, resented in the model by a dotted line. This orientation spawns from the iterative evolution presented in Figure 7 and Figure 9, and supports both the sustainability of the Operational Excellence efforts and, in a perspective of remaining excellent and creating value for a market under constant change, the creation of an “understanding” that allows the development and deployment of Organizational Agility capabilities.

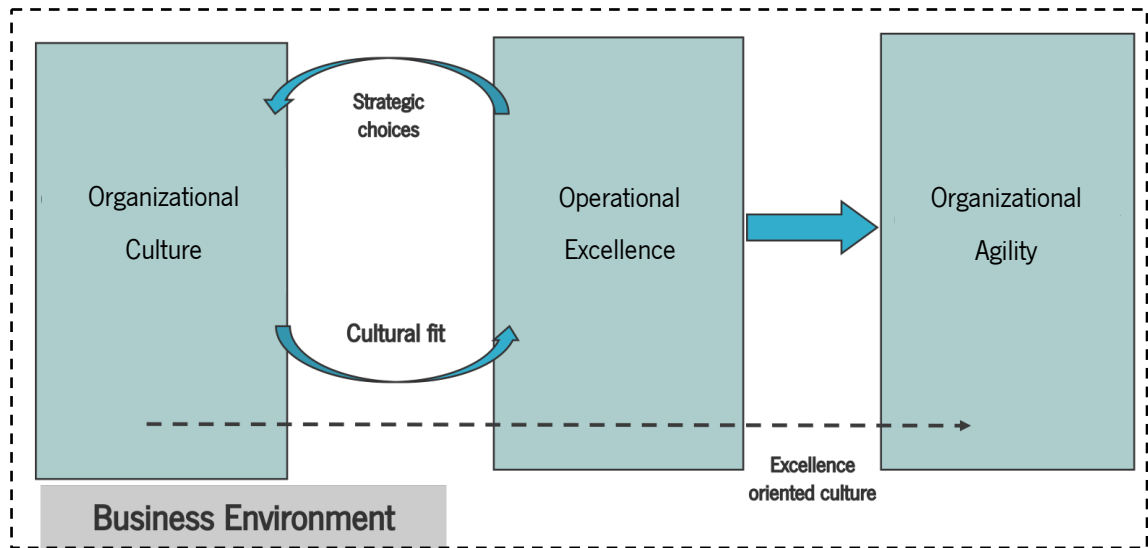


Figure 10 - Conceptual Model representing the proposed relationships between Operational Excellence, Organizational Culture, and Organizational Agility (adapted from Carvalho et al., 2019).

With the model outlined, it is essential to revise the proposed relationships, describing a step-by-step its process and promoting a better understanding of the proposed theory. It initiates with the decision of an organization to pursuit Operational Excellence– more clearly, with the deployment of a series of strategic choices that develop and deploy in the organization the principles of OpEx. These strategic choices, as seen in this chapter, need to match the prevailing Organizational Culture to be well-received and adopted by the people in the organization. As this happens, they should not only foster Operational Excellence but also influence the Organizational Culture, promoting in it a growing orientation to Excellence (Figure 7). As a result, there would be in the organization a stronger cultural fit with Operational Excellence, allowing a deeper alignment with it, and new strategies to be deployed in its scope.

As this process is repeated, an Excellence-oriented Culture is developed, and the gap between the operations of an organization and the principles and criteria of Operational Excellence is increasingly closed. The cyclical process helps to shift the emphasis on Operational Excellence, steering it away from the focus on implementation and towards a perspective of long-term sustainability. It is this perspective of sustainability that the last step of the model represents. The sustainability of Excellence initiatives is associated with the ability to sense and manage changes. Organizations aiming to be sustainable need not only to ensure alignment in their internal environments but also with their external context, as success in the long term will be based on the ability to manage change. To do it, a series of organizational capabilities are necessary, with most of

these capabilities can be found in the concept of Organizational Agility. Accordingly, as an excellence-oriented organization understands that it needs to manage change to deliver value continuously, it starts to focus on the development of such capabilities. The process is thus complete as Excellence-oriented organizations develop and deploy the principles and practices of Organizational Agility in their effort to remain valid and competitive in highly unstable demanding markets.

3.5. Summary

Over the last decades, Operational Excellence initiatives have been seen as a source of increased competitiveness and the achievement of superior results. However, too often, Operational Excellence initiatives have ended up looking like ‘ephemeral’ projects. Organizations neglect the alignment between OpEx initiatives and their Organizational Culture, thus failing to guarantee their success in the long-term. In the face of these limitations, a new perspective is necessary. This chapter addresses the development of the theory to support it.

The perspective it presents looks for sustainability in the use of Operational Excellence, promotes the continuous development of the Organizational Culture, and focuses on the development of Organizational Agility capabilities. Based on the existing literature, the theory developed in this chapter sustains such a view. It has a strong base on previous research available on the concepts of Operational Excellence, Organizational Agility and Organizational Culture, their relationships, and the broader organizational dynamics around them – including change, business and corporate management, and a series of social factors with impact in the life or technical and technological organizations. Nevertheless, a profound understanding of the dynamics and relationships that affect these concepts cannot be dissociated from the scenario and context in which they happen. Accordingly, and while there is a good ground to support the proposed theory, further development in an industrial setting, with the collection of practical evidence, is necessary. The next chapter outlines the research design to obtain such evidence.

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4. Research Design

4.1. Intro

Based on a broad review of literature on Operational Excellence, Organizational Culture, and Organizational Agility, a theory synthesizing the existing knowledge on these concepts and their relationships was proposed. It offers a novel perspective of three-way integration and suggests a series of links to explain the organizational dynamics around these concepts. However, it lacks the support of practical evidence, evidence that can both provide a more profound understanding of the current conceptual framework, and further promote the development of theory.

The development of the theory so far has led to the suggestion that the sustainable pursuit of Operational Excellence leads to the creation of an enduring Excellence-oriented Culture and, as a consequence of such orientation, to an enduring capacity to adapt to changes in the business environment. However, there needs to be an effort to frame this theory in the industrial contexts in which organizations now live, and collect empirical evidence that sustains and helps to explain better the proposed links – as well as account for possible dimensions that have not been identified from the literature. In that scope, this chapter presents the research design efforts, covering the methods, methodology and frameworks used to collect, analyze and reflect on such evidence.

Taking the same step by step perspective that led to the definition of the four research questions and of the conceptual model, the next sections will present the structure and rationale for the development of the research design.

4.2. Research Design

4.2.1. Introduction and units of analysis

In order to ensure a simple, transparent, and repeatable process for performing our field research, it is necessary to outline it, describing the methods adopted for data collection and analysis. While it needs to be consistent and well-defined, this process must also allow some room for adaptation and improvement, especially after a case is concluded and its reflection is promoted. Accordingly, we established the broader lines to steer our practical research work, focusing on having a descriptive approach rather than a prescriptive, rigid guide.

The first step was to define the set of potential partner companies. The background of this work is today's quickly changing business environments. Accordingly, attention was put in sectors/industries in

the frontline of exposure to these changes. The list of potential sectors included automotive, aeronautics, electronics, software, and pharmaceutical industries, and organizations in heavily regulated areas and increased technical requirements, such as energy or waste management. There was an effort to avoid repeating sectors, since the concepts under study are found across different business contexts, being industry independent.

The second point to be considered in selecting a company was its fit to the research framework. This was assessed, with basis on publicly available documents – reports, newsletters, corporate website and media – that provided evidence of commitment to Operational Excellence and Organizational Agility, and to the Organizational Culture. Other topics of interest in the organizations that could promote the fit to the research project included change management or adaptability.

Apart from the industry and the focus on Operational Excellence, Organizational Agility, and Organizational Culture, the characteristic to be assessed included the number of years of experience of these organizations in their current activity. Initially, it was defined that participating organizations should have more than 15 years of experience with a determined product or project. This meant to ensure that they had well-established operations and had faced different technological waves and economic cycles. Later, however, and as outlined in this and in the next chapters, there was an effort to consider organizations at different stages of operation – including younger organizations, working with early stage products and operations; and organizations that had changed part of their core operations recently. By including such organizations, this research project was able to consider the relationships between concepts in a time when organizations are yet starting to explore them – rather than studying only their dynamics after several iterations – and offers a clearer understanding of the relationship between Operational Excellence, Organizational Agility, and Organizational Culture.

4.2.2. Research methods

The characteristics of the research field are crucial for the research design. Accordingly, it is necessary to identify, explore, and understand them – starting by analyzing the objectives of a research project and situating the boundaries of its research environments. This research project aims to (1) to understand if and how can the implementation of Operational Excellence (OpEx) initiatives promote an Excellence orientation in the Culture of an organization in the long term, and (2) establish if such orientation helps to make the organization more agile and fit to adapt to changes in the business environment. Given these objectives, this project can be described as dealing with organizational research.

Organizations are complex, open, and dynamic systems that are dependent on a context that presents both opportunities and constraints (Swanson & Holton, 2005). In this sense, the research design will be influenced not only by the research objectives, but also by the complexity and limitations of the organizational contexts under study, and the diversity and accessibility of sources of information. Romme (2003) argues that there are two modes of engagement with organizational research: the science mode and the humanities mode. The science approach is focused on the understanding of organizational phenomena, uncovering general patterns that help to explain them. The humanities approach is dedicated to portraying, understanding, and critically reflecting on the experience of the people in the organization. These two engagement modes allow to approach two different sides of an organization (technical and human), both essential for the understanding the dynamics between the concepts of Operational Excellence, Organizational Culture, and Organizational Agility.

At this point in the theory development process, the forces and relationships between these concepts are only known and modelled to a certain extent. Their further understanding is dependent on the collection, treatment, analysis and assessment of the practical evidence observed in an industrial context. In order to access this evidence, a field study is required: the phenomena under study, being a result of context-dependent organizational dynamics, cannot be simulated in a computer or laboratory.

Within field studies, a few other factors will help define the fittest research methodology. One of these factors has to do with the fact that the research team cannot have control over the events – thus excluding also a quasi-experimental approach (Yin, 2003; J. Á. Carvalho, 2018). Researchers do need to be present in the field in order to observe, identify and uncover the dynamics and reasons that lead to it. However, under no circumstance may the research team either participate or influence any outcomes, as this would mean an external interference that detracts reality (Yin, 2003). Finally, it is necessary to consider the chronological focus of the research: although some historical and archival data may be valuable, it focuses on the understanding of these relations in their contemporary contexts.

In reference to these characteristic and constraints, Table 9 presents a series of different research methods and the circumstances under which each one would be better implemented. According to it, and combining the objectives of the research project, the limitations of its environment, the requirements of a non-participant observation, and the chronological focus, the best is offered by the case study methodology. In the next section, the design and planning for the use of this methodology is outlined.

Table 9 - Relevant situations for different research methodologies (adapted from Yin, 2009; Swanson and Holton, 2005; Carvalho, 2018).

Method	Where does the study take place?	Type of questions research objectives try to respond?	Requires control of events?	Focuses on contemporary events?
Experiment	Laboratory	How, Why?	Yes	Yes
Quasi-Experiment	Field	How, Why?	Yes	Yes
Survey	Field	Who, What, Where, How Many, How much?	No	Yes
Archival analysis	Archives, Historical	Who, What, Where, How Many, How much?	No	Yes/No
History	Archives, Historical	How, Why?	No	No
Case study	Field	How, Why?	No	Yes

4.2.3. Case study

The case study methodology is a research strategy that focuses on understanding the dynamics of a certain setting (Eisenhardt, 1989) and which, in the organizational context, can be useful in capturing the knowledge of practitioners (Cepeda and Martin, 2005). The use of the case study methodology may involve a sole or several cases, and allows different levels of analysis (Eisenhardt, 1989; Yin, 2003). Furthermore, it provides room for the incorporation of different data collection methods – allowing a better fit to situations where the collection relies on multiple sources of evidence (Yin, 1984, 2003) and where the data gathered from those sources need to converge in the face of triangulation. Case studies are adequate for research situations that, like in this case, aim at building theory about phenomena occurring in a real-life environment and over which researchers have no control (Yin, 2003).

Conducting a case study encompasses several steps. Yin’s case study protocol (2003) includes (1) case study design, (2) preparation for data collection, (3) collecting evidence, (4) analyzing evidence and (5) reporting. In another example, Eisenhardt (1984) proposes a more detailed, 8-step roadmap for building theory from a case study. The steps are (1) getting started, (2) selecting cases, (3) crafting instruments and protocol, (4) entering the field, (5) analyzing data, (6) shaping hypothesis, (7) unfolding the literature (comparing results with existing and/or conflicting literature), and finally, (8) reaching closure. Nonetheless, the case study methodology can be limited in describing the process of

building theory – especially the essential recursion and backtracking that it demands. In the face of such limitation, the structured-case approach is proposed. This approach provides a “usable and useful representation of the process of inducing theory from the fieldwork” (Carroll & Swatman, 2000). It involves the development of an original conceptual framework, which will be reflected upon after each case, in an effort to include new perspectives and further develop the theory from the collected evidence. The structured-case approach intends to assist in the development of high-quality case study research. It is composed by three elements: a conceptual framework to provide the theoretical foundations of the research (in this case, the theory and conceptual model presented in chapter 3), an iterative cycle that continuously refines the research efforts and the conceptual framework (Figure 11), and a final analysis that ties the research results to the original theory (Plummer, 2001). The structured-case method encompasses a research cycle with four stages: (1) planning, (2) data collection, (3) data analysis, and (4) reflection. It is this research cycle that allows the iterative approach to theory development, with the last stage allowing a revision of the planning before reinitiating the research process on the next case (Carroll & Swatman, 2000).

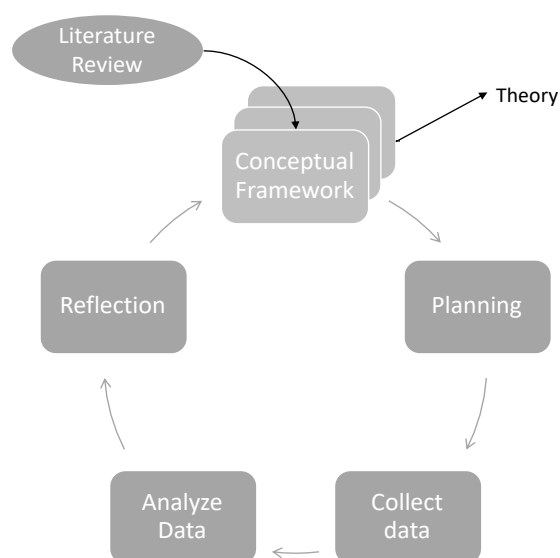


Figure 11 - The structured-case research cycle (adapted from Carroll and Swatman, 2000).

Each of these steps will has a vital role in ensuring the high-quality level of the research. The planning stage includes the definition of the research design of the first and succeeding iterations, including the case study subjects and the methods for collection, processing, and analysis of data (Plummer, 2001; Cepeda & Martin, 2005). The data collection phase considers the efforts to collect evidence. The data collection process is adjusted to the reality of the context, exploring new

opportunities or following emergent themes (Carroll and Swatman, 2000). Every case will have aspects that are its own, thus leading to the need of promoting in-depth studies that will required using and integrating different data collection methods. Next, the data analysis stage involves treating and coding the information collected, organizing and summarizing it to highlight its meaning. The data analysis needs to be related to the conceptual framework, so that the findings are linked to the aims of the research project. The concepts in this framework are initially used to guide the analysis, but new research directions or concepts are incorporate as the research (and the conceptual framework) evolves (Carroll and Swatman, 2000). Finally, the reflection stage considers the revision of the theory in light of the newly collected evidence, promoting its further development and evolution. Reflection is essential in the scope of theory building, allowing to formulate new questions about meaning, alternative explanations, the addition of new concepts, and the inclusion of contradictory evidence (Plummer, 2001). There is a tendency of researchers to look for confirmatory evidence. In this sense, deliberate reflection and critical analysis of any interpretations are seen as necessary for effective theory development. Only through a critical reflection there can be progress in the conceptual framework, ensuring that the accumulated knowledge is incorporated into the theory, and leading to a more accurate representation of the reality of the phenomena (Carroll and Swatman, 2000).

It is through the repetition of this cycle that the theory is developed, providing increased confidence on its ability to understand and portray the dynamics of an organization. Furthermore, this cycle allows the research team to improve not only the conceptual framework, but also the data collection efforts and the data analysis methods (Carroll and Swatman, 2000; Plummer, 2001).

In order to provide a clear, detailed and transparent account of this process, the data collection and analysis methods are better explored in the next sections. The reflections, general planning and descriptions of each case study are presented in chapter 5.

4.2.4. Sources of evidence, data and research quality

With the objective of understanding a context-dependent phenomenon, and especially considering the need not only to comprehend specific organizational phenomena, but also to reflect on the experience of the people in the organization, the research methodology that was found that best fits this project was that of case study, reinforced, for theory building purposes, by the structured-case approach. However, it is necessary to consider that organizational contexts offer the opportunity to gather evidence from a wide variety of sources. Table 9 shows how questionnaires, historical studies or archival analysis also fit the objectives of this research project, being valid methods in the efforts to

promote a, understanding of the organizational phenomena under study by addressing the questions of “how?” they happen and “why?” they happen in a determined way. In this sense, and considering that the case study methodology provides room for the use of different data collection methods, a variety of complementing data collection methods need to be considered.

In the face of multiple sources of information, it is important to address the questions related to the use of qualitative and quantitative data. Each method is normally associated with certain research types and objectives (Table 10). Qualitative Research is seen as being more fit for exploratory research, dealing with efforts to gain an understanding of underlying reasons, opinions, and motivations. Quantitative research, in its turn, is more often linked to the need of quantifying a problem and generalizing its results for larger populations (Flick, 2007). Qualitative research allowed us to understand in depth a certain problem and its environment, but the results are very context specific and unsystematic. On the other hand, quantitative methods allowed for a more systematic collection of measurable data. In general, qualitative research allows to formulate facts and to uncover patterns in research, but is less capable of presenting an understanding of the reason or motivations that lie deep in the source of the problem (Ottosson, Björk, Holmdahl, & Vajna, 2006).

Table 10 - Quantitative and Qualitative methods for assessing/studying Organizational Cultures (adapted from Balthazard & Cooke, 2004).

Qualitative	Quantitative
In-depth understand on each unit;	Ease of cross-sectional assessments;
Access and use of units' own terms to describe themselves;	Replicability on different units or cases;
Amenability of a method for exploratory research on issues and processes where there is little information.	Frame of reference for interpreting gathered data.

The use of case study methodology in this project, although primarily based on qualitative methods, allowed also the integration of quantitative methods (Yin, 2003). In this sense, it is important to frame the scope and boundaries in which each method was used. While the development and deployment of each method is presented ahead in section 4.2.5, it is important to highlight at this point how qualitative and quantitative data were considered and integrated into this research project. Given its objectives, and considering the need for in-depth analysis of each unit, their context-dependent reality, and sources of information that are not always immediately accessible, a qualitative approach

was predominant (Balthazard & Cooke, 2004), and qualitative methods were used to gather most of the data collections efforts and the cross-case analysis and reflection. Nevertheless, the use of quantitative methods allowed to collect measurable data to support a better understanding of each organization, allowing, within each case, to uncover trends and patterns and to reinforce the conclusion gathered from other sources through qualitative efforts.

The use of both quantitative and qualitative allowed to access and explore different sources of data and helps to improve the quality of the research by allowing triangulation. Triangulation is the study of the same phenomena using different collection methods and allows to improve the consistency of constructs and results by crossing the resultant outputs (Bogdan & Biklen, 2003). Triangulation, here based on the combined use of different collection methods, allowed maximizing the confidence on the results, overcoming their limitations and increasing the research quality.

These efforts to increase the research quality also meant looking for consistency, eliminating bias and promoting a concise definition of the constructs under study. In other words, this meant ensuring the validity and the reliability of the research project.

Validity is understood as being the extent to which an account accurately represents the phenomena under study, and reliability referring to the degree of consistency and stability of the results (Silverman, 2013). In terms of validity, is it necessary to address the cases of construct validity, external validity and internal validity. Construct validity considers the definition of the concepts or constructs under study, and the ability to use them transversely and with a clear understanding of their meaning and boundaries. External validity, on its turn, deals with knowing if and up to what extent the findings of one case are generalizable. And internal validity deals with the threat of ignoring third party factors (not considered in the project) that can influence the measures under study (Yin, 2003; Trochim, 2002). Validity issues were addressed since literature review efforts started, in the optics of identifying the precise definitions and boundaries of each concept under study (Organizational Culture, Operational Excellence and Organizational Agility – construct validity), identifying possible factors of influence over them and over the outputs of the study (internal validity), and defining the limitations in generalizing results from cases with such strong context dependency (external validity). Nevertheless, and as the project unfolded, they were be constantly considered.

As for reliability, it was sought as the research team made all efforts to guarantee that another study, using the same procedures and being unbiased, will achieve the same results (Yin, 2003). These efforts meant focusing on the consistency and repeatability of the research, guaranteeing consistency between different observers and observations, and looking for the stability of the measures

from case to case – confirming that different forms of acquiring data show the same or consistent outputs. In this perspective, the remainder of this chapter (as well as the general description of the case study structure in the next chapter and in Appendix V) is designed to provide a detailed description of the data collection methods, the units of analysis and their detail (constructs), and the analysis and review process. All procedures followed during this process are documented and logically justified. All relevant information made available to clarify to the maximum extent each step of the process and allow its replication.

4.2.5. Data collection methods

With multiple data sources available, it is important to consider the different data collection methods that can be of use in retrieving them – as well as identify each method's strengths and weaknesses. To better identify the possible sources of evidence, it is essential to return to the perspective of the two modes for engaging in organizational research: the science approach, more related to the technical side of an organization and focused on understanding the organizational phenomena and uncovering general patterns that help to explain them; and the humanities approach, which minds the human side of an organization and focuses on portraying the experience of its people.

These efforts for collecting evidence will be linked to the research approach. The science approach, focused on organizational phenomena, will look for empirical objects, evidence with well-defined properties which can be studied from an outside position. The humanities approach, on its turn, will focus on the discourse of the workforce as a source of information (Romme, 2003). In this sense, a series of data collection methods were considered. Observation and the review of organizational documentation and archives were identified as possible sources of evidence focused on the understanding of the organizational dynamics under study. The use of interviews, questionnaires, and focus groups was identified primarily in the scope of portraying and understanding the human experience of the workforce but also allowed to collect critical information to understand these organizational phenomena. In this scope, it is important to note the evidence resulting from the humanities approach needs to be integrated with the evidence from the science approach, as their triangulation will add value and increase the validity of the constructs used in this project and the outputs of the research. Accordingly, these methods will focus both on understanding the human experience of the organization and add relevant evidence to the understanding of the organizational dynamics. Table 11 lists these different data collection methods, outlining their strengths, weaknesses,

and well as their sources or previous usage in similar research. Following the table, a short reflection regarding the use and deployment planning for each method in this project is presented.

Table 11 - Data Collection methods (Adapted from Yin, 2003; Viller and Sommerville, 1999; Campbell, Greeson, Karim, Shaw, and Townsend, 2013).

Data Collection Methods	Strengths	Weaknesses	Similar usage in Literature
Method: Document review Sources of evidence: Processes, Work Instructions, tools and Frameworks, Award Applications, etc.	Can be accessed and reviewed repeatedly (stable); Exact and precise; Not created as a result of the case study.	Biased selectivity, if collection is incomplete; May reflect (unknown) bias of author; Information may be deliberately withheld due to confidentiality reasons.	Bou-Llusar, Escrig-Tena, Roca-Puig, and Beltrán-Martin (2009); Shingo Institute (2016); European Foundation of Quality Management (2019); National Institute of Standards and Technology (2019).
Method: Archive review Sources of evidence: Archives, historical records.	Stable, exact, and precise; Unobtrusive, little or no scheduling issues; Long span of time, many events, and many settings.	Biased selectivity and reporting; Information may be deliberately withheld due to confidentiality reasons.	Pettigrew (1979); Shingo Institute (2016).
Method: Questionnaire Sources of evidence: Workforce	Quick and inexpensive way to get information from a large number of people; Insightful, provides perceived causal inferences and explanations.	Bias due to poorly articulated questions or to rationalized self-report; Questionnaires are frequent in originations and may find resistance or take longer to answer to.	Denison (1984); Detert, Schroeder, & Mauriel (2000); Reijers (2006); Shahin & Zeinali (2010).
Method: Focus groups Sources of evidence: Workforce (groups)	In-depth information; Discussion among a diverse group of people can lead to insights that you would not get from individuals; Relatively low-cost and low-time investment.	Results will be influenced by group dynamics, requires skills in group facilitation; Interpreting the group discussions can be challenging.	Jacobson, Butterill, and Goering (2004); Jayne & Dipboye (2004); Buchanan & Bryman (2007).

Method: Interviews Sources of evidence: Workforce (individual)	In-depth information; Direct focus on case study topics; Provides perceived causal inferences and explanations.	Bias due to poorly articulated questions; Inaccuracies due to poor recall; Interviewee may give what interviewer wants to hear.	Ouchi and Wilkins (1985); Cooke and Rousseau (1988).
Methods: Observation and Ethnography Sources of Evidence: Behaviors, Values, Beliefs, Rituals, Language, Physical Artifacts	Insightful into the work as it is actually performed – actual behaviors versus self-reports; Access to cultural features and technical operations; Access to language and terminology of the user; Deep uncover of subtle features of the social nature of Work.	Is time consuming, a broad coverage may be difficult without a team of observers; Requires clear definitions of the elements to observe; Requires good observation skills and consistency across observations; Results with a great deal of detailed descriptions make them hard to communicate.	Wilkins & Ouchi (1983); Schein (1984); Homberg & Pflesser, (2000); Scott, Mannion, Davies, and Marshall (2003); Viller and Sommerville (2003); Blomberg, Giacomi, Mosher, and Swenton-Wall (2017).

4.2.5.1. Interviews

Interviews are the best way to access to an individual’s experience as a member of an organization, allowing an understanding of the certain behaviors, practices or impressions. They provide a direct focus and “first-hand” data on case study topics, and allow to explore in-depth certain phenomena (Yin, 2003; Campbell, Greeson, Karim, Shaw, and Townsend, 2013). Furthermore, by putting the researcher and the subject face to face or in direct contact (some interviews, due to logistical constraints, were made via phone), this method allows to create some empathy around the research and motivate the respondent to answer (Więcek-Janka, 2015). On the opposite end, there are some disadvantages. The interviewee may give what perceives as being what the researchers want to hear, or there may be inaccuracies due to poor recall or knowledge of an event (Campbell et al., 2013).

There are some challenges to overcome while using this method. Interviews are time-consuming, demanding more availability from both the researchers and the interviewee. It demands preparedness from the interviewer, both to collect and analyze data, to avoid bias. Furthermore, is not a typical situation of the work life, meaning a disruption of the routine, and the individual approach may be uncomfortable for some interviewees (Patrick et al., 2011; Więcek-Janka, 2015). To avoid some of

these challenges, there was an effort to adapt the questions to the reality of the organization. In this sense, interviews (and in a similar way, questionnaires and focus groups) were conducted more often towards the middle of the case study and thereafter, once an initial assessment of the organizations had been made. In order to avoid an ad hoc approach, leading to poorly articulated questions or to difficulties in the treatment of the collected data, a semi-structured approach was used. Semi-structured interviews allow the researcher to have some degree of definition around the matters to be asked, but still allows some flexibility in the issues to be addressed by the interviewee (Longhurst, 2010). Accordingly, a series of themes and a few core questions were defined from the beginning, but room was left to explore other issues, both by the researcher and by the initiative of the interviewee. The draft of a general semi-structured interview, with such questions and themes, is presented in the Appendix VI.

Interviews were used at all levels of the organization (associates, managers, and leaders). While the number of participants varied in an organization, there were efforts to guarantee that, through the use of interviews, questionnaires, and focus groups, a minimum of 20% of an organization's workforce was covered.

4.2.5.2. Questionnaire

Questionnaires are powerful tools to collect a large quantity of data from human subjects in a non-invasive way (Campbell, Greeson, Karim, Shaw, and Townsend, 2013), being a low cost, efficient, and fast methods for data collection (Sue and Ritter, 2012). Questionnaires allow a direct focus on topics under study and provide insights into an organization (Yin, 2003; Campbell, Greeson, Karim, Shaw, & Townsend, 2013). On the other hand, some of these advantages have a downside: questionnaires have become very frequent in organizations, leading to saturation (Yin, 2003). Furthermore, they are exposed to different kinds of bias, derived from poorly articulated questions, rationalized and self-reported answers, and inconsistently applied criteria (Campbell et al., 2013; Skaaning, 2018).

Questionnaires were considered within the efforts to cover, through primary data (excluding observation), 20% of the workforce (associates, managers, and leaders), and were deployed both physically and online. The use of these methods tapped into two different groups: associates and managers. Although similar questionnaires were distributed to these groups, data were treated separately in certain conditions, to triangulate data and help understand some behavioral observation or interviews/ focus groups insights. Questionnaires were distributed both physically and online.

The questionnaire was structured in 4 sections, each focused on understanding a different dimension, targeting both the experience of the workforce within the organization, and need to explore questions regarding organizational phenomena, mainly the possible relationships between Operational Excellence and both Organizational Culture and Organizational Agility, and the results and characteristics of those relationships. The first groups focus on exploring the social climate of the organization, understanding the perspective of the workforce regarding the work environment and the experience of working in the organization. The second and third groups focused on uncovering, respectively, the level of engagement and participation of the workforce in organizational improvement activities, and their perceptions and understanding of strategic initiatives and results. Finally, the fourth section presents a Cultural Relation Matrix, aiming at quickly assessing the level of cultural alignment of a series of concepts. These sections are presented in Table 12, with supporting literature for each section and the elements it considers. A draft of the general questionnaire (later adapt to the reality of each organization) can be found in Appendix VI.

Table 12 - Questionnaire Dimensions, Elements and respective sources in literature.

Section	Sources	Elements	Sources
Social Climate	Cooke and Rousseau (1988); Tesluk, Farr, and Klein (1997); Shingo Behavior Assessment Scale (Cultural Enablers) (2016).	Work Environment; Health and Safety; Reward and Recognition; Commitment; Satisfaction.	McCormack (2001); Harter, Schmidt, & Keyes (2004); Reijers (2006); Harter & Agrawal (2011).
Workforce empowerment and participation	Carrier (1998); Peters and Waterman (1982); Shingo Behavior Assessment Scale (Cultural Enablers) (2016).	Employee empowerment; Employee engagement; Active participation; Motivation.	Tesluk <i>et al.</i> (1997); Carrier (1998); Detert, Schroeder, and Mauriel (2000); Shanin and Zeinali (2010).
Perceptions and understanding over strategic initiatives and results	Khazanchi, Lewis and Boyer (2007); Shingo Behavior Assessment Scale (Enterprise Alignment) (2016).	Performance; Information access; Strategy alignment; Results.	McCormack, (2001); Reijers (2006); Khazanchi, Lewis and Boyer (2007).

Cultural Relation Matrix	Shingo Behavior Assessment Scale (Enterprise Alignment) (2016); Shanin and Zeinali (2010)	Cultural perceptions; Cultural orientation.	Detert, Schroeder, & Mauriel (2000); Reijers (2006); Shahin & Zeinali (2010).
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4.2.5.3. Focus Groups / Group Interviews

Focus groups are a source primary of data that allows the collection of new information, with relative depth, to a research project. Although not allowing the same in-depth perspective as individual interviews, focus groups have other advantages: promoting a discussion within a group of people can lead to release of inhibition and allow insights that would not arise from individual interviews; at the same time, they offer a method that involves relatively low cost and little time investment (Wilcox, 1991; Campbell et al., 2013). On the other hand, it requires the ability to lead and facilitate a group and interpreting the group discussions can be challenging (Campbell et al., 2013).

In the scope of this project, focus groups were used mostly within the associates and middle management levels. Nevertheless, occasionally these methods were deployed at the leadership level, in a “group interview” perspective, normally with 2 to 3 people involved. Groups were designed to have 10 people, although some variability was allowed, normally leading to smaller groups. Together with interviews and questionnaires, focus groups were used to gather data in considerable quantities, covering a minimum of 20% of the complete workforce.

4.2.5.4. Documentation and Archival Review

The review of documentation – either contemporary or historical – is a valuable way to collect stable, exact and precise information, no matter how frequently it is accessed. Furthermore, it is unobtrusive, requiring little engagement of the organization and its people. Furthermore, and in the case of historical and archival records, they allow access to events occurring in a long period (Yin, 2003). However, it is necessary to note that documental information may not always be easily accessible (or made accessible) by the organizations. Furthermore, this data allows only limited understanding, and its analysis can take considerable amount of time (Campbell et al., 2013).

Documentation, by not being the products of observations and notes created by the research team, guarantees some freedom from researcher bias and may help in the triangulation with other sources of data. However, other types of bias may arise: the selectivity of the documents and the possibility that

such documents reflect an unknown bias of its authors, especially within an organizational context (Yin, 2003).

Documents considered in this project include, amongst others, financial and strategic reports, work instructions, Quality, Operational Excellence and Agility standards, frameworks, and assessment reports, projects deliverables and reports, training programs, and newsletters or other artifacts of internal media.

4.2.5.5. Observation and Ethnography

Direct observation is an insightful approach to collect data and gather information on how a group, strategy or tool works. However, there are a few challenges associated with it: it is time-consuming, requires good and consistent observations, and a clear definition of the elements to observe (Viller & Sommerville, 2003; Campbell et al., 2013)

Together with observation, ethnography gains special relevance in this work due to the importance of the concept of Organizational Culture to the project. Ethnography in the workplace has been used by authors to promote the description of the customs of individuals and cultures within an organization (Freeman, Gellner, & Hirsch, 2003; Parry, 2003; Watson, 2011). Ethnography is a way of analyzing and reporting social life, including in the scope of organizational life. It will be essential to describe the experience of the people in the workforce, separately from the organizational dynamics, until the culture of the organization is well understood. From there, it may finally be compared and integrated with further evidence collected by other methods (Watson, 2011).

Grounds for observation included meetings at several organizational levels, from work activities in the shop floor to corporate events; and the general work environment in different sections and departments of the organization. Elements to be observed include behaviors, rituals, language, and physical artifacts regarding beliefs and values.

4.2.6. Data Analysis

Data analysis considers all efforts to review the evidence in the light of the currently standing conceptual framework. This involves all steps from initial data treatment to its structuring for reporting. An important part of this process is related to the coding of information, as the evidence collected is treated, structured and translated into order (Carroll & Swatman, 2000; M. B. Miles, Huberman, & Saldaña, 2014). The different sources of data make this stage complex, but only more crucial.

While the concepts in the original conceptual framework guide the initial analysis, further codes, and new details regarding those same codes, are expected to result from the evolution of the theory. It is expected that the evidence collected through the use of the structured-case framework can open the door for new interpretations. Accordingly, it is expected that during the data analysis process, the research team is open to an exploratory approach (Carroll & Swatman, 2000). This approach endorses open-mindedness and triangulation, and may be used to complement traditional confirmatory data analysis, Bayesian statistics or revisiting the data collected so far and its interpretations (Yu, 1977; Carroll & Swatman, 2000). In this sense, data analysis is an ongoing and iterative task that may involve reading and rereading transcripts repeatedly to gain a deep understanding of the data and the underlying themes and its patterns (Carroll, Dawson, & Swatman, 1998; Carroll & Swatman, 2000).

Another essential component of these efforts deals with the communication of the results. An important part of this research project is its close contact with organizations, seen as stakeholders more than just subjects of the study. In this sense, there is also a clear objective of providing practical results and knowledge to help organizations develop their performance. Accordingly, the reporting needs to be seen not only as being essential to build the theory – summarizing the findings of each case study and compare them with the conceptual framework – but also in the perspective of allowing a detailed yet straightforward analysis that can be easily understood by both researchers and practitioners, with results that can be used to promote both further research and to help promote organizational improvements.

4.2.6.1. Data treatment

Data treatment involves taking all collected data and manipulating it to the desired form. It includes the identification of the characteristics of the data, its organization, and the coding into meaningful information. This study makes use of several data sources: interviews and focus groups, questionnaires, observation notes and ethnography, the analysis of corporate documents or archival records. Most sources will provide qualitative data, although some quantitative data will also be collected. Accordingly, each type of data needs to be treated individually. In the end, qualitative analysis software was used to do data treatment, integrating all data sources and the results of the different sources.

Interviews were recorded and later transcribed, and text analysis was performed, including word frequency analysis within an interview or across multiple interviews, leading to the identification of

patterns in the speech. Some practical results of this analysis included words clouds (frequency) and word trees (patters).

Similar text analysis was made in the analysis of the documentation. Digital documents were processed similarly to transcribed interviews. As for printed documents (both current and historical), manual analysis was made to verify if similar orientation and scope were found. In these cases, and since the full-text analysis (either form interview transcripts or digital documents) was not possible, the reading of the whole text provided notes and keywords to be analyzed.

Similarly, notes were the main result produced by the use of focus groups and observation. In the face of the technical and logistical difficulty of recording focus group sessions (usually taking place at the end of corporate meetings and gatherings), as well as some resistance from the research subjects, relevant information from these sessions were registered, not only on the main topics and essential ideas discussed during the session, but also on the dynamics observed within a group. Other notes resulting from observation included working practices (from the shop floor to meetings), social relationships, and several cultural dimensions. These cultural aspects were reflected upon and described by the use of ethnography, as described in the previous subsection.

Minor statistic treatment was performed on the data collected from the questionnaires. Besides their treatment using the qualitative analysis software, questionnaire data and the capability maturity assessment process also made use of use of spreadsheets for organizing, analyzing and storing data.

4.2.6.2. Data processing

The process of coding aims to bring out the meaning of the collected data, capturing their original content and essence. In this process, a code is a construct that symbolizes and attributes interpreted significance to each piece of data, for purposes of pattern detection, categorization, and theory building (Saldaña, 2016). In the scope of this project, these constructs are essential to convey the organizational dynamics between Operational Excellence, Organizational Agility, and Organizational Culture. Constructs will provide an important link between the data collected and these concepts, allowing to understand in depth each concept, its context, and its relationships. Defining the constructs to use as codes is thus a critical step in this project.

Naturally, constructs need to be aligned with the conceptual framework, bridging between the collected data and the concepts and relations under study. Looking back to chapter 2, there is a clear opportunity to use critical success factors (CSFs) as the constructs to guide the analysis of data. These CSFs, having been identified for each concept, provide a detailed description of the elements that make

the study of Excellence, Culture, and Agility possible: the organizational capabilities that support these concepts and define them.

By using these CSFs as constructs, any evidence that relates to their scope will be coded within that CSF. A practical example is perhaps the best way to explain how these critical success factors can act as codes. Taking the “Leadership Development” CSF, defined within the “Leadership and Top Management Commitment” enabler of Operational Excellence, the data analysis can be guided to relate to this CSF any evidence of organizational efforts that are taken to promote the internal development of leaders – whether these efforts are identified via observation, analysis of documentation, questionnaires, or through interviewing or focus group conversations. Naturally, this demands a clear definition of each critical success factor – not only a description of its meaning, but also of possible sources of evidence and data collections methods. In this scope, an effort was made to define in detail each critical success factor, describing its meaning and scope, and to list the methods and sources of evidence most expected to be used with frequency. The results of these efforts, which ensure reliability and promote research quality, can be found in Appendix II.

It was also understood that even in presence of evidence regarding all CSFs, there would be different levels of development in different organizations. Different strategic choices, tools and initiatives, organizational perspectives and the frequency and intensity of these practices will have an impact on how well each capability (represented by the critical success factor) will be developed. In order to allow a cross-case analysis and comparison between the capabilities of different organizations, a framework for the assessing the maturity of these capabilities became necessary.

In a perspective that has been extended to Business and Technology, maturity is understood within the field of Psychology as the ability to respond to the environment appropriately (Hyatt, Hyatt, & Hyatt, 2007; Kane, Palmer, Phillips, Kiron, & Buckley, 2017). In the context of this work, it can be understood as the ability of an organization to develop the necessary capabilities to build its people, processes, and technology to deal with the environment and attain proposed objectives (Andersen & Jessen, 2003; Tonini, Carvalho, & Spinola, 2008; Presecan, 2018). Because the reality of an organization changes, maturity is to be understood as a dynamic objective. Accordingly, its elements and capabilities will need to be adapted to such changes (Tonini et al., 2008).

In line with this view, capability maturity frameworks define the aspects that are used to assess the competency of an organization to attain these objectives (B. Chen, Li, Feng, & Wang, 2010; Demir & Kocabaş, 2010). In the case of this research project, the capability maturity framework allows to understand how different organizations developed their capabilities regarding Operational Excellence,

Organizational Agility, and a cultural orientation to Excellence – and provides a simple and effective way to relate the competencies of different organizations in face of their respective environments. From there, the research team can study how the different development levels influence the relationship between these concepts.

Considering critical success factors as organizational capabilities, the develop of such framework the use of capability maturity scales was selected. More details on the use of the use of capability maturity assessments scales in this project can be found in the next section.

4.2.6.3. Defining the capability maturity scales

The usage of capability maturity scales is widespread. They have been used in the development of several frameworks, such as the Capability Maturity Model Integration (CMMI), the Project Management Maturity Model, or the European Foundation for Quality Management (EFQM) Excellence Model (Fraser, Moultrie, & Gregory, 2002; Tonia de Bruin et al., 2005). More related to the specific cases of this project, capability maturity scales have been used in the scope of Excellence and Quality, cultural and behavioral orientation, and Agility. The Excellence models so often cited and mentioned in this work are maturity models (Hillson, 1997; Tonia de Bruin et al., 2005), and there are proposals for integrated Quality Management Systems based on maturity assessments (Domingues, Sampaio, & Arezes, 2016). More importantly, and in the specific case of Operational Excellence, the Shingo Model provides the best example of the application of maturity scales – including the assessment of the cultural orientation to excellence (Ramadan & Arafeh, 2016; Rusev & Salonitis, 2016). Similarly, there are examples of their use in the scope of Agility (Wendler, 2014; Gren, Torkar, & Feldt, 2015; Henriques & Tanner, 2017). While mostly dedicated to other forms of Agility (agile project management or agile development) and limited focus on Organizational Agility, there have been efforts to define the guidelines proposes an Organizational Agility Maturity Model (Wendler, 2014).

A capability maturity model framework can be represented in two ways, depending on the assessment focus: the staged representation and the continuous representation. In the staged representation, the components under focus are the maturity levels, and a process area is given a score, focusing in an organization's overall improvement goals (Paulk, 1991; Shrum, 2000). In the continuous representation the components under focus are the capabilities (critical success factors) within each process area. Accordingly, the continuous representation is better used in scenarios where each process area has its specific goals and practices. It is more adaptable to different environments, and does not provide an improvement path, but rather an assessment for each capability (Paulk, 1991;

Shrum, 2000). There are also differences in the scales used for each of these two representations: while both have a similar progression and maximum (Level 5), the continuous representation considers a Level 0, where capabilities are considered “not performed”, while the staged representation initiates at Level 1 (*Table 13*).

Table 13 - Levels in the continuous and staged representations.

Level	Continuous Representation	Staged Representation
Level 0	Not Performed	-
Level 1	Performed	Performed
Level 2	Managed	Managed
Level 3	Defined	Defined
Level 4	Quantitatively Managed	Quantitatively Managed
Level 5	Optimizing	Optimizing

In this work, we opted for the continuous representation, as we wish to put emphasis on organizational capabilities (the critical success factors). The focus on capabilities also promotes a clearer perspective on how to study each concept. In this sense, each CSF is to be assessed on a score ranging from 0 (not performed) to 5 (Optimizing). Naturally, a more detailed and unique description of the different levels for each critical success factors is necessary. These descriptions are presented, together with the description of each critical success factors and the listing of the frequent data collections methods and sources of evidence, in the Appendices II, III, and IV. In order to structure and offer a better fit between the different CSF and their maturity levels, different capability maturity models were used as benchmark. Five types of assessment scales were created as general guides to help define the maturity levels of each CSF, according to the being constructs being assessed: processes, behaviors and alignment, change initiatives, awareness and compliance, and governance/management. These five types of maturity assessment scales are presented in Appendix I, together with the maturity assessment model used as benchmark in each one.

The level of maturity of each critical success factor is an essential part of the data analysis stage. Not only the CSFs are used as codes during the review and treatment of the collected data, but they also serve as units of analysis for organizational capabilities. Furthermore, these CSFs and the efforts related to their definition will also have an important role in ensuring the research quality and in the communication of the results. By using clear and well-defined constructs, there is a detailed description that facilitates the repeatability of the entire data analysis process. The results and conclusions of this

study can more easily understood – both by researchers and practitioners – and allow the impact of this work to go beyond the current research project.

However, it is important to define the remainder of the data analysis and capability assessment system. Critical success factors are grouped within enablers, serving as detailed elements of those same enablers. These, in turn, will define a concept (Operational Excellence, Cultural Orientation to Excellence, or Organizational Agility). In this sense, it is important to define how to calculate the maturity level of an enabler, and consequently, of the concepts – allowing the cross-case analysis to be made at a macro (concept), meso (enablers) and micro level (critical success factors). Following this logic, and the central role that critical success factors have in the data analysis process, a simple system was conceived. It is considered that it is the balance of all CSFs that will define the proficiency of the organization regarding an enabler. Accordingly, for an enabler to have a high score, showing a high level of performance of the organization in a certain process area (enabler), all its critical success factors will need to have high or medium-high scores. In this sense, it is only logic that it is the average of the maturity scores of the critical success factors that will lead to the maturity score of their enclosing enabler. From this point, the same logic was applied for the calculation of the maturity level of the concepts. The maturity assessment score for each concept will then be achieved by calculating the average of all their enablers' scores.

As an example, and taking again the concept of Operational Excellence and its enabler “Leadership and Management Commitment”, the assessment was made to each of its enclosed critical success factors: “Sustainability of excellence initiatives”, “Leadership Development”, and “Silo Reduction”. It is considered that the first CSF (“Sustainability of excellence initiatives”) was assessed as being in level 4 – “qualitatively managed”; and that the other two critical success factors (“Leadership Development” and “Silo Reduction”) were assessed in level 3 of the capability maturity scale – “defined”. From this point, and calculating the average of the scores of these three critical success factors, the enabler is assessed with a score of 3.33 (see *Table 14*). Following a similar process, the score for each enabler with the concept of “Operational Excellence” will be calculated. Finally, for estimating the score of the concept of Operational Excellence, the scores of each of its enablers would be considered, and the average score would result in the final level of maturity of the concept.

Table 14 - Structure used to calculate and present the assessment score for the enabler "Leadership and Management Commitment" (Operational Excellence) and its success factors.

Enabler	Enabler Score	Critical Success Factors (CSF)	CSF Score
Leadership and Management Commitment	3.33	Sustainability of excellence initiatives	4
		Leadership Development	3
		Silo Reduction	3
		Average (=enabler score)	3.33

4.3. Practical issues

4.3.1. Partner organization selection

The first step to identify potential partner companies is defining the pool of potential partners companies. The background of the theory under development in this work refers to today's quickly changing business environments. Accordingly, it is important to look for sectors and industries that are in the frontline of exposure to this change. In this sense, organizations operating in highly technical and technological industries were approached. The list of potential sectors included automotive, aeronautics, electronics, software and web-based services, healthcare and pharmaceutical industries, and several areas where operations were critical, such as organizations with development and production processes supported in long supply chains, or areas heavily regulated and with increased technical requirements, such as energy or waste management. While ensuring some heterogeneity, only certain degree of importance should be given to the industrial sectors, since the concepts under study in this research project are used across different business contexts and are industry independent.

In order test and further develop the theory the theory under different cultural, regulatory and environmental contexts, it was planned to do studies both in European and American-based companies in order to reduce the impact of cultural, political and geographical factors in the development of Cultures and in the pursuit of Excellence and Agility. In this perspective, the bridge with the MIT is essential to allow the case studies to be carried in the United States.

After this selection, but before the first contact with these organizations, we assessed the fit to our research work, based on publicly available documents – reports, newsletters, corporate website and media, etc. – searching for evidence of commitment to Operational Excellence, Quality, or

Organizational Agility, or mentions to Organizational Culture. If such evidence was found, we advanced to the next step and contacted the organization to assess their interest.

In case a positive answer was obtained, a meeting was prepared with representatives of the leadership team. Out of that meeting came the final decision to advance or drop the study. From the research team side, it was established that a large degree of freedom was to be ensured, including in what concerns access to the organization and publication. It was agreed that no names or identifiable characteristics of the participating organizations would be published, allowing the researchers to freely report findings without jeopardizing the integrity and confidentiality of the organizations. In return, access to the results and conclusions of each study were provided, allowing the organizations to use that information to promote internal revisions, tackle uncovered limitations and take advantages of the identified improvement opportunities. In all organizations, these terms were accepted and followed. All of them allowed free access to their site (upon registration with security); three went even further and provided a physical space for work in their premises, with a working space assigned for the researcher.

4.3.2. Number of case studies, duration and focus

In order to ensure a simple, transparent, and repeatable process for performing multiple cases, a case study structure was designed. This structure outlines the expected duration of a case study, as well as some of the departments or organizational with the most potential of interest for the collection of relevant data. The idea was not to develop a fixed timeline or a rigid roadmap. Each case study will have specific characteristics that will make it unique, and the context will demand studying different areas and following different schedules. However, to ensure maximum consistence and to allow repeatability, it was necessary to draw some lines for orientation and timeline limits. Part of this effort was considered in the previous point (4.3.1 - Partner organization selection), but it is also important to identify some of the focus areas within each organization and the minimum and maximum expected duration of a case study. Accordingly, there was an effort to define some of the departments and areas expected to be involved, and the groups and level of detail to be used in analyzing the different in the roles of the workforce.

Typical areas to be studied were set to include (but not be restricted to) activities related to Quality, Operations, Production, and Innovation/Research and Development, both from a technical and management point of view. Although some subclasses can be further defined within each group, the workforce was divided according to three main roles: leaders, managers and associates.

Case studies were designed to be rolled out during a period of time summing up to 80 to 100 hours, continued or split for periods of between 4 to 10 weeks. These numbers were considered as being essential to allocate all interviews and focus groups, run questionnaires, and allow some observation of the daily work life.

As for the number of case studies, a minimum of six case studies was planned, with equal distribution between Portugal and the United States – with three case in each region. This number was defined based on the project timeline, and considering the necessary time for identifying potential partners organizations, assessing their fit and defining the conditions and circumstances for each case study, collecting evidence, and analyzing and reporting it. In the end, as despite some challenges a total of ten case studies was performed.

4.3.3. Confidentiality and disclosure

The opportunity to do data collection in industrial organizations has the advantage of allowing the assessment of several variables that are context-dependent and would not be considered otherwise. However, even when immersed in these environments, some challenges need to be considered. One of those challenges has to do with confidentiality around certain types of information. For a variety of reasons, information may be considered sensitive and confidential. In such cases, organizations will typically make dealing with such information subject to strict control. Different realities can be found concerning confidential information. While many times it will be visible and open within the boundaries of the organizations, it may not be openly shared with the outside, under the risk of jeopardizing the advantage and strategic significance that covers it. Other times, it may even be concealed from the majority of the people in the organization, being accessible only to a small group of people.

The opportunity to do data collection in industrial organizations has the advantage of allowing the assessment of several variables that are context-dependent, difficult to consider otherwise. However, even when immersed in these environments, some challenges need to be considered. One of those challenges has to do with confidentiality around certain types of information. For a variety of reasons, information may be considered sensitive and confidential. In such cases, organizations will typically make dealing with such information subject to strict control. Confidential information exists in different formats. While many times it will be visible and open within the boundaries of the organizations, it may not be openly shared with the outside, under the risk of jeopardizing the advantage and strategic significance that covers it. Other times, it may even be concealed from the majority of the people in the organization, being accessible only to a small group of people.

Given the importance of such information for the full understanding of the organizational dynamics under study, it was necessary to consider a set of actions to ensure the protection of the sensitive data. Such actions had as supporting base the idea that the organization would allow full access to any information considered relevant for the research objectives, but that such information was not to be shared beyond its defined borders at any moment. Accordingly, it needed to be treated with high levels of safety and absolute confidentiality and used only for the assessment of the relationships, enablers and critical success factors related with the concept under study, never making its way to the reporting of the results.

In this sense, and while some descriptions need to be made to provide framing and support for the assessment of organizational capabilities and the analysis of organizational dynamics, it was defined that no details would be shared on any information that was considered to be sensitive and confidential. Some confidential information could still be accessed to promote a better understanding of a certain phenomenon, or to triangulate with other sources of data, but no details could be reported considering its development or deployment in the organization. Furthermore, and to further improve the integrity of participating organizations, it was also decided that their names and any identifiable characteristics would not be included in the reporting. This decision has a few advantages beyond the simple promotion of anonymity and the protection of information. First, it protects the independence of the research team: by not naming the participating organizations, it is free from pressure to describe each organization accordingly to their communication guidelines, rather focusing on the observation and analysis. Second, it ensures that the readers will be focused on this same analysis and reporting, rather than being influenced by previous opinions or other existing bias.

To document these practices, safeguard publication rights, and limit the liability on both sides, cooperation agreements were set between the research team and the participating organizations. Accordingly, a series of Non-Disclosure Agreements (NDA) and Research Cooperation Agreements (RCA) were signed between the parts. Non-Disclosure Agreements were signed when the organizations were more concerned about the access required by the research team and wished to ensure they would be able to review on the results and information to be used in reporting the results, thus ensuring that no information considered to be sensitive would be shared. In these cases, and to ensure that the review of the reports would not indefinitely impact the ability to the research team to publish the results of this study, limited review periods were established in the agreements for organizations to analyze a proposed document for publication. Accordingly, after this period and in the absence of feedback, the research team would be legally permitted to proceed with the publication. As for the

Scientific Cooperation Agreements, they promoted a more cooperation-based approach, more focused on ensuring that the results of the study could be used in the scope of the internal development of the organization.

In these cases, the agreements focus only on the obligation of the research team to keep the study anonymous, abstain from the publication of any identifiable characteristics, and avoid sharing specific details on the strategies and methods used in the development of the different enablers and critical success factors.

Finally, it is important to note that these agreements, although traditionally understood as a requirement for researching commercially driven organizations, also work for the protection of the rights of the research team. At one point or another, the results of this study (intermediate or final) were shared with the partnering organizations. However, and before their publication in scientific journals and conferences, they too, are confidential. Accordingly, these agreements also established limits for the usage of the results within the boundaries of the organizations.

4.3.4. Ethics

Organizations are made of people, as they are a group of individuals working together towards a certain goal. Consequently, one of the challenges of researching within industrial organizations is the caution that the research team needs to have regarding these people, which are an important source of information and may become human subjects of the research. Dealing with people represents a challenge at many different levels, the main one being their “protection”. Accordingly, the research team must make sure that no individuals are harmed or penalized for their participation in the study, including guaranteeing the confidentiality of their statements, securing their agreement to participate in the study, and taking special precautions with more vulnerable groups (Yin, 2009). In this sense, an action plan was designed to guarantee the human subjects protection during this project, including the following steps:

- Account for the potential exposure of the participants;
- Avoid any impact of the research in the study in the work life of people in the organizations;
- Protect the privacy and confidentiality of people, and the security of their data;
- Have clear consent from all persons who may be or become part of the study, avoid gathering data without their fully awareness and voluntary participation.

In order to limit the exposure of the participants, a few actions were taken. First, traditionally vulnerable organizational groups, such as shop floor laborers or subcontracted workers, were identified. These groups are more vulnerable as they could be penalized for sharing certain views or opinions that counter the official discourse of the organization, and may be forced to participate in the study under certain instructions of their managers. In order to avoid such situations, it was ensured that all questionnaires, focus groups, and interviews were done behind closed doors. This guaranteed that the conversations remained private, and there was freedom for anyone to decline participation, without it being known to the organization. All participants were also assured that all data would be treated anonymously.

The following point deals with the need to reduce the impact of the research activities in the daily work life of the members of the organization. In this sense, research activities were planned to minimize any disruptions coming from participating in the study. Interviews were scheduled according to the interviewee's availability, and questionnaire and focus groups were scheduled for the final minutes of meetings, training sessions or other groups activities already planned by the organization (in events with vulnerable groups, any managers or team leaders were asked to leave the room). Regarding the particular case of the questionnaires, and in the circumstance of an online distribution, respondents were given a minimum time of two weeks to answer.

Before starting these research activities, however, another condition was necessary: ensuring the consent of all participants, whether they were being involved in questionnaires, focus groups or interviews. To do this, processes and documents to gather consent were planned and prepared by the research team. All participants in the study were required to give their agreement, either written or verbal (recorded interviews). If written consent was necessary, consent forms were made available (online or physically) and signed before any research actions took place.

Finally, and once data collection was concluded, it was necessary to ensure the security of the data, protecting the privacy and confidentiality of people. Any documents used for data collection, as well as a research action plan were submitted both to the Ethics Subcommittee for Social and Human Sciences (ESSHS) at the University of Minho (UM), and to the Institutional Research Board at the Massachusetts Institute of Technology, for revision by the *Committee On the Use of Humans as Experimental Subjects* (COUHES). In both cases, the requests were approved and waived from the need to take any further actions to ensure the protection of the research subjects. In the process to get the approval from the COUHES, a collaborative institutional training on Human Research for Social and Behavioral Research Investigators was completed.

All documents regarding these submissions and the approvals by the different boards can be found in Appendix VI.

4.3.5. Security

As discussed in the previous section, ensuring the security of the collected data is another issue of paramount importance. There are two main motivations behind these efforts: the confidentiality and sensitiveness of data; and the need to protect the privacy and anonymity of people.

Documents containing information from the data collection (notes, ethnography, photographs, transcriptions, interviews, questionnaire results, etc.) were password protected or enclosed in password-protected folders. Files from the software used for data analysis were also protected by password, and their names/titles coded. All names of companies were substituted by letters, with the organizations themselves being coded A to J to protect their confidentiality. Similar steps were taken to code the files containing personal identifiers (such as the audio or the transcription of the interviews) to avoid using names or roles of human subjects.

All physical evidence was stored in a locked compartment. Digital files and documents were stored in two different hard drives, always subject to the input of at least two passwords.

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5. Case Description

5.1 Intro

This chapter presents the description of the case studies conducted as part of this project, summarizing the context and work done in each organization and the insights they provided. Such description is essential to understand the context in which each case study was conducted, outline the data collection efforts, and support the analysis, discussion and conclusions presented ahead. The description of each case is divided in two parts:

- Context and introduction – this section starts by briefly introducing the organization, and describing the methods, steps, and roles and areas studied in each organization. The development of Operational Excellence and Organizational Agility capabilities, and the creation of an orientation in the Organizational Culture are then described.
- Results and reflection – this section presents the main results in terms of data collection, and a brief analysis on what the collected evidence indicates regarding the relationships between concepts. It promotes a reflection on the impact of these results on the theory building and the development conceptual framework, as well as on the methods used and their adequacy to the realities encountered.

In a research project that includes the collection and treatment of considerable amount of qualitative data and that relied heavily in a qualitative analysis, this description is also essential to support the quantitative representation that is used in this work as one of the ways to present and discuss the results (see Chapter 6). This representation, based on the calculation of the assessment scores as described in Chapter 4, uses the assessment scores calculated, for each organization, for their maturity in the development of organization capabilities of Operational Excellence, Organizational Agility, and the development of a cultural orientation towards Excellence. These scores are presented at the end of each description. In all cases, a more detailed report on the enablers of critical success factors of each concepts, as well as their assessment scores, is presented in Appendix V.

5.2 Case study description – Phase I

This phase was initiated with the objective of covering, as planned, a total of six organizations, equally distributed between Portugal and the United States of America (USA). During the planning of this set of case studies, a few characteristics were added to those initially listed for the selection of partner companies.

One of the characteristics established focused on the number of years of activity of the organizations to be studied. It was established they should have minimum of fifteen years, ensuring that they had well-established operations, and that they had been exposed to the competitiveness and uncertainty of the global markets, surviving different technological waves and economic cycles.

Another characteristic had to do with the emphasis put by these organizations on the concepts under study. Despite looking for evidence of clear engagement with Operational Excellence, Organization Agility, and Organizational Culture prior to the selection of a company, emphasis was put on identifying organizations communicating clearly their engagement with Quality and Operational Excellence. The rationale behind this effort was linked to initial perception that, while aiming to study the influence of Operational Excellence on Culture and Agility, these relationships would be better understood if departing from a stronger development of OpEx capabilities.

In the end, valuable evidence was also added by organizations that despite showing evidence of a significant development of the three concepts, operated with emphasis on Organizational Agility. Furthermore, it was understood that organizations in earlier stages could also provide important insights. These topics are discussed in the final reflection on this first phase.

5.2.1 Organization A

5.2.1.1 Context and introduction

Organization A is a government-owned waste management organization, its operations focused on clean and green energy, located in Northern Portugal. It has been in operation for more than 35 years, managing and transforming different kinds of urban waste. The organization has four main operational areas with highly technical processes: technical confinement (landfill), energetic valorization, organic valorization, and multi-material recovery. The case study was conducted between late May and early August 2017, and included several visits to the organization in the span of 10 weeks. It involved mostly the departments of Training, Communication and Marketing; Planning, Management and Information Systems; Operations Management and Logistics; and Research, Development and Innovation. The heads of these departments were interviewed, and managers and associates participated mostly in focus groups. *Organization A's* CEO was also interviewed, and a couple of interviews were performed with associates within the department of Planning, Management and Information Systems.

Questionnaires were conducted next to the associates. Shop floor associate's questionnaires were distributed and completed in the last minutes of training sessions. Online questionnaires were

used to conduct the questionnaire next to associates in administrative roles. At the time of this study, the organization had about 200 employees. A total of 36 associates replied, meaning that, together with the interviews and focus groups, the percentage of workforce participation was above 20%. Observation played an important role in the data collection, and included non-participant presence in meetings, corporate events, and team huddles. Further observation was offered by the chance to participate in stakeholder visits to the different areas of activities, including to the shop floor. The analysis of documents included several internal and external newsletters, the analysis of financial and strategic reports, and the revision of key performance indicators, business processes maps and work instructions. Each visit was organized individually, with the help from a host in one of the involved departments. In order to define the boundaries and conditions for the use of information, and limit the liability on both sides, a Research Cooperation Agreement was signed between the parts.

Organization A communicates its focus on Operational Excellence clearly, highlighting efforts as the pursuit of management systems integration and certification, partnerships and initiatives to promote streamlined operations, and a focus on continuous improvement and process revisions. Furthermore, and although no structured Excellence programs have been deployed, the leadership team puts Operational Excellence as a central element in the strategy of the organization. This commitment transpires in a variety of ways, and influences top-level behaviors and communications.

Efforts to develop Organizational Agility are less obvious than those related to Excellence, but face similar challenges. An initiative to implement agile project management tools and methods spawned from the needs of project development teams in the Information Technology (IT) area. At the same time, efforts to drive process flexibility and innovation were established with strong support from the leadership, focused in the development of Organizational Agility and fostering adaptability. However, it was observed that the engagement with these projects is yet limited beyond the boundaries of the departments and sections directly responsible for them.

5.2.1.2 Results and Reflection

This first case study provided valuable outcomes both concerning the conceptual framework and the methodology. At the conceptual level, the relationships between Operational Excellence, Organizational Culture and Organizational Agility were less evident than what the initial screening of the organization seemed to promise. This was a result of the reality of the organization, with leadership and top management showing a strong orientation to Operational Excellence, but being unable to share this alignment and create a practical commitment in the entire organization. Accordingly, evidence related

to the impact of Operational Excellence in orientating the Organizational Culture or in helping to promote Organizational Agility was more difficult to find than what the screening of the organization, the first interviews at the top level, and the official communication of the organization seemed to promise.

Nonetheless, this gap between the orientations of the top level of the organization and the remainder of the workforce still provided valuable information for this project. The evidence collected at *Organization A* exposes a company with a series of challenges in communicating and sharing the cultural and strategic orientation that exists at the top level. Several barriers and structural silos, together with the inability to motivate the workforce, have had a profound impact on the organization. Together with undeveloped processes and channels to foster communication between different areas and levels, there is a clear lack of cultural homogeneity, and creating a cultural alignment across the organization is a challenge. While the majority of the Quality- and Excellence-oriented efforts in the organization follow a top-down approach, a few examples of bottom-up initiatives were observed. However, associates and middle managers shared concerns regarding the ability of these initiatives to be taken beyond the local level, highlighting the lack of channels and defined processes to help structured and expand new knowledge and capabilities. This influenced not only the alignment and commitment to Operational Excellence and the development of its practices, but also impacted the development of Organizational Agility capabilities. Despite having been developed within the organization and in different departments (Information Systems Management, Innovation, Research and Development), Organizational Agility capabilities were unable to go beyond departmental boundaries and become accessible tools for the entire organization.

The biggest contribution of the case study at *Organization A* was understanding that the organizational inability to take commitment towards Operational Excellence beyond the top hierarchical levels has impactful consequences. Being unable to turn principles of Operational Excellence into aligned practices and behaviors, leaders are incapable of creating an organization-wide commitment, and the development of a cultural orientation to Excellence is mitigated in several areas. The lack of Operational Excellence practices makes it difficult to develop more flexible processes and create channels for the sharing and development of organizational competencies, impacting the ability to develop new capabilities or expand those already existing in the organization – such as was the case of those related to Organizational Agility.

As for the research methodologies, this case verified that the research design offered fit methods for data collection, evidence treatment and analysis, and the logical development of the

research theory. All data collection methods offered good performance and allowed to gather valuable evidence. Important notes on improving the communication before and during the interviews, questionnaires, focus groups were taken. Despite the use of multiple data sources, the treatment and integration of data coming from different sources was done without major issues, and triangulation was easily promoted, further sustaining the analysis of data.

In the face of this reflection, the conceptual framework and the methodology remained much unchanged, while the need for additional case studies was evident in order to allow any further development.

Furthermore, and based on the analysis of the collected evidence, and qualitative analysis to better summarize and communicate the levels of maturity of the organization in terms of Operational Excellence, Organizational Culture, and Organizational Agility. Using the Assessment Scales and calculation methods presented in Chapter 4, the following assessment scores were attributed:

Table 15 - Maturity Assessment scores for Organization A on the concepts of Operational Excellence, cultural orientation towards Excellence, and Organizational Agility.

	Operational Excellence	Cultural orientation towards excellence	Organizational Agility
A	3.31	3.10	2.54

A full assessment of the enablers and critical success factors used to calculate these scores for *Organization A* can be found in Appendix V.

5.2.2 Organization B

5.2.2.1 Context and introduction

The second organization to be studied was an electronics company operating in the automotive industry. It is part of a multinational group, having functioned in the location where the case study was performed, in Portugal, for the past decades. Data collection took place between September and November 2017, during a period summing up to 9 weeks. Support and orientation in the organization was provided by members of the senior leadership team. Access to the organization was offered unreservedly, but dependent upon previous scheduling and communication with the security team. The initial interviews were made with senior leaders responsible for Quality and Excellence, Innovation and Industry 4.0. The two CEOs of the organization were also interviewed, together with the heads of

department and several section managers in the departments of Logistics and Operations, Quality, Human Resources and Manufacturing. Focus groups and questionnaires were used with the associate's group, with online questionnaires being distributed via email, and focus groups and paper-based questionnaires being scheduled for the last minutes of training sessions. At the time of this study, the organization had about 2500 employees. More than 200 members of the workforce participated in this study via interview, questionnaire or focus groups, summing to a total representing little less than 10% of the organization's workforce. Observation included several plant tours, presence in meetings, and attendance to corporate events. Reviewed documentation comprised financial and strategical reports, balanced scorecards and key performance indicators from different departments and functional areas, processes and value stream maps, employee satisfaction and customer questionnaire results, market and consultants' reports, and excellence awards applications and feedback/results.

Based on the evidence collected, it was possible to understand that, throughout the history of the organization, Quality and Operational Excellence efforts and initiatives were a constant, motivated by evolving needs: starting with the needs to meet the regulations of the automotive industry, the organization sought next to sustain the results achieved through the implementation of certifications and customer requirements, engaging in further optimization and improvement initiatives. These efforts were reinforced by the need to cut down costs and compete with rivals operating in countries with much lower operations- and labor-related costs. Following this strategy, *Organization B* was able to develop a lean production system and to successfully promote integrated Quality, continuous improvement and Operational Excellence systems. During this process, the organization worked to develop a cultural orientation to Excellence, and was recognized with multiple awards for its commitment to Excellence, Quality, and Innovation.

In recent years, *Organization B* underwent a major transformation and has partially shifted its core activities: having been for a long time a production-oriented facility, it has invested in becoming a center for innovation in products and processes. These efforts are actively communicated as having been identified as opportunities in Excellence assessments done in the past. They focus on ideas such as process digitalization and connectivity, new product conceptualization and testing, and optimization and innovation in its operations. As a result, the organization is becoming more agile-oriented and readier to adapt to changes in its external environments, and has found new market engagement. After a few years struggling with a downward market trend, it has seen an upturn in its orders and new contracts, leading to increased production and development levels. However, this reality also produces

challenges. The extra workload derived from the production increase and strategic shift is mostly felt by the associates, either in administrative, operations or production activities. A number of associates was unable to participate in training activities, and a common complaint had to do with the effects of increased work levels in the work life balance and stress of the workforce.

5.2.2.2 Results and Reflection

The case study in *Organization B* added strong evidence supporting the relationships proposed in the conceptual framework. First, it exposed how, in *Organization B*, the culturally-integrated development of Operational Excellence led towards the creation of a cultural orientation to Excellence. Second, it revealed how the organization's sustained pursuit of Operational Excellence helped it understand the changing business environments around it, and identify opportunities to best succeed in it. Accordingly, *Organization B* was able to truly drive its success in becoming more agile through the creation of a Quality and Excellence-oriented culture. The efforts of the organization in continuously improving processes and optimizing operations had a substantial impact on making it more flexible. Market awareness, and a focus on continuously delivering value, supported the commitment of the workforce towards becoming more adaptable. Using systems and frameworks developed in the scope of its pursuit of Operational Excellence, *Organization B* was able to identify and develop several capabilities to support Organizational Agility. This case did not need the creation of a new Research Cooperation Agreement, as one was already in place between the Organization and the University.

Additionally, the organization was able to develop an Excellence-oriented culture, with workforce attributing high scores to the cultural relationship with Quality and Excellence. This culture proved to be essential in supporting the strategic shift of the organization. The evidence collected in this case study showed three concepts under study were positively related in the organization, with Operational Excellence being the primary driver of these relationships. The evidence collected in this case study thus provides an affirmative answer to this project's overall research question: "*Do companies incurring in sustainable Operational Excellence initiatives have more capacity to be Agile, through the transformation of their Organizational Culture?*".

This case also showed that, despite this positive influence, some challenges and factors can impact the relationship between Operational Excellence, Organizational Culture and Organizational Agility. With the complexity of operations growing, the organization has put increased emphasis on technical aspects. It focused on developing and acquiring capabilities to help in the development and the production of new and technologically disruptive products. But in parallel to this emphasis, the

social side of the organization seems to be facing some disinvestment. At the very least, it is already visible that in the current state of operations, the organization is facing difficulties in caring for its associates. Maintaining high levels of performance, as well as supporting the commitment and motivation of the workforce, will be challenging if they do not receive both enough training and reward for their efforts. Evidence was collected showing that this balance might be at stake. As an example, it was observed that the amount of work is impacting training activities: new employees have more limited attention from their peers and managers, and older employees are burdened with responsibilities (not only operational but also related to guiding recent hires) and frequently had to skip training sessions.

In terms of the methodology, this case offered some challenges to deploy all collection methods. These were due more to the number of employees of the organization than by their lack of adequacy. Collecting data in an organization that was about ten times larger (in terms of headcount) than the previous case study required scaling up all methods and extra effort to meet the proposed metrics. While interviews, focused mostly on critical roles, were completed as expected, questionnaires and focus groups required intense activity, with a larger number of participants to be considered. The distribution of online questionnaires did not present a particular challenge, but their physical distribution required the participation in multiple training sessions, at the end of which the questionnaires were distributed. A similar situation was experienced in the promotion of focus groups. Finally, the review of documentation and processes, and observation activities also had to be done with increased frequency.

In the end, and despite an increase in the total number of hours, the methodology was functional, providing all necessary evidence for the analysis and reflection. The minimum proposed of 10% of the organization's workforce being covered via interviews, focus groups or questionnaires was met, and a balance between all different data collection methods was ensured. The same evidence that provided information for this reflection was used to calculate the assessment scores the three concepts under study. A full assessment and the detailed scores for all the enablers and critical success factors in *Organization B* can be found in Appendix V.

Table 16 - Maturity Assessment scores for Organization B on the concepts of Operational Excellence, cultural orientation towards Excellence, and Organizational Agility.

	Operational Excellence	Cultural orientation towards excellence	Organizational Agility
B	4.17	4.36	3.64

5.2.3 Organization C

5.2.3.1 Context and introduction

Organization C operates in the software industry, developing business software solutions. Based in northern Portugal, it has been on the market for 25 years and has operations in more than 20 countries worldwide. The case study was conducted in its headquarters in Northern Portugal during October 2017. It received strong backing from the leadership of the organization and was supported by the head of the Planning and Management department. The organization provided a workstation for the project, granting flexible access to its facilities.

Interviews were used to collect data next to the organization's leaders and high-ranked managers, including the two co-CEOs and the heads of the departments of Planning and Management, Customer Care, Software Development, Human Resource Management, Strategy, and Marketing. Experts with crucial roles in the activities of the organization were also interviewed, such as product and project management, agile coaching and process development. The involvement of associates was secured through the use of focus groups and questionnaires. About 80 members of the workforce were directly involved in the data collection efforts, from a total under 300 employees. The opportunity to have a workstation in the organization allowed observations to be made frequently and in several informal moments of the daily life of *Organization C*. Observations in more structured events were made during meetings, corporate events, visits of external stakeholders, and training and coaching sessions. Data collection was completed with the analysis of several key performance indicators in each of the involved departments, the revision of strategic and financial reports, and customers and associate questionnaire results. External communications (website, newsletters, leaflets) were analyzed. A Research Cooperation Agreement was signed between the parts.

Reconstructing the history of the organization regarding Quality and Excellence, it was possible to understand that *Organization C* started its journey as a response to a quick scaling-up process that demanded stabilized and reliable processes to maintain development and delivery performance levels. As the organization grew and faced increased complexity, leadership felt the need to ensure standard

operating procedures in different areas in order to reduce the entropy accumulating in both internal and external operations. Facing increased disruption, the organization moved towards the implementation and integration of its management systems, focusing on the formalization of processes, the definition of follow-up metrics, and the pursuit of optimization. Nevertheless, this move seemed to be driven more by the need to face environmental demands than an inorganic effort aimed at the development of an orientation towards excellence.

Since then, the organization has continuously engaged in systems management and Quality control. It has upheld Quality as a central idea in the organization, not only in its processes and operations but also regarding the quality assurance around its products and services. However, it has not invested in continuous improvement, showing little evidence of a definite commitment to Organizational (or Operational) Excellence. The current focus on Quality and Excellence is done mostly through different, local approaches, with no definition of a centralized responsibility for Quality Management. As a result, different areas of the organization have developed different perspectives and uneven levels of alignment with the principles of Quality and Operational Excellence. Furthermore, the lack of an organization-wide approach has permitted the preservation of existing silos and limited organizational-wide processes and operations.

In line with the current market standards in the software industry, *Organization C* has been promoting different forms of Agility. It has invested in the development of different Organizational Agility capabilities, most notably at the leadership and management levels. Furthermore, it has promoted strong usage and knowledge, next to its associates in technical/development areas, of agile project management methods and tools. However, and despite this evidence of well-developed practices in these areas, the rest of the organization is distant from such methods and tools. The organization has not been able to take or integrate these approaches to other areas and departments, limiting the alignment to Agility that is observed across its workforce.

5.2.3.2 Results and Reflection

This case study provided the first encounter with a context where an organization puts more emphasis on Organizational Agility than on Operational Excellence. In the two previous cases studies, there was a clear focus, at least at higher organizational levels, on Operational Excellence. To a large extent, this focus was one of the main drivers of these organizations' activities, with evident influence on strategy development. In *Organization C*, however, a different reality was observed. While the organization has an espoused commitment to Excellence, observable in its operations and product

development activities, the truth is that it puts higher emphasis on strategic ideas such as innovation and adaptability. Efforts around Quality and Excellence are driven more by business and market needs than by the development of a strong commitment to continuous performance improvement.

Organization C thus sees Operational Excellence as a vital competent for success, but not a real driving force behind the organizational strategy. This perspective was visible also in the development of the culture. *Organization C* puts substantial importance in developing an Organization Culture that upholds Innovation and Agility, and the creation of an agile work environment. On the other hand, and despite some commitment to Quality and Excellence, their principles are not perceived by the workforce as core cultural components.

Despite these differences, the analysis of the relationships between concepts was still possible – and extremely valuable for the project. This case study helped to understand how Organizational Agility can be constrained by the lack of sustained Operational Excellence principles and practices. In an industry where there is usually a stronger focus on being agile, we observed a series of limitations on the development of Organizational Agility.

Evidence suggested that *Organization C* was not able to fully develop and scale agile capabilities because there was no consistent Operational Excellence system to support them. Due to this fact, rather than seeing Operational Excellence capabilities helping to catalyze Organizational Agility, we observed how it was limited by issues that could have been addressed by the promotion of an organization-wide commitment to Excellence. As a consequence of this limited perspective on Operational Excellence, not only the development of related capabilities was constrained, but also the creation of an excellence-oriented culture was restricted.

Evidence showed that despite significant maturity in terms of process integration and strong team cross-functionality, sharing Agile knowledge and capabilities was a difficult task. While within the environment of development teams the use of Agile methods and the development of Organizational Agility capabilities are well advanced, their development has been made in a somewhat isolated manner from the rest of the organization – especially from commercial and operational areas. One of the most pressing reasons behind these difficulties seems to be the lack of an organization-wide alignment that promotes an integrated understanding that is able to uphold the importance of Organizational Agility (and for that matter, of Operational Excellence) in areas here it is not used in the scope of the daily work. By focusing on tools and systems in a local, task-oriented perspective, the organization was not able to integrate its different activities within an organization alignment that focuses on the delivery of value to its customers.

Another consequence of the lack of an organization-wide alignment is the creation of different subcultures. While sharing similar principles and behaviors, these cultures show diverging practices. Perceptions around the importance of different tools and methods to the overall performance of the organization are deeply influenced by local usage, and vary across different units. Although not critically affecting the unity of the organization, these different subcultures support the idea that a constrained approach to Operational Excellence leads to limits the development of an organization-wide orientation towards Excellence.

In the face of these conclusions, this case study adds a new perspective over the conceptual framework, so far centered on Operational Excellence as the concept triggering these relationships. It suggests the need to explore, in future cases, other examples of the dynamics of the relationships between concepts when the efforts and strategies of the organization are driven mostly by a focus on Organizational Agility.

Finally, and in terms of methodology, this cause provided no noteworthy challenges. The organization was very receptive to the idea of the case study and provided all necessary support for its development. The methods for data collection proved their fit to the contexts of this project. One highlight was that being a software company, all associates in *Organization C* have computer access, making the distribution of the questionnaires easier than previous cases.

In line with this reflection, the assessment scores for Operational Excellence, the development of a Cultural orientation to Excellence, and Organizational Agility were the following:

Table 17 - Maturity Assessment scores for Organization C on the concepts of Operational Excellence, cultural orientation towards Excellence, and Organizational Agility.

	Operational Excellence	Cultural orientation towards excellence	Organizational Agility
C	3.73	3.38	3.73

A full assessment of the enablers and critical success factors in *Organization C* can be found in Appendix V.

5.2.4 Organization D

5.2.4.1 Context and introduction

Organization D operates in the pharmaceutical sector, with manufacturing operations plus a strong focus on Research and Development. It is located in Central Portugal, where it has been in operations for the past 18 years. The case study was conducted in January 2018. It included several visits and a week-long immersion in the organization, during which a work station was provided. The main sponsor of this project in *Organization D* was the department of Research and Innovation, but strong support was also provided by the leadership team. These leaders were interviewed, together with those responsible for the departments of Human Resources, Business Development, Planning and Production Management, Quality Management, and Product Quality. Managers participated mostly in focus groups, although a couple of interviews were performed within the Research and Development department. Associates participated via questionnaire (the questionnaires were distributed vi email) and focus groups (mostly used with shop floor associates). Observation included the access to onboarding training activities, visits to the organization in the company of recently-hired associates, and several moments of the daily life in the organization (during the week of immersion in the organization). The review of documents considered several reports (strategic, financial, performance), process maps, the review of key performance indicators and scores, and the analysis of different internal media booklets. Platforms for external communications (website, newsletters) were also assessed. A Research Cooperation Agreement was signed between the research team and the company.

The organization's engagement with Quality and Operational Excellence is deeply marked by the need to meet industry regulations, which are demanding and vary from market to market. Evidence showed that the organization has been able to integrate into its efforts several frameworks and initiatives for improving manufacturing an operational performance. These engagements and its supporting practical objectives are actively promoted through the organization's training plan.

Organization D includes in its onboarding sessions (for all new associates) several dimensions of Quality (technical and regulatory) and Excellence (processes and operations). New managers and associates thus start by learning the importance that the organization puts in ensuring not only the highest levels of product and process Quality (driven by industry requirements) but also the need for high levels of performance and Operational Excellence (pursuing high efficiency and competitive production costs), and the tools and systems in place to help it do so. The rest of the workforce

experiences similar training with regularity, and are constantly reminded of these objectives at different corporate events.

In terms of Organizational Agility, little more than an initial level of commitment was found. Most initiatives already established do not go beyond the project approach. In general, Agility is mostly associated with innovation. In other areas, such as Production Planning and Control, the organization looks at new opportunities for increasing reconfigurability of processes and operations with caution, and limited commitment or activity has been seen.

5.2.4.2 Results and Reflection

This case study introduced a scenario where production and operations take place in a highly regulated and competitive market, with a very strong impact on Quality and Operational Excellence. While it was obvious that the focus on product quality and Operational Excellence drive most of the strategies and initiatives in *Organization D*, this case offered access to an environment where Operational Excellence is deeply tied to market requirements.

Operating in the pharmaceutical industry, where any errors may have drastic consequences for human lives and public and health safety, *Organization D* deals with heavily regulated markets. The organization has to ensure very high and constant levels of product quality: it has to prevent or eliminate any defects before distribution, ensure the quality and reliability of raw materials and components, and eliminate any failures along its processes (leading, for example, to contaminations, wrong dosages or incorrect packaging). Failing to do so puts the organization in the face of severe consequences, under the risk of losing not only a number of customers, but the ability to operate in entire markets. This pressure is visibly influential in the creation of the organizational commitment to Excellence. Most of the evidence collected in this scope underlined, in way or another, the vitality of product quality in ensuring not only the success, but even the survival of the organization.

With a large number of the organization's products competing mostly on the basis of their market price, the pursuit of a level of Excellence in the operational performance is also driven by market requirements – based on the need to ensure increased efficiency and reduced costs in order to be able to be successful. This and other evidence showed that this side of the focus on Operational Excellence was mostly cost-driven, rather than being intrinsic to the organization and driven by an organization-wide alignment.

This market-oriented focus does not mean that the levels of commitment of the workforce are low. Leadership and management show strong commitment to Operational Excellence, and associates

shows a significant level of engagement. But it means that there is at *Organization D* a strong task-oriented perspective that creates unaligned perceptions over different methods and tools. As a consequence, local activities tend to be more valued than those used by other groups elsewhere, and silos are observable. It has also an impact on the further development of a cultural orientation to Excellence – especially in the behaviors, where the roles of middle managers and associates are underdeveloped and tied to this task-oriented focus.

Despite efforts to promote integrate processes at higher level, projects show limited cross functional integration, and are promoted essentially with a local focus. The communication between departments is limited, adding to evidence of a somewhat unstructured and disconnected pursuit of Excellence. Different departments follow their Quality and Excellence objectives with local goals and requirements in mind, often unaware of similar or interactable processes and initiative ongoing in other departments. While not all of them allow integration, there are a few examples of similar initiatives running in parallel which are unconnected even when having complementary objectives. Another challenge has to do with the engagement of the workforce. While there was evidence of a good alignment with Quality and Excellence, there were also signs of practical limitations. Associates uphold excellence as a basic requirement of their jobs, but are not able to take it beyond the scope of their daily tasks. Furthermore, processes are not revised frequently, with the management focus being essentially centered on maintaining processes under control, acting mostly to correct any deviations.

In this case study, the link between Operational Excellence and Organizational Agility was more difficult to assess, mostly because *Organization D* does not actively pursue the later. The intense focus on the stability of processes, and the strategic importance of Quality and Excellence have so far left little room for efforts focused on improving the Agility of the organization. Although a number of initiatives have been considered, especially at leadership level, the organization fears that these large-scale changes will have a destabilizing impact its products an operation. Accordingly, agile strategies and initiatives are regarded both as an opportunity and a risk. An idea that seems frequent in the organization is avoiding making risk associated changes in the processes due to the effects that these might have next to clients and regulators.

A series of opportunities to further develop the level of Agility at *Organization D* were identified – many of which could be built on better developed Operational Excellence capabilities. Being mostly driven by the need to meet regulation and requirements, *Organization D* shows limited ambition regarding the optimization or change of its processes. This reality limits the flexibility of the organization's processes, not setting up the basis for a more structured approach to adaptability.

In regards to the methods, one particular challenge must be referred. Despite several attempts, it was not possible to effectively distribute questionnaires next to the shop floor associates. In this sense, the questionnaire considered only the answers of administrative associates and middle managers with computer access. Shop floor associates were included in this study through the use of focus groups. No issues were encountered while deploying any other data collection methods or setting up the case study.

Based on the analysis of the data collected in *Organization D*, and using the Assessment Scores and calculation methods presented in Chapter 4, the following assessment score were attributed:

Table 18 - Maturity Assessment scores for Organization D on the concepts of Operational Excellence, cultural orientation towards Excellence, and Organizational Agility.

	Operational Excellence	Cultural orientation towards excellence	Organizational Agility
D	3.60	3.41	3.06

A full assessment of the enablers and critical success factors in be found in Appendix V.

5.2.5 Organization E

5.2.5.1 Context and introduction

The group to which *Organization E* belongs has more than 40 years in the food and beverage business. However, *Organization E*'s operations, focused in the design and development of household appliances and consumer electronics, have been integrated more recently – about 20 years ago. While it started by outsourcing most technical and technological activities (include large parts of the design and development processes), the group has recently shifted its strategy to bring research and development under its direct responsibility. Understanding the growing value and critical strategic importance of this segment, it has gradually transferred all innovation and development activities in-house, ultimately leading to the construction of new facilities dedicated to its technical and technological operations. *Organization E*, the location of this case study, is one of the results of this active efforts to promote an “agile transformation”, having been created as a technology-focused Research and Development Center about 5 years ago.

The organization provided full access to its facilities (located in Eastern Massachusetts, United States) and offered a workstation for the duration of the study, a total of 7 weeks between August and October 2018. The study was sponsored by a member of the senior leadership team, responsible for Technology Development. Senior leaders responsible for Technology Development, Strategy and Human Resources were interviewed, as all as the managers for Quality, Supply Chain/Operations, and several projects managers. A number of focus groups were promoted with top and middle managers and associates. Questionnaires were made available online (all associated have computer access), and about 80 associates participating in the questionnaire. In the end, and out of a total around 1000 employees, about 150 directly participated in the study, approximately 15% of *Organization E's* workforce. Observation included the participation in meetings and corporate events and celebrations, and a tour through the facilities. Most observation activities happened on a daily basis, a result of the daily access provided by the organization. Analyzed documents included performance indicators reports and scorecards, workbooks and instructions, training plans, project documentation and several pieces of internal media. A non-disclosure agreement (NDA) was signed between the parts.

Organization E's primary strategic focus is on delivering, quickly and efficiently, new products to the market. Its efforts are centered on research, design, and development, with a strong focus on speed and Agility. Accordingly, the organization has spent some time experimenting with product development methodologies. Early efforts included the deployment of agile development methodologies, an approach that proved not to be fully functional. From there, *Organization E* started to customize different methods and approaches, and looked for partners to help it establish methods that offered a better fit to its needs and the existing expertise. Ultimately, a methodology focused on product innovation was implemented with the help of an external consulting body.

Despite offering a better fit to its reality, the new methods have been difficult to scale up and spread across the organization. There have been challenges in the definition on the tools, systems, and practices to be used, and the engagement of different development teams has been highly variable. As the leadership team became aware of these issues, it took efforts to balance the focus on agile development with that on processes and operations. Since then, efforts are being made to define processes better, establish workbooks, standardize working methods and tools, and train people on their usage. Currently, emphasis is also put on better educating associates and managers on their roles and responsibilities.

At the time of this case study, *Organization E* was also making efforts to integrate all these different aspects into a quality management system, leveraging the importance of Quality Management

across the organization. However, a series of challenges still need to be addressed. The organization has invested little in the creation of organizational alignment, with poor focus on the organizational culture or in the development of an organizational orientation to Process or Operational Excellence. Different areas of the organization seem disconnected, showing not only varying levels of engagement and commitment, but even of understanding of the organization's culture and strategy.

5.2.5.2 Results and Reflection

In the case study on *Organization E*, the research team encountered again a scenario where the driving focus of the strategy is more clearly related to Organizational Agility than to Operational Excellence. This focus on Agility is centered on development activities, and agile initiatives are essentially found in technical areas. Most of the workforce has joined the organization during the last 5 years. However, a number of associates, especially in the areas of sales and operations, have been in the organization longer, some having transitioned from other locations. Despite having a majority of tech-oriented employees, *Organization E* has been unable to create a stable organizational alignment. Over the years, it has experimented different strategies, typically based on the use of different product development methodologies. These have expanded, contracted or been replaced as the organization looked for a best fit to its activities. For the past two years, the organization has been dedicated to the implementation and expansion of a new methodology focused on innovation and fast and repeatable product development. However, the experimental nature that many initiatives have had in the past created some resistance and even mistrust on these methods and strategies amongst the workforce. Furthermore, another problem in the creation of an alignment is related to the lack of an orientation to Operational Excellence. The engagement with Excellence that exists in the group – essentially focused on process control and efficient distribution – has been absent in *Organization E*. Most of the focus on Quality and Excellence observed in the organization is linked to the development processes and their metrics. However, even they are a recent concern, with most efforts and initiatives still at a development phase or, when fully developed, being under the responsibility of certain groups and having yet to expand across the organization.

In general, the issue that seems to impact most the development of all these systems is the lack of a process orientation. This is visible in the poor definition of the structures behind many of *Organization E's* activities. Work instructions, development methods, quality systems and tools and, in general, the requirements for the development of different Excellence and Agility capabilities have been poorly defined over the years. While in the past couple of years the organization has taken efforts to

define its working practices and processes, they are still under development and unequally established across the organization. Furthermore, management systems are poorly developed, and there is no organizational focus on process administration and improvement.

Based on this evidence, this case study exposes a setting where the development of Organizational Agility has been actively pursued, but is constrained by the lack of stable systems to support it. Notably, the absence of such systems seems deeply related to the poor investment in Operational Excellence, most particularly through the development of process, but also in the promotion of workforce commitment and engagement and in the establishment of more frequent self-assessment efforts.

Practical examples include the current efforts of the organization to develop its quality management system and define its processes. Leadership understood that the unbalanced focus on Agility led to a reality where the approaches were done mostly in an experimental, project perspective, having difficulty in settling and being perceived as organization-wide perspectives. As a result, the development of Organizational Agility capabilities was constrained. In order to counter this reality, a series of initiatives have been initiated focusing in the development of Quality and Operational Excellence capabilities – many of them showing a broader scope and cross-departmental focus than that found in the “agile transformation” that has been promoted over the past few years.

Being the first case study performed in the USA this case presented a number of differences in the process leading to the start of the case study. Both the company and the host university in the US (MIT) put significant emphasis on the issues of confidentiality. The NDA several months to negotiate, with interference in the project’s timeline.

In order to better understand this analysis, a more detailed description of the enablers and critical success factors identified in this study is presented, together with their maturity assessments scores, in Appendix V. Overall, the following assessment score were attributed to the concepts of Operational Excellence, Organizational Agility, and Culture:

Table 19 - Maturity assessment scores for Organization E on the concepts of Operational Excellence, cultural orientation towards Excellence, and Organizational Agility.

	Operational Excellence	Cultural orientation towards excellence	Organizational Agility
E	2.92	2.69	3.30

5.2.6 Organization F

5.2.6.1 Context and introduction

Organization F is a healthcare research center. The organization is located within the Greater Boston Area and does research on non-human subjects, with a focus on comparative medicine and complex research support operations. The case study took place between January and February 2019, in a total time of 5 weeks. The project was sponsored by *Organization F*'s director and had strong support from the members of the senior leadership team. Due to the restricted access to the organization, all visits were scheduled directly with a member of the leadership team, responsible for Operations Management and Continuous Improvement, who followed up on much of the research efforts. Nevertheless, privacy and confidentiality were ensured during the focus groups with associates and managers, or in the interviews with top managers and leaders. Questionnaires were distributed online, with the questionnaire results being analyzed separately for associates and managers. Participation levels in the questionnaire were high: more than 90% of the managers and two-thirds (64%) of the associates responded, ensuring a high percentage of workforce engagement in this study. Observation was used to collect data from Senior Leadership Team meetings, weekly management meetings, team huddles, and a few corporate events. Visits to the facilities were also promoted, allowing access to the shop floor and local interactions with associates. Documentation used in this case included training documents, strategic meeting minutes, performance reports, internal media (newsletters and leaflets), and the access to the records of the key performance indicators. An NDA was signed between the parts.

Organization F has a long story of commitment to Quality, which has expanded throughout the years to a pursuit of Operational Excellence. It was initiated as a response to the heavy regulated environments in which it operates but quickly expanded beyond that scope. Understanding the competitive advantage that it could develop, the organization invested in creating a robust organizational alignment with Quality and continuous improvement. As part of these efforts, it recruited experts in the areas of Lean and Quality Management. It then established a small group to prepare a comprehensive training and development initiative to help increase the awareness on Quality and continuous improvement tools, and create an organization-wide commitment. These initiatives were deployed incrementally, slowly but consistently steering the organization towards the desired alignment. This small group started to develop leaders and managers, expanding the knowledge base and creating a bigger group to help train and teach the workforce. Associates were involved next, and a team

focused on the strategic development and deployment of Quality and improvement initiatives was formed with members of all the different groups of the workforce.

While at first these focused mostly on developing an organizational understanding and mindset focused on Quality and improvement, *Organization F* subsequently took efforts to balance principles and practices, providing its associates with a series of tools and systems to deploy this mindset into their daily tasks. In the end, these efforts led to a strongly aligned workforce with strong practical expertise. Key people in each of the organizational levels were identified to help ensure the correct use of the tools and systems and foster organizational commitment. As a result, the organization was able to, in a few years, take the focus on Quality and Operational Excellence beyond the task-oriented level and create a truly organization-wide commitment. Satisfied with the cultural alignment it was able to develop, the organization centered its efforts on updating the training materials, deploying new tools, and expanding the scope of its initiatives.

There were, however, market circumstances that have been having a significant impact in the recent history of the organization. A growing biotech and healthcare industry scene is setting in the same metropolitan area, with multiple competitors settling and expanding their activities in the area. With these, the challenges to recruit and maintain talent has been growing. *Organization F's* workforce, with good levels of experience and expertise, and additionally trained in organizational improvement and Quality management systems, became highly valued in the market, and competitors have been attracting them with benefits and better salaries. As a result, it has been experiencing high levels of employee turnover, with a considerable number of associates – and even some middle managers – having left recently.

As for Organizational Agility, it is a very recent concern, which spawns in part from the need to react to the changes in its business environment and reduce the impact that they have been having in its workforce. As a consequence, it is a concern that is seen mostly at top organizational levels, and still in an isolated manner, with no organizational-wide ambitions. Most initiatives are observed only at this level, including the efforts to better sense and anticipate the market, analyze the available data, and act to counter the drainage of associates to the competition. It is notable that the levels of flexibility of the organization processes – developed in the scope of its focus on continuous improvement and operational Excellence – are recognized to be vital to the organization in a time where it needs to be particularly adaptable. It has allowed *Organization F* to improve communications between different levels and groups, manage the extra workload that the associates are facing as a result of sudden resource limitations, and maintain the level of productivity. Nevertheless, the current level of

engagement with Organizational Agility is still done as a timid effort to address a mounting number of problems. Furthermore, it is regarded with special caution when discussing its expansion, most significantly due to the impact it may have in many of the well-established processes and operations that are subject to strict regulatory requirements.

5.2.6.2 Results and Reflection

This case study provided valuable insights on the development of a sustainable commitment to Operational Excellence and the creation of a cultural orientation to Excellence. Having started its journey with efforts to create an organization-wide alignment with Quality and continuous improvement, *Organization F* understood that the full potential benefits of these efforts could only be achieved through the use of tools and systems, supporting the principles with practices. Accordingly, it worked to balance cultural alignment and practical capabilities, achieving stable levels of commitment, and observing improved operational results after some time.

Similarly, the organization now sees how an unbalanced focus on tools and systems is unable to keep the organizational alignment in the long term. The reinforced emphasis on tools and systems that *Organization F* has promoted recently, associated with the departure of a significant number of associates and the recruitment of new people, has relegated the cultural aspects of Operational Excellence to a secondary position. This reality has an impact on the levels of engagement of the workforce, and in their individual commitment. New associates are trained in the tools and methods but have little formal engagement with Culture – especially in a time when the rest of the workforce is dealing with increased work levels and has less time to coach new members.

These insights are essential to understand the dynamics between Operational Excellence and Organizational Culture better. They support the relationships proposed in the conceptual framework and explored by the first research questions of this project. They highlight the importance of the cyclical relationship between these concepts, and the need to continuously develop the Culture over time to develop (or maintain) an orientation to Excellence.

In terms of the relationship between Operational Excellence and Organizational Agility, limited evidence was found to allow any in-depth inference. The highly regulated environment in which *Organization D* operates has driven it to focus mostly on defining and controlling processes and operations, ensuring that they meet the requirements of the different regulatory bodies and agencies that regulate its activities. Consequently, there has been a very limited development of Organizational Agility capabilities, and efforts to develop them are recent. However, valuable insights were still added.

This case showed how the development of Operational Excellence capabilities is vital as an organization initiates its commitment to Organizational Agility, providing a basis for the development and deployment of Agility capabilities and strategies. It shows also that not all levels of maturity in the development of Operational Excellence are enough for an organization to have the necessary market awareness to initiate a move towards Organizational Agility actively. Being mostly focused on the development of its internal capabilities, the organization was unable to identify new market risks and opportunities.

Finally, and while no relevant reflections are made on the use of the structured-case approach or the data collection methods, one crucial comment should be made regarding the level of participation in the questionnaire, and the levels of direct workforce participation in this case study. More than 80 people responded to the questionnaire, in an organization of about 120 people. Accordingly, this case considered a percentage of the workforce being directly engaged in the data collection efforts well beyond the expected coverage of a total between 10% and 20%. This situation happened because *Organization F* took a particular interest in the questionnaire, and asked for the questionnaires to be sent to the entire workforce in the hope of learning their general perspectives on the topics of the questionnaire. Naturally, questionnaire responses are anonymous, and individual answers are confidential. Accordingly, and the organization only had access to the overall results for the two groups. Since a Research Cooperation Agreement was already in place between the organization and the host university, the process to establish a Non-Disclosure Agreement was not as long as in the previous case. However, it still took a couple of months.

With basis on the collected evidence, and using the Assessment methods presented in Chapter 4, the following results were calculated to *Organization F*:

Table 20 - Maturity assessment scores for Organization F on the concepts of Operational Excellence, cultural orientation towards Excellence, and Organizational Agility.

	Operational Excellence	Cultural orientation towards excellence	Organizational Agility
F	3.47	3.30	2.66

A full assessment of *Organization F*'s enablers and critical success factors can be found in Appendix V.

5.2.7 Reflection - Phase I

The initial planning considered a total of six case studies, with the study of three organizations in each country (Portugal and the United States of America). However, this total of six case studies was first achieved with four cases concluded in Portugal and two in the USA. In the face of this reality, the reflection of Phase I started by analyzing the reasons why this happened and understanding the impact it has in this study.

Two main reasons for this unbalance were identified. The first reason was the (seized) opportunity to do a total of four case studies in Portugal within the defined timeline (1 year). This situation happened in part because the case study in *Organization A* was initially regarded as experimental. As the opening case study and first opportunity to deploy the methodology, expectations were that it could be inconclusive and require changes to the methods or the theory. Accordingly, several contacts with possible partner organizations were initiated, eventually leading to three more case studies being confirmed. However, the reflection promoted at the end of this case study showed that the methodology was fit for collecting evidence, and the results were aligned with the proposed theory. As other case studies were added and proved how aligned the first case was with the overall findings, it was considered as part of the case study set.

The second reason had to do with the negotiation of confidentiality agreements with organizations in the USA. Long periods (up to several months) of negotiation affected every proposal, and irreconcilable requirements on both sides (organizations and university) led two organizations to desist from participating in the study, limiting the number of case studies performed in the US to two (in a similar 1-year period).

Despite these circumstances, and having a total of six case studies been reached, the reflection was continued in order to analyze the work done so far, the results achieved and their relation with the conceptual framework and the limitations encountered so far. Based on this reflection, the next steps of this project were defined.

The evidence collected within this first group of organizations provided clear support for the theory built so far, while helping to develop it further. Whereas the case study at *Organization B* uncovered a reality closely matching the relationships considered in the original conceptual framework, the remaining organizations added contributions that helped both to better understand particular relationships between concepts, and to consider the addition of certain links.

The cases on organizations *A*, *D*, and *F* showed how a limited perspective on Operational Excellence could limit the ability of an organization to develop its Culture and restrain the pursuit of

higher levels of adaptability. These organizations, having in one way or another developed a focus on Operational Excellence that was mostly local, task-oriented, and isolated to a few organizational areas or levels, showed reduced cultural orientation to Excellence and a limited development of Organizational Agility capabilities. Furthermore, and in the particular case of *Organization F*, it was possible to see how their pursuit of sustainable Operational Excellence demanded both technical and cultural development efforts. On the one hand, too much focus on cultural aspects did not deliver the practical results that the organization expected. On the other, unbalanced attention to tools and the technical development of processes and operations did not ensure their correct usage and understanding by the workforce.

In regards to the development of Organizational Agility capabilities, organizations *A*, *D*, and *F* added evidence that, even in the presence of highly unstable business environments, limited levels of development of Operational Excellence are not enough for organizations to actively seek the development of Organizational Agility capabilities. Focused mostly on internal processes and operations, these organizations did not reach a level of maturity in Operational Excellence that stimulates them to look and tackle problems beyond their walls. This perspective reduces their sensitivity to the markets and their awareness of the changes in their environments.

Although from a different standpoint, the case studies in organizations *C* and *E* also reinforced the perspective that a limited development of OpEx capabilities constrains the development of Organizational Agility capabilities. While both organizations emphasized Agility over Excellence, their development of Organizational Agility capabilities was still constrained by issues that fall within the area of activity of Operational Excellence. Silos, limited integration and communication between departments and stakeholders, poor engagement and motivation of the workforce, and no active management, control, and optimization of processes are examples.

While the evidence collected in these six organizations supports or increases the understanding of the relationships represented in the original conceptual framework, it also suggested interactions that are not considered in the theory built so far. Such is the case of contexts found in organizations *C* and *E*. In these organizations, emphasis on Organizational Agility has been stronger than on Operational Excellence – and the pursuit of OpEx has been initiated at a later stage in their lives. Such realities expand the initial perspective, shared in the theory, that the focus on Organizational Agility would result from a continued focus on Operational Excellence, as Excellence-oriented organizations sought to develop agile capabilities in order to be able to create value to the markets continuously. These organizations provided two clear examples of how the initial focus of an

organization can be centered on Organizational Agility, with the pursuit of Operational Excellence coming later, as the need to define and systematize process and operations becomes evident. Such need, as shared by leaders in organizations *C* and *E*, comes as an organization needs to ensure the reliability and repeatability of its processes and operations. Usually, it happens when their markets and operations have stabilized, or when an approach has been developed and tested and is to be expanded within the organization.

This reality leads to a series of questions: How do these relationships unfold when the primary focus of an organization is on Organizational Agility? How does the pressure to ensure Operational Excellence build? How do organizations cope with the balance between Operational Excellence and Organizational Agility at earlier stages of their lives? Moreover, what effect does that have on the development of a cultural orientation?

In the face of these questions and those raised by the analysis on the findings of these first six organizations (see chapter 6), it was decided that further case studies should be performed. These cases should be used to seek answers for these questions and close the identified gaps in the theory development. In this sense, there was an effort to include organizations that, through a set of different characteristics, would offer a better fit for the collection of data from organizations that prioritizes Organizational Agility over Operational Excellence. In this optic, Phase II focused on organizations in such circumstances, and in earlier stages of their lives. These organizations should be dealing with highly unstable contexts and experiencing rapid growth, but facing increased pressure from their stakeholders to improve process orientation and reliability. The description of these cases and their general context is presented next.

5.3 Case Study Description - Phase II

5.3.1 Intro

After an initial phase where the interest was put on organizations with a minimum of fifteen years of operations, the organizations considered in second phase present different features. Designed to cover the limitations identified after the end of Phase I in exploring the relationships between Operational Excellence, Organizational Agility, and Organizational Culture, this phase focuses on organizations with less than 15 years and experiencing a stable growth period. The objective of this second phase is to understand the dynamics between concepts at an early stage of the life of an organization, more specially in times of rapid growth and pressure from to adapt and offer value to the markets. As a result of these dynamics, it is expected that the focus of these organizations is often more emphatically put on Agility than on Excellence, allow to explore the dynamics between these concepts under these circumstances.

Typical companies falling within this profile include mature start-ups or scale-ups experiencing rapid growth and a stable market activity (sustaining its activities in product and service sales rather than on funding from investors). In order to better frame this search, a minimum of 5 years of activity was included in the requirements.

5.3.2 Organization G

5.3.2.1 Context and introduction

Organization G is a scale-up focused on the development of web-based solutions for the design and development of equipment and indoor spaces, offering services including the creation of 3D environments, quoting, and production planning. The case study was performed between February and March 2019, in a total of 4 weeks. Data collection included online interviews and visits to one of the facilities where the organization operates from, in a start-up incubator in northern Portugal where it is headquartered (the organization has another office in this region). The case study was proposed to the two CEO's, who supported its deployment and helped in reaching the workforce. Data collection methods included interviews, observation and the analysis of documentation. Given the small number of associates (15) the questionnaire and the focus groups were replaced by interviews, with about 50% of the organization's workforce participating directly in the study. Observation included visits to the

headquarters and the participation in a leadership meeting. Key performance indicators and work instructions were reviewed, as well as different media channels.

Organization G was founded in 2013, and has initiated a considerable expansion and internationalization process in 2017. During the initial years, it was mostly focused on the development of its technology services and ensuring funding and sales. As the organization started to close the first contracts and to receive stable orders, it found the need to design its operations better and ensure the ability to translate customer requirements into technical features. This need led to the first expansion of the company – which was focused on bringing more technical capabilities to the workforce – and the first efforts to define processes. The organization also put more emphasis on communication, trying to expand its market opportunities. In this scope, the organization promoted an agile strategic thinking, upholding the importance of being capable of taking projects from different customers and adapting to their different needs.

In its early years, *Organization G* had a number of different projects and saw its customer base grow. Despite looking for increased process definition, the focus of the organization continued more actively on the attraction of new customers. With the number of projects and sales growing, the organization had little time to develop a process orientation effectively. Furthermore, as new customers offering major contracts appeared, the organization changed part of its focus, taking advantage of its Agility and acquiring the necessary talent to support these strategies and deliver the technical requirements of the products and services contracted.

However, this focus has started to change recently. The organization started circling back to the need to define processes, in large sense due to the expanding operations and growing workforce. Accordingly, the organization is currently emphasizing the development of its process orientation and aims to standardize approaches, work practices, and methods in order to better structure its activities and allow a more stable scale-up process.

5.3.2.2 Results and Reflection

A highly relevant aspect of this case study is that it was the first to be done after the major reflection concluded after the end of the six cases studies included in Phase I. Together with the expectation to gather additional insights on the relationships between the concepts under study, taken from an organizational setting with stronger the focus on Agility, it was anticipated that some of the approaches and methodologies would need adjustment.

In this sense, efforts were taken to define the methods to be used since the beginning. The initial meetings with the CEOs also served to discuss the deployment of the different methods. Based on their inputs on the characteristics of the organization, it was decided to substitute the questionnaire and focus groups for interviews, and keep the remaining data collection methods altogether unchanged. The data collection was done without any significant setbacks, although it should be noted that it was more difficult to find documentation to review than in the previous case, a situation that was in no small extent identified to be a result of the poor process definition of the organization.

In regards to the collection of evidence on the relationships between Operational Excellence, Organizational Culture, and Organizational Agility, this case offered compelling evidence to understand how they evolve in a scenario where the focus of an organization is on being highly adaptable.

Organization G made Agility as a core aspect of its strategy, focusing on being able to grow by learning from the market and adapting to the needs and expectations of its customer and stakeholders. In this process, and despite some emphasis on the development of strategies, the organization invested little in the definition of processes and systems to guide its activities. They were always developed on a “need-to” basis, and the focus was always on exploring new market opportunities. The organization was able to find success under this strategy, changing and expanding its business activities. It saw steady growth and used its stakeholders – customers primarily – to develop better products and services.

As a result, the organization started to grow – and this scale up process brought new challenges. The large number of different customer requirements and specifications was conflicting with the increased importance of some customer and market segments over others. The organization started to feel the need to define its product and operations better and focus on the development of a solution to serve as its core product – still allowing customization to a certain level, but being well defined and offering the possibility to be marketed in a large scale, ensuring high levels of quality and active maintenance of the services offered. The recent growth in the workforce is another factor putting pressure for the organization to develop its processes, as the lack of definition impairs the efficiency of the training process.

In this sense, this case study reinforced the idea that as organizations scale up, the urgency to define processes and standardize tools, systems, and approaches becomes higher. Such conclusion, which aligns with similar claims made by one of the CEOs at *Organization C*, finds in this case strong supporting evidence. Furthermore, and besides limiting the growth of the organization in a structured and stable way, the lack of development of Operational Excellence also showed to be constraining the ability of the organization to develop its Agile capabilities further. To this extent, these conclusions align

with those resulting from the cases in organizations *C* and *E*. The need to further develop capabilities and the maturity of Organizational Agility efforts thus had an influence in the development a process orientation and in setting the organization in pursuit of Operational Excellence.

Based on the same evidence that supported this reflection, the assessment scores for Operational Excellence, the development of a cultural orientation to Excellence, and Organizational Agility were calculated (the full assessment, including the scores for each enabler and critical success factor, can be found in Appendix V). They are presented below in Table 21.

Table 21 - Maturity assessment scores for Organization G on the concepts of Operational Excellence, cultural orientation towards Excellence, and Organizational Agility.

	Operational Excellence	Cultural orientation towards excellence	Organizational Agility
G	2.97	2.75	3.62

5.3.3 Organization H

5.3.3.1 Context and introduction

Organization H is a scale-up company that does software design and development. It was founded in 2010, and is based in Northern Portugal. The case study took place during March 2019, extending for four weeks. The initial meetings and agreement to proceed with the case study were done with two of the organization’s founding members. Several meetings followed, allowing interviews with the CEO, managers and associates. Most of these meetings and interviews were held at the organization’s headquarters, which allowed opportunities to engage in observation activities and take several notes on the working space, working dynamics, and environment. One of the interviews was done remotely, and another outside the organization’s facilities. Some digital documentation was analyzed, as well as the organization’s online media channels. About 30% of the organizations’ workforce participated in this study via interview.

Organization H was founded almost ten years ago by a group of college students. According to the founders, the idea for the organization spawned from a conceptual project for an international contest. After achieving some success in this competition, the idea was developed and expanded to become a product. In this process, the organization was formalized and officially established in 2011, as it looked for new stakeholders. In the beginning, the emphasis was put more on finding partners and

customers in the broader area in which the organization operated (software security). The organization was active since its early days in promoting its internationalization, and its members attended different events across Europe to expand the network and explore more market opportunities.

Organization H adapted to the different needs and expectations of its customer, leading to an investment in agile methods and capabilities. The organization experimented early with agile projects methods and was able to develop them and use them consistently. Project development processes and methods are now well-developed, with clear metrics to promote balanced, cross-functional, and autonomous teams. The organization made good use of this balance and used the existing knowledge and expertise to promote the learning development of its workforce. It also focused on the development of agile capabilities, especially at the leadership and management levels, to better support the development and deployment of agile strategies. There was also an effort to create an agile-oriented work environment and mindset. On the one hand, these efforts focused on developing the ability of the workforce to spot market trends and opportunities. On the other, they served as a factor for motivation, and were used to support the needs and expectations of its employees. The organization puts a strong emphasis on retaining the talent and knowledge it has acquired and developed. Talent is seen as a crucial factor to support the agile strategies of the organization, and *Organization H* worked actively to acquire, develop, and retain it.

Despite this focus on Agility, the organization's leaders state that this pursuit of adaptability did not drain the focus on other organizational areas. Although with less intensity, the leadership team promoted the quality of its products and services as one of the central values of the organization. The importance of ensuring a stable process for delivering the projects to their customers was also well understood. In order to ensure it, operations were developed to a certain degree. To this day, the organization was able to define several of its core processes, supporting its operations and strategy on them. There are active systems to manage resources and balance capabilities, expertise, and other project team needs, and a dedicated process to be followed in any project, ensuring on-time delivery and active feedback loops. The defined processes are stable, and the organization starts to manage them actively.

5.3.3.2 Results and Reflection

Organization H put a strong emphasis on Organizational Agility but did so in a more structured manner when compared with the reality observed in other cases. While defining its product development project methods and tools, the organization also emphasized the importance of having

balanced project teams. It emphasized individual talent, but also on using that talent to build a robust organizational knowledge set and promote the learning and development of its workforce. More balanced teams allowed greater resource fluidity, higher flexibility in managing projects – even with a limited number of associates - and helped to create a barrier-free work environment, where its employees felt free to express their opinions and contribute to the advancement of the organization. This reality was made possible by the vision of the leadership, which maintained a strong emphasis on the development of processes to allow a stable pursuit of the organization's strategies. This alignment was enforced with the help of some managers; the engagement of the associates being generally task-oriented – visible on their focus to ensure Quality during the product development process, and guarantee a level of service Excellence in their maintenance afterward. However, and despite this alignment with Excellence, the focus on Agility has been driving most of the efforts of the organization. The efforts on the development of processes and operations followed this lead, and can be seen as an effort meet the organizational needs tied to new and agile strategies and initiatives.

In the face of this reality, this case study adds valuable insights into the relationship between Organizational Excellence and Organizational Agility. It shows how despite a clearer focus on Agility, organizations are able to develop a stable degree of commitment to Excellence. *Organization H* made evident efforts to define core processes and metrics to manage and improve product development processes. As the organization grew, this focus was maintained steadily – but also that it was always done in a “reactive” manner. Strategies focused on the pursuit of Agility and in answering the demands of the market systematically came first. The organization first deployed and tested these strategies and approaches, then working to define a structure around them. Accordingly, there has been an incremental Operational Excellence development, tied to the maturity development of Organizational Agility. This evolution has been dependent on environmental factors, and its somewhat balanced evolution was allowed by the steady but incremental growth that the organization is experiencing.

Looking at the conceptual framework, this idea reinforces the perspective that a two-way relationship between Organizational Agility and Operational Excellence. It reinforces the need to include a scenario where the entry point for initiating the relationships between these three concepts is through the pursuit of Organizational Agility, and to describe the relationship between Operational Excellence and Organizational Agility better.

As for the research methods, in this case, the data collection next to the workforce were made via interview, without the use of focus groups and questionnaires. This approach showed to be favored

by the leaders, considering it less impactful on the organization, much as had been the case in the previous organization studied. No other relevant notes were registered.

Based on the same evidence that supported this reflection, the assessment scores for Operational Excellence, the development of a cultural orientation to Excellence, and Organizational Agility were calculated (the full assessment, including the scores and further details on each enabler and critical success factor, can be found in Appendix V). They are presented below in Table 22.

Table 22 - Maturity assessment scores for Organization H on the concepts of Operational Excellence, cultural orientation towards Excellence, and Organizational Agility.

	Operational Excellence	Cultural orientation towards excellence	Organizational Agility
H	3.06	2.94	3.55

5.3.4 Organization I

5.3.4.1 Context and introduction

Organization I offers web-based, Artificial Intelligence-driven solutions for the management of intellectual property. It was founded in 2013 by a group of professionals with a leadership background in the corporate world. The case study was conducted in April 2019, mostly via phone and online interviews. The organization operates primarily as a virtual enterprise, with its team distributed across the Northeast Region of the United States and in Central Europe. Interviews included the two founders and current leaders, and one associate (the organization has under ten associates). Some documentation was shared upon request and was analyzed together with publicly available documents (via the company website or other online platforms) and news and press releases.

Organization I was founded as a result of the identification of a market opportunity that the founding members wished to explore. Given the profile of this team, with experience on top positions in large organizations, there is within the leadership team a strong understanding of the importance of Operational Excellence. This understanding is seen in the approach that was imprinted in the organization. The use (and the adaption) of different management philosophies, tools, and methods are promoted to guarantee the stability of the organization. The discourse of the leaders also showed a clear emphasis on Quality systems and the management, control, and optimization of processes. These perspectives strongly influenced strategy formulation and product development processes.

Despite this process orientation and a series of perspectives that favor the development of Operational Excellence, *Organization I* is, at this point, operating mostly on a project approach. Despite using these principles and methods to define the development processes, its activities are still at a trial-run level. Product versions are developed and tested, in a process that counts with active stakeholder participation, and has an iterative nature that is supported on the use of agile project development methods.

Agility-related methods and approaches are also very present in the discourses and communications of the organization. At this stage, there is still a considerable level of variability in the products and processes of *Organization I*. While the definition of processes is essential, their flexibility is at this point more critical for its ability to adapt to the market and find the best way to connect with its customer's expectations. As a consequence, the organization has been more active in the deployment of agile strategies and methods. There is a strong focus on the use of technology to maintain flexibility and a focus on maintaining agile management and strategy.

Leaders, despite their espoused commitment to Operational Excellence, are more actively focused on prioritizing change management and maintaining a balance between the needs and requirements of its projects and the available resources, expanding the organization's workforce as a result of those needs. Efforts to ensure this balance includes the acquisition of talent to support agile strategies and the development of Agility-related capabilities – from project management methods to technical skills to deal with increased complexity and disruption of the level technology supported by its products.

The culture of the organization was deeply influenced by the focus on the leaders. It showed to have an orientation to Excellence, but a more active concern with Organizational Agility.

5.3.4.2 Results and Reflection

This case study added a new organizational context, with operations based on a virtual network, a workforce spread across the different regions of the world, and no physical working facilities. It creates a new scenario for the study of the relationships between the concepts of Operational Excellence, Organizational Agility, and Organizational Culture. Despite this new reality, the identification of principles and practices related to these three concepts did not present a significant challenge. The evidence offered a perspective of where the organization stands in terms of the development of both Excellence and Agility. Similarly, the available evidence was enough to understand where the organization positions itself, in terms of culture, in regards to the first two concepts.

While there were no major challenges in identifying the elements of the conceptual framework, significant adjustments had to be made on the data collection methods. The characteristics of *Organization I* demanded a different balance on the data collection methods. With the organization operating on a virtual network, interviews had to be made via phone or online platforms. Interviews were favored over questionnaires by the leaders of the organizations, but the number of interviews effectively performed was low (although ensuring a percentage above 20% of direct workforce engagement in the study). This reality meant longer and less structured interviews in order to cover all topics under study. The virtual and remote characteristics of the organizations also limited the ability to measure certain enablers and critical success factors such as “agile style work environment” (in what refers to the physical environment) or the “built environment” and other physical manifestations of the culture.

Organization I provided important insights on the evolution of an organization that tried to balance, from the moment of its foundation, the pursuit of Agility and Excellence. The strong orientation of the leaders towards the process led them to uphold principles and practices related to Operational Excellence. Accordingly, the organization deployed and adapted different management philosophies and methods focused on ensuring stable and yet flexible processes and operations. There were efforts to adapt lean management to the reality of the organization (with the deployment of lean start-up principles). Development processes, initially outsourced, was brought into the organization’s activities in order to allow better control and alignment of the process; and the organization started to integrate stakeholders in the development of its strategies, products, and markets, gaining better perspectives on how to deliver value. However, the organizational context and market activity of *Organization I* influenced the development of the organizations’ capabilities, putting more emphasis on Agility. Processes and even products present high variability, and sometimes have to be completely redrawn or replaced, rather than improved. The development process, even considering the integration of stakeholders in its development, is dependent on fast feedback loops and iterative evolution that the use of agile methods supports. With the increasing pressure to be agile, the organization has effectively prioritized the development of Organizational Agility capabilities. Operational Excellence, although regarded as essential in the long-term, is seen as contraoriented in a moment in the life of the organization where adaptability is still a key for success. This case shows how organizations developing their first generation of products have challenges in defining their processes and operations, having a clear market pressure to be adaptable, and quickly meet new customer demands in order to explore their true market potential.

This reality is also present in the culture and work environment of the organization. Teaming is reportedly still more pervasive than structured teamwork, and even considering the efforts to balance project teams, there is a spontaneous approach to work. The work environment and organizational structure are other examples. Despite some attempts from the leadership to better define the structure and move away from a work dynamic based on personal relationships, the leaders claim that the existing approach works and is difficult to abandon.

In line with this analysis, the assessment of *Organization I* delivered the following results (full assessment on Appendix V):

Table 23 - Maturity assessment scores for Organization I on the concepts of Operational Excellence, cultural orientation towards Excellence, and Organizational Agility.

	Operational Excellence	Cultural orientation towards excellence	Organizational Agility
I	2.68	2.54	3.73

5.3.5 Organization J

5.3.5.1 Context and introduction

Organization J is a startup that operates in the cleantech and green energy sector, providing solutions for access to clean water and energy in isolated areas. It was founded in 2013 and now has offices in three continents: Europe (HQ), North America, and Africa. The case study unfolded throughout May 2019, for about five weeks. Case study activities were conducted in the US office, located in the Greater Boston Area, and online. In-person interviews were held with the founder and the US director, and a remote interview as done with the operations director. The direct participation of the workforce was approximately 25%. Corporate documents, communication channels, and news and press releases were reviewed. Data collection through observation was done in the US office. A focus group session was conducted in the same facilities. Questionnaires were not used in this case study.

Organization J developed a product that works as a station for access to clean water and energy in remote or isolated areas. The mission of the organization is centered around the idea of offering a technical solution for crisis relief. However, and with a strong focus on value creation, it has also designed the product to adapt to other installations and serve different purposes. The station is internet connected and can collect and update data (on its usage or through the integration with sensors) while providing local access to the network. This balance between social mission and business

value has allowed the organization to grow and attract several stakeholders from around the world. Value creation is central to the development of the organization. Although the core product is well defined, the way and scenario where it can be deployed vary, and the organization aims to balance its mission and vision with the creation of value for a wide number of customers.

In its activity, *Organization J* has two main technical challenges. The first deals with product development; the second with the operations to deploy and manage it after installation. With a product aimed for areas with difficult access, quality is a major concern, with the need to ensure its endurance and reliability in the long term. In the same sense, deployment and installation operations offer a series of challenges, from transportation, local assembly, and the training of the operators (which may be the customer, local populations, or authorities).

To deal with these challenges, *Organization J* has focused on the quality of products and the development of operations. Nevertheless, the variability in the characteristics of the products and possible deployment scenarios puts pressure on the organization to operate under the principles such as speed and flexibility. There are clear efforts to involve customers and stakeholders in the description of products and delivery operations, but each case is approached in a project scope. Furthermore, emphasis on Operational Excellence capabilities has been less evident than the one to promote Organizational Agility capabilities, and the development of the workforces is more clearly centered on helping the organization maintain high levels of adaptability. The focus on acquiring talent and retaining is obvious, but the organization has been more actively engaged in reinforcing the technical capabilities of the workforce.

The Organizational Culture is deeply influenced by the mission of the organization, with emphasis on its social impact. In a great deal, it is aligned with the vision and values of the founder and CEO.

5.3.5.2 Results and Reflection

The case study at *Organization J* provided further evidence to understand the relationships between Organization Culture, Operational Excellence, and Organizational Agility in the context of start-ups and organizations deeply dependent on virtual networks.

Organization J deals with high levels of complexity and volatility in its activities, with a significant degree of customization to its products, and operations in very particular settings – in locations that are not only remote but often underdeveloped and experiencing extreme and exceptional circumstances. After six years in operation, the organization has achieved truly global status, despite its

limited direct workforce (less than 20 people). Besides its offices being physically distant, its operations are scattered across the entire world.

In this scenario, a focus on Quality and Operational Excellence could be expected. However, given its characteristics, the organization's approach to operations has been more focused on adaptability and flexibility than in the definition of its processes. While the leadership is conscious that the further growth of the organization will demand higher maturity levels for Operational Excellence capabilities, at this point it is not seen as a priority given its current reality and resources. For an organization with limited resources, a project approach centered on the individual expertise and capabilities of people showed to be more practical and more efficient than an effort to define processes and operations in detail. The variability it faces in its daily operations requires high levels of adaptability. However, with a market yet under development, and having limited data or experience to anticipate most circumstances, each situation needs to be managed individually – often under pressure to act quickly. As a result, adaptability for *Organization J* lies in the individual skills of people, and the ability, for teams to reconfigure, to be highly flexible, and to focus primarily on problem-solving.

This case study added another example of the importance of Organizational Agility in the early stages of the life of an organization. Nevertheless, it showed also that the maturity of the Agility capabilities is still limited – a reality comparable to the case study on *Organization I*. Despite the strong emphasis on the acquisition and retention of talent, and the use of that expertise to help the organization grow and solve its problems, learning is still limited. Teams are not always fully developed, and teaming (unstructured team formation and work) becomes a common approach, without necessarily providing lessons learned in a consistent way that helps to define future activities. Furthermore, the ability to deploy agile strategies and manage change, are deeply tied to the activities of the top leadership team, which defines the pace and focus of the activities of the organization. This situation closely relates to the reality observed regarding the Organizational Culture, deeply centered around the perspectives of the founder.

This focus does not mean that there was no evidence of a focus on Operational Excellence. The organization and its leaders clearly understand the importance of developing its processes, workforce, and strategies in a sustained and defined manner. However, such efforts are of difficult pursuit when the pressure of the market is on speed and adaptability. As a result, they are unstructured and unable to promote a stable solution or the long term.

This reflection is complemented by the quantitative assessment of the concepts under study. The assessment scores for each concept are listed in Table 24.

Table 24 - Maturity assessment scores for Organization J on the concepts of Operational Excellence, cultural orientation towards Excellence, and Organizational Agility.

	Operational Excellence	Cultural orientation towards excellence	Organizational Agility
J	2.81	2.66	3.60

The full assessment, including the scores and further details on each enabler and critical success factor, can be found in Appendix V.

5.3.6 Reflection - Phase II

The evidence collected from the case studies in Phase II adds valuable insights into the relationship between Operation Excellence, Organizational Culture, and Organizational Agility. It expands the total number of case studies to 10, but more importantly, adds two new types of organizations: established start-ups with global operations relying on virtual networks, and scale-ups experiencing rapid growth and increased stability (besides the use of virtual networks, the distinction between the two types – start-ups and scale-ups – is based precisely on the recent growth of the workforce and the number of stable contracts with customers).

The realities of these organizations allowed a more comprehensive analysis and understanding of the relationships between the concepts under study – most evidently, their dynamics in a different stage of the lives of organizations. This second group had very different characteristics from the first one. More than the number of years of activity (that varies in these four organizations between 6 and 9 years), the most common characteristic of the organizations studied in this phase is that they are dealing with their first generation of products.

This second phase provided insights on how the ability to react and adapt is an advantage for organizations in this early stage of their development. It showed that even if there is some focus on process definition and operations Excellence, the pressure from the market or the organizational structure to enforce it does not become evident until later. In opposition, all these organizations faced evident pressure to be highly flexible and to quickly adapt to new or changing demands from its (potential) customers. In this sense, their efforts have been more centered on the development of Organizational Agility capabilities.

Nevertheless, and regardless of the scores obtained, the capability maturity levels for Organizational Agility in these organizations are built on an approach that is different from that observed

in the first set of organizations. The development of Organizational Agility capabilities showed to be supported on individual talent, working primarily in a project approach, and more prone to teaming than to well-defined teamwork. Accordingly, these organizations may face considerable challenges to expand Organizational Agility capabilities if their environments change – as is the case if they start to grow considerably, adding new people and functional areas to the structure. In the event of such growth, and as was seen in the case of the organizations in phase I, the expansion of agile capabilities will demand the support of well-defined processes and systems – and a reinforced emphasis on Operational Excellence.

This reality is understood by the leadership in these organizations, and was assumed in the discussions on their prospective growth scenarios. At this point, however, the need for defining processes and structuring operations does not see the same level of pressure from the markets. Operational Excellence may be a concern, but is not a priority, yielding to Organizational Agility. The different organizations studied in this phase proved to be aware of the need to, at a certain point in their future, shift the focus towards Operational Excellence. Nevertheless, they consider that such a shift will have profound implications in their ability to be agile. As a result, efforts to promote Operational Excellence are seen as a lesser priority until they have stabilized their products and markets.

As for the creation of a cultural orientation, neither concept – Agility or Excellence – had a particularly marked influence in its development. This set of cases showed there is little cultural development at this stage beyond the alignment with vision and values promoted by the founders or early leaders.

These conclusions have important implications in the building of the theory and the conceptual framework. The most important contribution of this second set of case studies was the understanding of the dynamics between concepts when the focus of the organization is more clearly put on Organizational Agility. As a result, it underlines the importance of considering, in the conceptual framework, Organizational Agility as an entry point for the relationships between these three concepts to be initiated, with a subsequent move towards Operational Excellence.

6. Cross-case Analysis, Findings, and Discussion

6.1 Intro

In the scope of presenting the overall findings and further developing the theory integrating the concepts of Operational Excellence, Organizational Agility, and Organizational Culture, this chapter reviews, reflects and incorporates the insights and results that each case added to the understanding of the organizational dynamics under study. In the previous chapter, the last step of the Structured-case approach – Reflection - was used to express the findings in each case study. This chapter now promotes a cross-case analysis aiming to uncover patterns and trends across the entire set of case studies. This cross-case analysis goes through the insights collected in each organization and compares them and, taking the different viewpoints and reflections, reviews and summarizes the evidence to further develop the theory. It looks for consistency in the findings, analyzing how similar evidence was treated, how complementary information was integrated, and how every data piece adds up and contributes to the overall findings of this study. Additionally, and using the assessment scores calculated for each organization's maturity in the development of capabilities of Operational Excellence, Organizational Agility, and the creation of cultural orientation to Excellence, this analysis uncovers a series of patterns and trends in the relationships between these concepts.

First, a cross case analysis is presented in section 6.2, bridging the findings of the reflections with the results of the capability maturity assessments. The following section (6.3) focuses on the development of the theory, and the update of the conceptual framework. Finally, a discussion is promoted in section 6.4, reviewing the proposed theory and its alignment with the existing knowledge, comparing it against the literature, and testing the scientific support for the proposed behaviors and dynamics. Accordingly, the theory development process is – following the structure-case approach – reflected upon once more time, and the theory itself is presented with reinforced confidence and integrated with its broader body of knowledge.

6.2 Cross case analysis

In order to initiate this cross-case analysis, it is first important to review the research objectives of this project and the findings (reflections and assessment scores) of each case study. As for the research objectives, they are, as defined in the previous chapters, the following:

1. Understand if and how can the implementation of Excellence programs influence the Culture of an organization in the long term, creating sustained performance Excellence

and embedding in the Organizational Culture an enduring orientation towards Excellence, and;

2. Comprehend if such Cultural orientation helps to develop Organizational Agility capabilities, making the organization a more agile and fit to adapt to changes in its extended business environments.

The individual case study results are listed in Table 25.

Table 25 - Summary of the findings by individual case study - reflections and capability assessment scores.

Case Study	Contribution to theory development	Assessment Scores		
		Operational Excellence	Cultural Orientation to Excellence	Organizational Agility
A	In case study A, the creation an organization-wide approach to Operational Excellence helped to develop the Organizational Culture and create an active workforce commitment. Evidence of limitations in the expansion of Organizational Agility due to constrains not tackled by Operational Excellence (e.g. silos, poor communication channels and processes, undeveloped process integration and cross-functionality).	3.31	3.10	2.54
B	Case study B added evidence of how a mature Operational Excellence system, sustained in well-developed capabilities and a cultural orientation to Excellence, can lead to the development of Organizational Agility capabilities.	4.17	4.36	3.64
C	Case study C provided insights on how the pursuit of Organizational Agility can be constrained by the limited development of Organizational Excellence. The organization puts clear emphasis on Agile capabilities, but the lack of Operational Excellence capabilities and an organization-wide cultural alignment limits their further development.	3.73	3.38	3.73
D	This case study provided important insights on how the context of an organization may lead to a narrow focus on Quality and Operational Excellence. Besides showing limitations in the development of Operational Excellence capabilities, Organization D presented limited cultural alignment with Excellence, and a very limited development of Organizational Agility capabilities.	3.60	3.41	3.06

E	This case study added evidence on the limiting effect that the inadequate development of Organizational Excellence has in the pursuit of organization-wide Agility. Organization E faces severe constraints to the expansion of Agile capabilities across the organization due to the lack of Operational Excellence capabilities, systems and cultural alignment.	2.92	2.69	3.30
F	Case study F helped to understand with increased detail how the development of a sustainable approach to Operational Excellence demands asi. Additionally, it added evidence that even in the presence of highly unstable business environments, limited development of OpEx capabilities are not enough for organizations to actively and efficiently seek the development of Organizational Agility capabilities.	3.47	3.30	2.66
G	This case study at Organization G added important insights on the relationships between concepts when an organization is more actively focused on Organizational Agility. It also provided evidence to reinforce the understanding on how the awareness and need to develop Operational Excellence capabilities starts to build.	2.97	2.75	3.62
H	The case study in Organization H provided evidence that an organization can develop Operational Excellence capabilities even when their more actively engaged in the expansion of Organizational Agility capabilities. It also helped to identify the reactive nature of this process - OpEx being developed to support the needs of expanding Agile capabilities - and its dependency on market circumstances and growth patterns.	3.06	2.94	3.55
I	Organization I provided important insights on the evolution of an organization that tried to balance, from the moment of its foundation, the pursuit of Agility and Excellence capabilities, and the influence that the business environment has in this balance.	2.68	2.54	3.43
J	Case study J allowed to collect further evidence on the influence that the context of early stage organizations has in the prioritization of Organizational Agility capabilities over those of Operational Excellence. This case also added clear evidence of the deep impact that the vision of founders and leaders has in shaping the Culture of an organization.	2.81	2.66	3.48

Departing from these results, it is first important to cluster the case studies according to their assessment scores. Looking at the first group of organizations (Phase I), the results obtained in the case study at *Organization B* stand out for their singularity and alignment with this study's research

objectives. The data collected in this case study constitutes evidence of how the sustained use of tools, methods, and philosophies related to Quality and Operational Excellence (OpEx) led to the creation of a cultural orientation to Excellence. *Organization B* implemented Excellence as a long-term strategy, and adopted different approaches not only for developing and deploying Excellence enablers and critical success factors, but also for sustaining them in a strong cultural base. As a result, it developed higher levels of process flexibility and reconfiguration, promoted supply chain integration and stakeholder involvement, and sustained a focus on value creation. In this process, it also developed higher market sensitivity and identified new opportunities for growth and sustained success. Clear evidence was found supporting that the investment and current focus on Innovation and Organizational Agility (OA) was spawned by the organization's continuous pursuit of Operational Excellence, with a constant focus on optimizing processes and operations, delivering added value, and integrating the supply chain.

Organization B scored the highest in Operational Excellence and Organizational Culture, and second on Organizational Agility. These results, together with other findings of this case study, put this organization in a place of its own as the best practical example of how the sustainable development of Operational Excellence capabilities helps organizations to become more Agile through the transformation of their Organizational Culture. However, and while closely aligning with the research objectives and questions, one case study is not able, by itself, to explain the entire extent of the dynamics between the concepts of Operational Excellence, Organizational Agility, and Organizational Culture. The remaining case studies performed in the first phase offered different insights on the several factors that influence the relationships between concepts and show that, despite the tremendously positive example provided by *Organization B*, the complexity of these dynamics demands the consideration of multiple contexts.

One of the factors that influence these dynamics is the intensity put on the pursuit of Operational Excellence, or, in opposition, of Organizational Agility. This factor is itself influenced by the managerial context, strategic decisions, and the business environment of each organization. It has a profound impact in the sustainability of Operational Excellence – both in terms of the development of its capabilities and the creation of a cultural orientation that supports it. Despite their different contexts, these conclusions were reinforced by the evidence collected in the case studies in organizations *A*, *D* and *F*. The first case (*A*) provided an example of how the tentative creation of an Excellence-oriented culture failed due to a Quality and Excellence commitment constricted to the top organizational levels – with the leadership and top management teams being unable to integrate, motivate and engage the workforce in the pursuit of a much-desired level of Excellence. In the absence

of an organization-wide alignment, and with incomplete development of Quality and Operational Excellence systems, the organization was unable to tear down the barriers between hierarchical levels and departments, and to create a commitment to OpEx. Similar constraints affected the development and expansion of Organizational Agility capabilities. With much of the organization focused on the local level, *Organization A* was unable to expand Organizational Agility capabilities across the organization. Existing capabilities and frequent use remain isolated to a few areas, unable to influence other areas in the organizations to use them. As a consequence, *Organization A* saw its assessment score for Operational Excellence constrained, a limited development and assessment score for its cultural orientation to Excellence, and a weak score regarding the development of its Organizational Agility capabilities.

As for the case studies at organizations *D* and *F*, rather than the inability of the leadership to share the commitment to Quality and OpEx with the workforce, constraints were created by the business environment – more explicitly, by the highly regulated business environments in which these organizations operate. Despite the efforts to develop Quality and Operational Excellence capabilities and systems, as well as to ensure the engagement and dedication of the workforce, both organizations had to deal with the impact that regulatory issues have in shaping their activities. Operating in similar environments (pharmaceutical and healthcare, respectively), organizations *D* and *F* developed their OpEx capabilities in a compliance-oriented, somewhat narrow manner, and with attention on local activities rather than on cross-departmental initiatives. These realities led to task-oriented Quality and Operational Excellence perspectives, mostly concerned with process control, product quality, and operations management. As a consequence, silos subsist, and the integration and collaboration between departments are reduced.

These limitations affect not only the expansion of Operational Excellence initiatives and capabilities but also the management of resources, with similar activities conducted in parallel, multiplying the need for resources instead of building synergies. This reality means a limited development of Operational Excellence capabilities, an unaligned culture, and minimal engagement with the external environments beyond regulatory issues. As a consequence, the development of Organizational Agility (OA) is severely constrained. On the one hand, the internal orientation of these organizations does not promote awareness and sensitivity to the changes in the external environment (beyond compliance issues); on the other, the narrow development of OpEx limits the flexibility and integration of processes and operations, and fails to create a stable ground for the development of internal Organizational Agility capabilities. Furthermore, there is a cautious approach to Organizational

Agility, as these organizations fear the impact it may have upon processes and operations that have been designed in the scope of meeting regulatory requirements. In their assessment score, both organizations showed scores for Operational Excellence and Organizational Culture similar to those of *Organization A*, although scoring slightly better in terms of Organizational Agility capabilities (with *Organization D* outperforming *Organization F* in this dimension).

Another angle on how these relationships unfold was uncovered in case studies *C* and *E*. In these organizations, business environments and strategic decisions created led to a higher emphasis on Organizational Agility. Accordingly, the pursuit of Operational Excellence has been initiated as these organizations understood that they needed to stabilize their strategies and programs (*Organization E*), or operations (*Organization C*) in order to improve their OA capabilities. Aware of the effect that improving the performance of processes and operations has in their ability to expand OA capabilities, organizations *C* and *E* put reinforced attention on Excellence. However, different realities were observed in each case. *Organization C* has already gone beyond the initial definition and standardization level, and despite some limitations, was able to create an organizational alignment with Excellence even when prioritizing Organizational Agility. In the past few years, and despite this strategic emphasis on Agility, it has been able to balance the further development of both OpEx and OA capabilities. As for *Organization E*, it has only recently started to develop Operational Excellence capabilities. It is doing so in a reactively manner, grounded on the necessity to have a stable basis for the expansion of Organizational Agility capabilities and to create an organization-wide alignment with the transformation efforts. As Operational Excellence capabilities are developed in this scope, Organizational Agility capabilities stagnate and remain constrained to the areas where they were initially developed.

These two case studies offer insights to a context that had not been yet considered in the theory: organizations prioritizing Organizational Agility over Operational Excellence, working more actively to develop Agile capabilities. Despite leading to conclusions similar to the previous cases (the need for Operational Excellence capabilities to support the development of Organizational Agility), the dynamics between Excellence and Agility in these organizations are considerably different. Contrary to organizations that have focused essentially on OpEx development, organizations *C* and *E* show higher maturity scores for Organizational Agility than for Operational Excellence. These results transpire not only in the higher practical emphasis put on Agile strategies, tools, and systems but also in the Organizational Culture. These organizations show a predictable lesser development of a cultural orientation to Excellence, in line with the lesser development of OpEx capabilities. Looking at the assessment scores of these organizations and their representation in Figure 12, the effect is evident:

they show greater capability maturity scores for OA than for OpEx, scoring higher than any other organization in the same range of OpEx capability scores.

While organizations *A*, *B*, *D*, and *F* scored better for OpEx, and organizations *C* and *E* did so for OA, there appears to be a balance between the development of the concepts of Operational Excellence, Organizational Agility, and Organizational Culture. First, it is evident that as Operational Excellence capabilities are further developed, there is a similar effect on the development of a cultural orientation to Excellence. Looking at Figure 12, it is observable that as we move along the horizontal axis – where the scores for Operational Excellence are graded – the area of the “bubbles” – representing the cultural orientation to Excellence – also grows. Additionally, it is observable that regardless of which concept has seen further development, there is a relationship of mutual influence between Operational Excellence and Organizational Agility. For organizations emphasizing strategies that foster the development of Operational Excellence capabilities, different outcomes – such as optimized processes and operations, the integration between different functional areas, or a focus on the external environments and the creation of value – incrementally add to the ability of an organization to be quicker and more adaptable in responding to changes in business environments. As for organizations investing primarily in strategies to foster Organizational Agility and its capabilities, it was observed that the need for a stable support system to build these capabilities takes organizations to partially refocus and invest in Operational Excellence in order to build the necessary skills, practices, and tools to support their further development.

Accordingly, the evolution of each concept seems to be tied to the development of the other two, regardless of the emphasis that is put on Excellence or Agility. Looking at Figure 12, there is a noticeable pattern relating the development of the capabilities of the three concepts under study. Organizations see their performance maximized when there is a balanced development of Operational Excellence and Organizational Agility capabilities, with similar impact on the development of a cultural orientation to Excellence: moving along the horizontal axis, it is observable that following increased assessment scores for Operational Excellence enablers, not only higher scores for Organizational Agility are registered, but also the stronger cultural orientations to Excellence are identified.



Figure 12 - Visual representation and comparison of the assessment scores for the six organizations studied in Phase I. Scores for Operational Excellence are read along the horizontal axis (X), and scores for Organizational Agility are read along the vertical axis (Y). The area of each “bubble” represents the assessment score for cultural orientation to Excellence. The “+” sign represents the intersection between Operational Excellence and Organizational Agility. The assessment score for the cultural orientation to Excellence, as well as each company’s identification, are identified next to their respective “bubbles”.

This pattern is represented by the trendline in Figure 12, and shows the overall direction of the data as these six different organizations are considered together. However, and while this trendline supports the idea of a positive association between the concepts, some of the data points and their fluctuation suggest that there may not be a linear evolution in the way these concepts are developed together. While organizations with several years of experience in a particular set of activities and operations (A, B, C, D, and F) show an intermediate or advanced level of maturity in the development of Operational Excellence capabilities and present a positive association between concepts (all improve as Operational Excellence capabilities are further developed and expanded across the organization), Organization E suggests that an organization that is undergoing a focus shift from Organizational Agility to Operational Excellence may experience a different reality: while there is a development of Operational Excellence capabilities and cultural orientation, the development of Organizational Agility capabilities may stagnate.

While the findings of the case studies and the data trendline in Figure 12 seem to support this assumption, the limited number of data points – and the individuality of the characteristics of

Organization E – do not allow clear conclusion to be made. Accordingly, important questions are left unanswered after this analysis: How well is this trendline able to represent the general trajectory in the evolution of the relationships between of Operational Excellence, Organizational Agility and Organizational Culture? How does the trajectory for each organization evolve across different levels of maturity, depending on where organization puts its strategic focus: Agility or Excellence? And how do these dynamics set in organizations that are yet going through the focus of defining this strategic focus?

Much as argued in the previous chapter, these questions tap into how organizations balance the relationships between these concepts at different stages of their lives. By understanding how the interest on Operational Excellence or Organization Agility builds in organizations that are yet defining their processes, products, and operations, the different trajectories that can be followed by those prioritizing one or the other could be made more evident. Furthermore, the possibility to collect important takes on the development of their Organizational Cultures was also offered.

In this sense, new organizational profiles were added to the case study set: established start-ups with global operations and relying on virtual networks, and scale-ups experiencing rapid growth and increased pressure to define their products and operations. This led to the expansion of the number of case studies to ten, with the consideration of organizations at earlier stages of their development: organizations *G* and *H* (scale-ups), and *I* and *J* (start-ups).

The first pair of companies added important insights on the relationships between concepts when organizations that are more actively focused on Organizational Agility start to experience stable organic growth and increased market definition. The case studies in organizations *G* and *H* provided evidence on how the need to develop Operational Excellence capabilities starts to build in such organizational profiles. As both organizations started to experience this process, pressure mounted to ensure that processes and operations were stable enough to guarantee the reliability, repeatability, and performance of their deliveries. These organizations identified the need to invest in OpEx capabilities to promote the integration and collaborations between departments, and to support the expansion of Organizational Agility capabilities as the organization grows. As a consequence, and despite the efforts to develop Operational Excellence in these organizations being mostly driven by the needs of the market, there are some internal motivations to this move. Furthermore, and even considering these mostly extrinsic motivations, organizations *G* and *H* were able to advance their development of Operational Excellence capabilities. Although limited, the presence of a cultural orientation to Excellence was also identified, with principles and practices of supporting the OpEx capabilities already developed – although with less influence to the Organizational Culture than some of the principles and practices of

Organizational Agility. These two case studies showed that Operational Excellence capabilities and a growing cultural orientation to Excellence can be developed even when an organization is more actively engaged in the expansion of Organizational Agility – although this is done reactively and with dependency on market circumstances and growth patterns. Both organizations show very similar scores for the three concepts, and score well for Organizational Agility (Figure 13).

As for organizations *I* and *J*, they offered evidence on how the dynamics between concepts unfold at an even earlier stage of an organization's life. Again, the influence of the business environments was evident. Organization *I* tried to balance, from the moment of its foundation, the development of both Organizational Agility and Operational Excellence capabilities. However, its organizational context and market activity – marked by high variability in product requirements and operations – influenced this development, emphasizing the importance of Organizational Agility capabilities.

In the case of Organization *J*, efforts have been more focused on adaptability and flexibility than in the definition of processes and operations. Despite some efforts in this direction, the organization deals with high levels of product customization and, often, with unique deployment conditions and operational requirements. With global operations and a pressure to quickly deliver products under singular circumstances, it has effectively prioritized the development of Organizational Agility capabilities over those of Operational Excellence.

These two case studies helped to further understand how, for organizations in an early stage of their activities, the balance between Operational Excellence and Organizational Agility is strongly disrupted by the need to explore potential new markets and product variations. Even as these organizations start looking for stable markets and the definition of their core customer base, Organizational Agility capabilities offer a better fit for their daily challenges. With organizational structures built on limited resources, adaptability is a key for success and quick team formation and individual skills become essential.

The four organizations studied in phase II contributed to the understanding of the dynamics between Operational Excellence and Organizational Agility, and how even when there is an active effort to promote a balance between the two, market constraints and demands lead to the need to prioritize one over the other. These cases also provided important insights into the development process of an Organizational Culture, as well as its orientations. They showed clear evidence of the influence that founders and leaders have in the formation of the Cultures of these organizations. While obviously dependent on the markets needs and requirements, the cultural orientation (either towards Excellence

or more focused on Agility) showed to be deeply tied to the vision and favored working practices of these people.

When integrated with the first groups of organizations, the case studies at organizations *G*, *H*, *I*, and *J* allow a broader perspective on the dynamics between the concepts Operational Excellence, Organizational Agility, and Organizational Culture. As in the previous chart (Figure 12), Figure 13 showcases a trendline that allows to visualize a pattern in the data collected in organizations that have different maturity and experience levels in their core activities and operations.



Figure 13 - Visual representation and comparison of the assessment scores for the entire set of the 10 organizations studied in Phases I and II. Scores for Operational Excellence are read along the horizontal axis (X), and scores for Organizational Agility are read along the vertical axis (Y). The area of each “bubble” represents the assessment score for cultural orientation to Excellence. The “+” sign represents the intersection between Operational Excellence and Organizational Agility. The assessment score for the cultural orientation to Excellence, as well as each company’s identification, are identified next to their respective “bubbles”.

The chart in Figure 13 highlights of how the relationships between Operational Excellence, Organizational Culture, and Organizational Agility behave under different circumstances. These circumstances strongly influence the individual levels of maturity of each concept and are linked to the stage in the life of an organization. In this case, more than their absolute “age” (i.e. the total amount of years of activity), this study found that one of the critical aspects in differentiating the behavior of organizations studied is the number of years developing, producing or operationalizing a particular type of products or services (i.e., product/service generation). In Figure 13, this aspect is already evident and is observable in the position of the organizations in the chart. While start-ups, scale-ups, and

Organization E cluster at one end of the chart, organizations with more routinized activities spread towards the opposite end. With several decades of activity but only a few years of experience in product development, Organization E scores closer to “younger” organizations, showing the importance that the experience dealing with a particular product or service line has in shaping the relationships between Operational Excellence, Organizational Agility and Organizational Culture. Organizations dealing with new product generations present higher maturity for Organizational Agility capabilities, and show a reactive development of Operational Excellence capabilities, with a limited cultural orientation to Excellence. In opposition, organizations that have gone through consecutive generations of products tend to show a more proactive focus on Operational Excellence. Having better established and routinized activities and operations, they show higher maturity levels for Operational Excellence and a stronger cultural orientation to Excellence. Furthermore, they show well-sustained levels of Organizational Agility and a positive association between the three concepts under study.

These two groups of organizations show two main differences: the dynamics of the relationship between Operational Excellence and Organizational Agility, and the characteristics of the Organizational Culture and the development of a cultural orientation to Excellence. The limited definition of early-stage products and operations leads to unstable business environments and takes organizations to invest primarily in Organizational Agility. In these contexts, the pressure to quickly adapt to market needs and requirements has a strong influence on the success of an organization. Even when there is some intrinsic motivation to pursue Quality and Operational Excellence, the limited resources of these organizations or the siloed scope of a transformation program constraint the ability of the organization to further develop OpEx capabilities. The focus on Operational Excellence, when initiated, is mainly observed reactively, ensuring basic Quality and operational requirements to meet their market and strategic needs, and to support the expansion of Organizational Agility capabilities. However, as organizations grow and face increasingly stable market contexts, they start to focus on defining processes and operations and in standardizing them, and Operational Excellence starts to be more actively pursued. When this happens, there is a tendency for the score for Organizational Agility to stagnate or decrease. This does not mean that an organization will lose the OA capabilities already developed. However, and as it grows and expands its activities, or takes a change program beyond its initial boundaries, new organizational units will have to re-align. As a result, the organization as a whole will score worse for Organizational Agility, as its capabilities are not equally spread across functional units. While initial levels of Operational Excellence initiatives, based on the definition of processes and

the use of standard operating procedures, are newly implemented across different functional areas, also the development of Organizational Agility capabilities is reinitiated in many of them.

As for organizations that have dealt with consecutive product generations, they showed to have gone beyond the normalization phase of their Quality and Operational Excellence journey and were able to take advantage of optimization and integration efforts in order to make their processes and operations more flexible, steadfast and better connected. The continued focus on OpEx also led these organizations to become more aware of their business environments and to adapt to its circumstances in order to continuously offer value to the marketplace. Even as Organizational Agility is prioritized over Operational Excellence, organizations that have gone beyond an initial commitment and maturity level for Operational Excellence showed to be able to take advantage of this positive association and further develop their OA capabilities in a sustained way. A synergic relationship was thus observed in the case studies in the organizations included in this second group: while high levels of Organizational Agility push for the further development of Operational Excellence, Operational Excellence capabilities help organizations to be more flexible and sensitive to the markets.

In terms of the characteristics of the Organizational Culture, differences between the two groups are observed in terms of behaviors, practices, and strategic focus. While this work was dedicated mostly to the understanding of a cultural-orientation to Excellence, the case studies showed that organizations prioritizing Organizational Agility show a culture that is more permeable to the principles and strategies of Organizational Agility. While it was found that the principles behind both orientations can be aligned to a certain extent, the different characteristics of these cultural orientations show impact not only the intensity of the orientation towards Operational Excellence but also the way Operational Excellence is sought. Organizations in the first group of, giving their first steps in the pursuit of Operational Excellence, showed a limited cultural orientation to Excellence. In most cases, OpEx capabilities were pursued reactively, but even when a more active stance on their development was observed, Organizational Agility capabilities were prioritized and sought more consistently. As a result, the behavior of these organizations in the pursuit of value generation, product quality, and superior operational performance was deeply influenced by an agile-oriented culture. Organizations prioritizing Organizational Agility culture showed a higher emphasis on individual talent, with teaming and improvisation marking group activities, as well as more frequent use of project and program approaches. In contrast, the organizations in the second group showed stronger cultural orientation to Excellence, in line with higher levels of maturity in the development of both Operational Excellence and Organizational Agility capabilities. Whether prioritizing OpEx or OA, it was observed that the culture of

these organizations is market by a systems perspective, and the further development of organizational capabilities is promoted with a focus on the collective, emphasizing teamwork and cross-functional integration.

Another important aspect is the different Organizational Agility profile between organizations within these two groups. The profiles are observable in the score of the different enablers assessed. Organizations dealing with early product generations showed Organizational Agility scores leveraged by their orientations to Excellence, their use of Technology and Information Systems, and their focus on project and process teams. As for the organizations, within the second group, showing high maturity scores for Organizational Agility (organizations *B* and *C*), results were supported on their process flexibility, agile strategic planning and change management capabilities. Coincidentally, these three enablers were often among the lowest scoring in the first group of organizations. As for organizations *B* and *C*, the organizational structure and the agile information and communication strategy were amongst the enablers showing the lowest scores.

The two groups, highlighted in Figure 14, represent different stages in the life of organizations, inherently related to their experience with consecutive generations of a type of product or service. However, it is crucial to understand that they do not represent disconnected realities. As organizations with similar characteristics to those in the first group grow, find increase market stabilization, and better define their processes and operations, they will observe a change in the relationship between Operational Excellence and Organizational Agility, and move towards a behavior similar to that observed in the organizations in the second group. In this sense, the trendline presented in Figure 14 is a good indicator of the general dynamics an organization will experience as it evolves: from an initial phase where Operational Excellence and Organizational Agility compete for resources or are dependent on each other to advance and expand across the organization, to a point where both concepts align, and the development of one fosters the development of the other. Throughout this transformation, the cultural orientation to Excellence is continuously developed and helps to support both Operational Excellence and Organizational Agility capabilities.

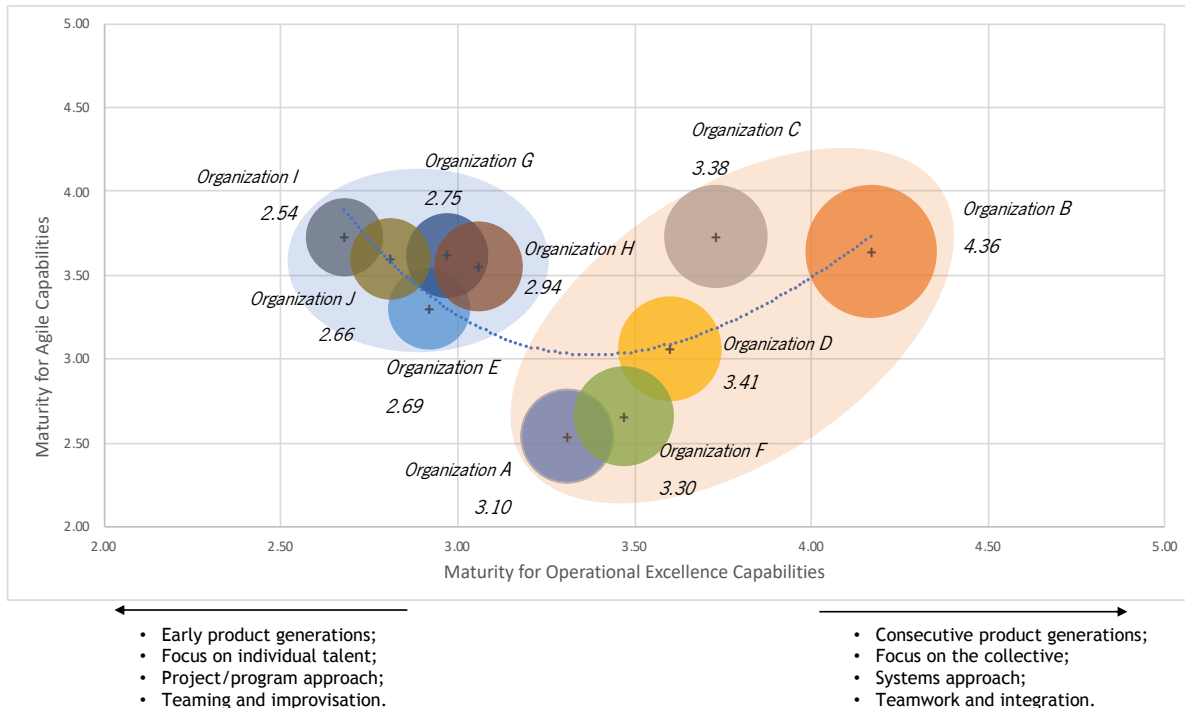


Figure 14 - Departing from Figure 13, two distinct groups are highlighted. The division is made with basis on the different dynamics on the relationship between Operational Excellence and Organizational Agility and on the distinct characteristics of the Organizational Culture.

The trendline in Figures Figure 13 and Figure 14 presents a general pattern that different organizations are expected to experience, with more or less variation, as they develop their Operational Excellence capabilities. Looking at these charts, it is possible to understand how the individual characteristics of the organizations influence in this variation. Most notably, this study found that different industries and market contexts are amongst the main factors leading to different behaviors. However, these variations seem to relate more to the steepness or flatness of the possible trendlines than to a different general behavior across the chart. If only organizations operating in Information Technologies sectors were to be considered (organizations C, G, H, and I), a flatter trendline would be observed, meaning a more balanced development of Operational Excellence and Organizational Agility capabilities. These organizations, operating in business environments where Organizational Agility is a strategic advantage, prioritized the development of AO capabilities, and took actions to minimize its stagnation as they start to focus on Operational Excellence.

On the other hand, organizations operating in heavily regulated business environments, such as the healthcare and pharmaceutical industries (organizations D and F) showed a clear prioritization of Quality and Operational Excellence capabilities and little active engagement with Organizational Agility.

Having developed a compliance-oriented perspective on Operational Excellence, these organizations show intermediate levels of maturity for OpEx capabilities but score low for Organizational Agility capabilities. Consequently, they imprint a steeper curve on the trendline.

In line with this argument, it is also important to understand that these trendlines do not intend to represent a universal behavior that, with more or less variation, will be followed by any organization where these three concepts are present. Each case is a case, with very particular circumstances, and certain organizations may be able to integrate Operational Excellence, Organizational Culture and Organizational Agility in such a way that the evolution between concepts is completely different. However, and based on what was observed and discussed in each of the ten case studies, the general behavior represented by these trendlines sets as a common result of the integration of these three concepts. Since a limited number of organizations was studied, this sample cannot lead to solid statistical conclusions, such as variable correlation analysis. However, such results in an exploratory data analysis context, especially when based in an incremental, continuously reviewed structured-case approach, allow a significant level of confidence in building this theory. Accordingly, the results of this work outline and explain the relationship between the three individual concepts under consideration: Operational Excellence, Organizational Agility and Organizational Culture show to be clearly associated, each one being connected with the others and capable of positive reinforcement. That being the case, one may also derive from these findings that any organization will not be able to outperform in one of these dimensions in the long term if not handling also appropriately the other remaining two ones, at least for the kinds of organizations that we have studied in detail.

6.3 Theory Development and conceptual framework discussion

The findings of each case study provided a series of inputs essential to the development of the theory. Together with the cross-case analysis, they allow a better understanding of the relationships between each pair of concepts, but also a novel comprehension of their dynamics as a trio. By exploring these relationships under different contexts, a significant number of different insights and perspectives were collected, adding to each other in the creation of a more complete, almost panoramic view of the relationships between Operational Excellence, Organizational Agility, and Organizational Culture.

Before this research, there was no evidence in the literature of a perspective integrating the concepts of Operational Excellence, Organizational Agility, and Organizational Culture. However, the relationships between these concepts had been explored, as pairs, in the past. Based on the available

knowledge, a series of links between concepts were proposed, leading to a new theory promoting their integration. In order to summarize these links and represent the proposed theory, the original conceptual framework was developed (Figure 15). Departing from it, the objective of this section is to use the knowledge acquired during the data collection and analysis phases, and to reflect on the theory critically. For that, it assesses, validates, or adds links to the conceptual model, thus representing and summarizing the theory development.

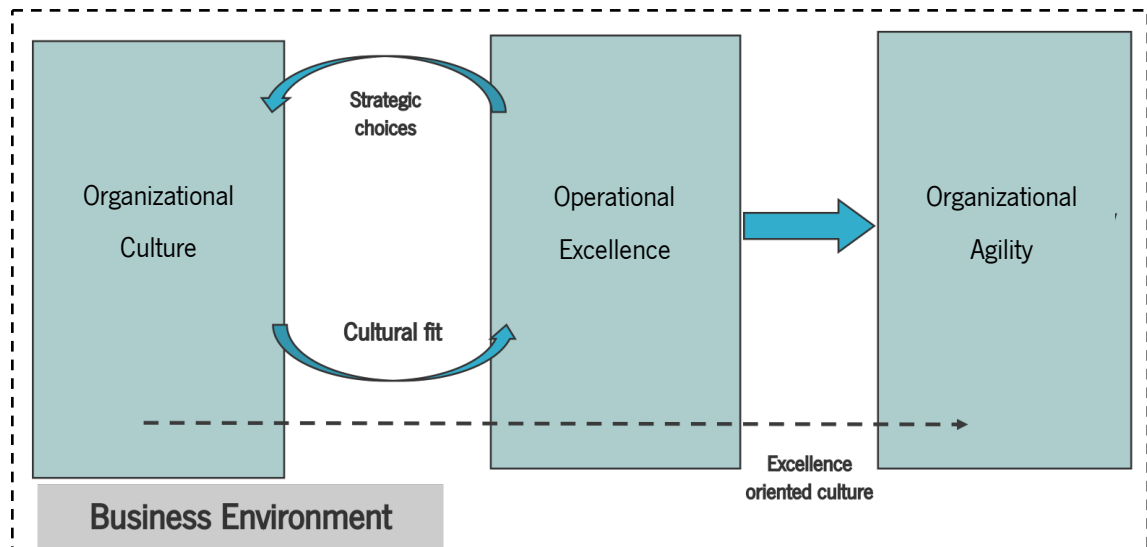


Figure 15 - The original representation conceptual framework, developed with basis on the existing literature on the concepts of Operational Excellence, Organizational Agility and Organizational Culture (adapted from Carvalho et al., 2019).

The first relationship to be addressed is that of the relationship between Organizational Culture and Operational Excellence, namely through the creation of a cultural orientation to Excellence. Based on the literature review, two conditions were identified to ensure the long-term success of Operational Excellence, leading to the two links between OpEx and OC shown on Figure 15: (1) the need to adapt Excellence initiatives to the Organizational Culture, and (2) the creation of cultural fit that expands the alignment of an organization with Operational Excellence and supports the further pursuit and implementation of related strategies, methods, and tools. Considering that these two conditions were observed, it was proposed that their interaction would create a cycle leading to a sustainable pursuit of Operational Excellence based on the creation of a cultural orientation to Excellence.

The findings of this work provide support for this relationship, as it was observed that the creation of a cultural orientation to Excellence is tied to the development of Operational Excellence capabilities. Across the ten organizations studied, higher maturities in terms of Operational Excellence

capabilities corresponded to higher cultural orientations to Excellence (Figure 13). Furthermore, different case studies provided clear evidence of the dynamics of this relationship. Most notably, evidence collected in *Organization F* shows how Operational Excellence sustainability and the ability to reach the full potential of an OpEx initiative can only be achieved when there is an active development of both the Culture and capabilities. The case study on *Organization B* showed how this strategy provided outstanding results. Accordingly, not only the proposed relationship between OpEx and Organizational Culture sees its links validated by practical evidence, but also the proposed dynamics for the creation of a cultural alignment with Excellence (Figure 16) find support in the collected data.

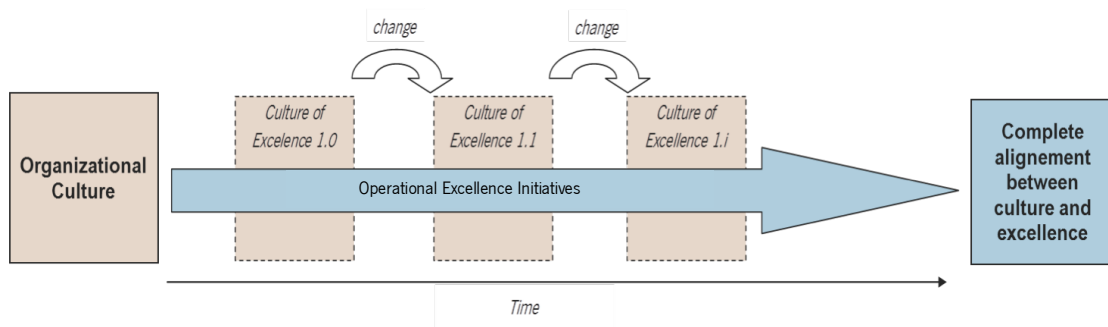


Figure 16 - Development of an Excellence-oriented Organizational Culture, as proposed in the initial conceptual framework and confirmed through the field work (adapted from Carvalho et al., 2019).

As for the relationship between Operational Excellence and Organizational Agility, evidence showed that the links initially proposed were only able to capture part of the organizational dynamics between concepts. This relationship was at first understood to flow in a single direction, with the development of Operational Excellence capabilities leading to the engagement with Organizational Agility and the development of its capabilities. This proposed relationship was based on two main ideas identified in the literature. The first one is that in the face of a highly dynamic business environment, marked by change and instability, Organizational Agility (OA) should be regarded as an indicator of the level of Excellence of an organization. The other idea related to the need for AO to be developed on previous build capabilities in an organization, with particular mention of those related to Operational Excellence. In line with these ideas, the perspective supporting the proposed link was that organizations looking for Organizational Agility were already mature in terms of Operational Excellence capabilities when they initiated their engagement with Organizational Agility.

The reality observed in the field, however, partially challenged this perspective. The evidence did show that organizations that have mature Operational Excellence capabilities start pursuing Organizational Agility as part of their search for continuous improvement and value creation in

increasingly unstable environments and that the way they are developed is tied to the maturity levels of an organization's Operational Excellence capabilities. However, the proposed relationship did not consider all possible origins for the development of a focus on Organizational Agility. Despite being able to develop it in the scope of OpEx, it was observed that some organizations approach Organizational Agility as a strategic choice, regardless of their level of maturity in terms of Operational Excellence. In such cases, the relationship between Operational Excellence and Organizational Agility is not one where the development of Agility capabilities is a consequence of the development of OpEx capabilities and an Excellence-oriented culture. Instead, it is rather a response to the organization's market needs, often following an attempt to grow the organization or broaden the scope of the existing Organizational Agility capabilities. The case studies in organizations *C*, *E*, *G*, *H*, *I*, and *J* contributed to support this conclusion. Case study *C* was the first to show how an organization may pursue Operational Excellence in order to further the development of Organizational Agility capabilities. As for the remaining cases, they demonstrated, for the particular cases of organizations dealing with earlier generations of a product or service, how the balance between Organizational Agility and Operational Excellence is affected by market circumstances and the strategic prioritization of one concept or the other.

These case studies provided evidence that allows understanding better the contexts where Organizational Agility capabilities are the main focus, as well as the challenges organizations face as they are met with the increasing need to define processes and improve operational performance. They showed that the continued development of OA capabilities is dependent on the existence of stable organizational systems to support them. Such systems, being developed through a focus on Operational Excellence, help to ensure defined and repeatable processes and operations, the integration between different programs and methods, and the commitment and engagement of the workforce. Improving Operational Excellence capabilities – as well as defining and normalizing those improvements – allows organizations to sustain and expand the scope of their Operational Agility efforts, and to make OA capabilities accessible to a more significant number of associates. In this sense, as organizations prioritizing Agility wish to develop their OA capabilities further, they find the need to push for the improvement of their Operational Excellence systems.

With the understanding that the relationship between OpEx and Agility could be initiated at any of the two concepts, the existence of a cultural orientation to Agility was also uncovered. This orientation is found in organizations that prioritize the development of Organizational Agility capabilities and connects with OpEx from the perspective of building a strong base for its development. While no evidence was found suggesting any differences between the process leading to this cultural orientation

and the development process of a cultural orientation to Excellence (outlined in Figure 15), it is essential to consider that this orientation was only studied to a very limited extent. In this work, focused mostly on understanding the influence of Operational Excellence in the Culture and adaptability of organizations, the most critical finding regarding this orientation to Agility is how it influences the development of Operational Excellence and shape the characteristics of the Organizational Culture (see Figure 14).

In the light of these findings (summarized in Table 26), and as new perspectives on the relationships between Operational Excellence, Organizational Agility, and Organizational Culture are considered in the theory, new links are added to the final version of the conceptual framework.

Table 26 - Summary of the findings of this study in the different relationships proposed and verified between the concepts of Operational Excellence, Organizational Culture, and Organizational Agility.

Operational Excellence and Organizational Culture	The creation of a cultural orientation to Excellence is tied to the development of Operational Excellence capabilities: the higher the maturity in terms of Operational Excellence capabilities, the higher the cultural orientation to Excellence (see Figure 13). Operational Excellence sustainability and the unlocking of its potential benefits is only achieved when there is an active development of both the culture and the capabilities of OpEx (see case study reflections for <i>Organization B</i> and <i>Organization F</i>).
Operational Excellence and Organizational Agility	The proposed path leading organizations that have mature Operational Excellence capabilities towards Organizational Agility was proved, with these organizations developing OA capabilities as a result of their search for continuous improvement and their goal of creating value in increasingly unstable business environments (see case study <i>B</i>). However, a new broader reality was uncovered, showing that the relationship between these concepts is not a single way dynamic. Instead, organizations may approach Organizational Agility, as a strategic choice, regardless of their level of maturity in terms of Operational Excellence. Normally, such organizations do so in order to better support or expand their OA capabilities, normally after identifying constraints to their development (see organizations <i>C</i> and <i>E</i> , or <i>G</i> , <i>H</i> , <i>I</i> , and <i>J</i>).
Organizational Agility and Organizational Culture	Traits of an agile-oriented culture were identified. Organizations with an agile-oriented culture showed higher emphasis on individual talent, with teaming and improvisation marking team activities, as well as a more frequent use of project and program approaches (see case studies <i>J</i> and <i>I</i>). These cultural orientation and traits are seen even in efforts focused on the development of Operational Excellence capabilities. Not enough evidence was found to explain in detail how the process leading to the creation of this cultural orientation unfolds.
Operational Excellence, Organizational Agility and Organizational Culture	There is a mutual influence between the three concepts, as observed across the entire set of case studies. Strategic prioritizations and different levels of maturity affect the way Operational Excellence and Organizational Agility interact and how their capabilities are developed. There is a constant development of an excellence-oriented culture, but some of its characteristics are also influenced by these same factors.

The links between the first two blocs of the conceptual framework (Figure 16) sees no changes. The evidence collected in the case studies proved that the relationship between Operational Excellence

and Organizational Culture is under constant development from the first moment there is an organizational focus on OpEx. The cyclical nature of this relationship was also proved, as it was confirmed that it is the constant search for fit between these two concepts that fosters the creation of an Excellence-oriented Culture and allows the pursuit of higher OpEx capability maturity levels. As a result, organizations with improved maturity levels for Operational Excellence capabilities consistently showed higher maturity levels in the development of a cultural orientation to Excellence (Figure 13). The sustainability of Operational Excellence initiatives was observed to be dependent on the evolution of both OpEx capabilities and the development of the Organizational Culture.

As for the dynamics between the blocs of Operational Excellence and Organizational Agility, further detail and new links were added to the conceptual framework in order to better represent the reality observed in the organizations studied. The move from Operational Excellence to Organizational Agility became better understood. As seen in the cross-case analysis, organizations that have been able to ensure sustainability in their efforts to the pursuit of Operational Excellence also showed to have developed increased levels of maturity in Organizational Agility capabilities. The most important finding regarding this particular relationship is the fact that it was observed to happen as a result of the focus of these organizations in meeting customer needs in business environments under constant change. These organizations base their pursuit of Organizational Agility not only in OpEx capabilities – such as process flexibility and optimization – but also in an Excellence-oriented Culture that supports increased awareness and sensitivity in the development of value to the market.

In the opposite direction, the development of Operational Excellence capabilities was observed to spawn from Organizational Agility in specific scenarios. This happens when organizations prioritize agile strategies and adaptability in their strategic choices, but understand that they need the support of Operational Excellence capabilities to expand or stabilize their Organizational Agility approaches. Often, this move from OA to OpEx was observed to occur as organizations experience increased stabilization in their markets and need to define their processes and activities better to ensure reliable quality and operational performance. Another motive observed for this move was the need to expand a change program across the organization, creating better integration and alignment between different functional areas and their teams.

Contrary to the relationship between OpEx and Organization Culture, the dynamics between Operational Excellence and Organizational Agility do not follow a cyclical pattern. They usually occur in one way or the other, depending on the needs and market context of an organization. While they may happen with high frequency, almost in a cyclical way (for example, in organizations prioritizing the

development of Organizational Agility capabilities but needing to improve their Operational Excellence systems to do so), they can also be observed in a single direction. This happens in cases where an organization is mainly focused on Quality and Operational Excellence and sees its (probably limited) Organizational Agility capabilities develop as a result of this focus; or in early-stage organizations that are primarily focused on ensuring their adaptability to very unstable and volatile market requirements. The direction, frequency, and intensity of the relationship between OpEx and OA are thus heavily dependent on the business environment and the strategic choices of each organization. If an organization invests primarily in OpEx, it will initially be less agile; if it goes down the OA path, it will be less efficient in the deployment of its resources. Either path may eventually lead to a mature organization that has both, but won't enjoy the full benefits of both until it reaches the mature stage.

Finally, the integration between the three concepts demands a new link be included. Initially, the conceptual framework considered only the creation of a cultural orientation to Excellence as connecting the three blocs. It proposed that it was the creation of an excellence-oriented culture, that, together with the use of Excellence approaches, tools and techniques, lead to the development of a sustainable approach to Operational Excellence and, in the face of a highly unstable business environment, fostered the development of Organizational Agility capabilities. While this relationship was sustained by the practical evidence collected during the fieldwork, another one was uncovered, in line with the two-way dynamic between Operational Excellence and Organizational Agility explained above: the creation of an Agility oriented culture and its influence in the pursuit of Operational Excellence. This link is important not only because it helps understand the development of Operational Excellence capabilities sparked by Organizational Agility expansion needs, but also because of the way it shapes how OpEx is pursued, and the characteristics of Organizational Culture itself. As an organization with an Agility-oriented Culture starts to focus on the development of Excellence capabilities, it also initiates the development of a cultural orientation to Excellence. However, the Organizational Culture, being more influenced by Agility principles, profoundly affects the way the organizational structure and the people arrange and approach this development. The characteristics of this culture thus shape the early steps of most organizations in pursuit of Operational Excellence, as outlined in subsection 6.2 and Figure 14.

In the end, and considering the findings on the relationships between these three concepts, it is possible to identify the advantages of the fieldwork for this project. Not only the proposed links between concepts were proved, finding support in the evidence collected in the ten participating organizations, but other links were uncovered, helping to better understand the relationships between Operational

Excellence, Organizational Culture, and Organizational Agility in the life of highly technical and technological organizations.

We see that these three concepts are profoundly intertwined, with actions taken in the scope of one of them have an evident influence on the development of the others. While Organizational Culture may seem to work mostly as a vehicle for the influence between OpEx and OA, evidence showed the limitations created by neglecting it (see *Organization D*). Such as initially proposed in the conceptual framework, it was proved that the sustained pursuit of Operational Excellence helps organizations to create an Excellence-oriented Culture, and, in the long term, to develop Organizational Agility capabilities. However, it is essential to understand that these effects are neither absolute nor immediate. They will depend on the business environment in which an organization operates and its maturity and expertise with a determined line of products and service.

Furthermore, this study has established that Organizational Agility, although achievable via Operational Excellence, is not a product of its pursuit. Instead, it is an active organizational strategy that deeply interacts with Excellence, but that can both be its instigator and one of its results. As organizations that prioritize and sustainably pursue Operational Excellence develop an Excellence-oriented Culture, they tend to move towards a more market sensitive and adaptable state that favors the development of Organizational Agility capabilities. In the opposite direction, organizations prioritizing Organizational Agility will develop an Agility-oriented culture

Ultimately, it is the business environment and its changes that determine how these relationships flow – both in direction and frequency. Accordingly, the most critical feature for a conceptual framework is to outline the possible interactions between concepts clearly. Figure 17 presents these interactions, providing an updated representation of the theory.

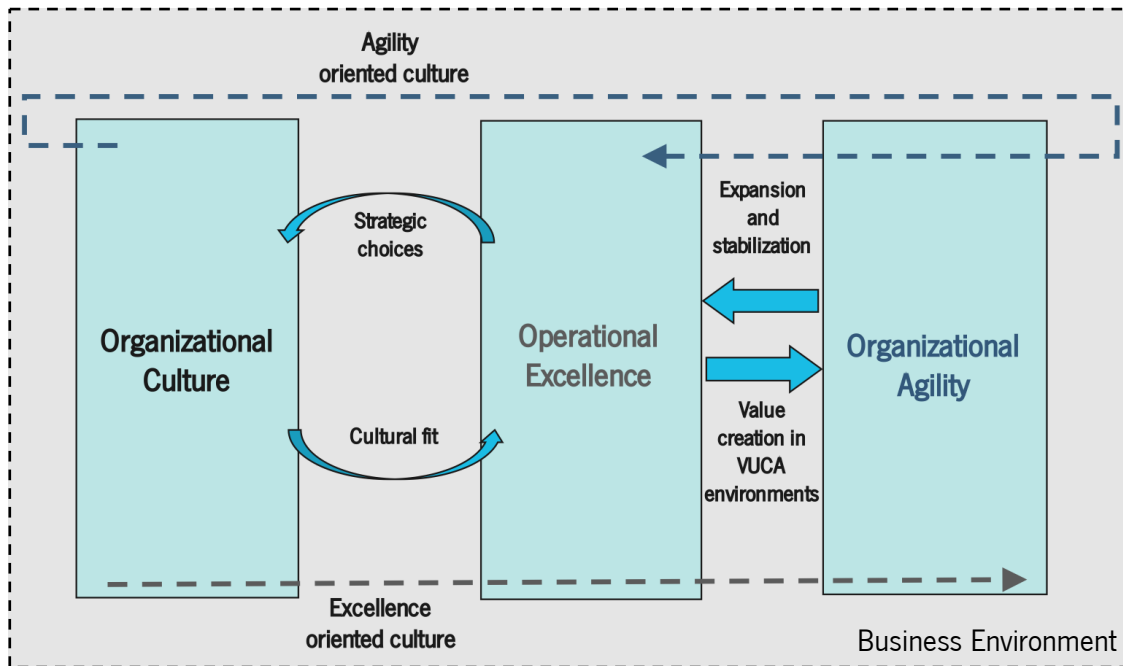


Figure 17 - The updated representation of the conceptual framework.

6.4 Discussion and comparison with the scientific literature

In the light of the cross-case analysis, and with an updated conceptual framework, it is at this point essential to revisit the literature in search for the alignment between the newly developed theory and the established knowledge. In order to do that, the findings of this work are now compared against previously published works in and around the areas of Quality and Operational Excellence, Organizational Agility, and Organizational Culture. First, the development process of an Excellence-oriented culture and the existence of a cultural orientation to Agility are connected to previously developed knowledge. Next, different works supporting the interaction and integration of Operational Excellence and Organizational Agility are identified, showing how OpEx and OA may co-exist or complement each other in an organization. Finally, different sources are shared aligning with the idea that these interactions are dependent on the characteristics of each organization's business environment, and in its ability to actively mind the Organizational Culture and promote changes to accommodate the necessary tools and strategies to better respond to them.

In line with one of its research objectives, this study confirmed that Operational Excellence initiatives, if sustainable, can influence the Culture of an organization and create an enduring orientation towards Excellence. It had been observed that although an Organizational Culture cannot be fully managed (Barney, 1986), it can be changed to a certain extent through the creation of a cultural orientation (Homburg & Pflesser, 2003; Gebhardt et al., 2006). In this scope, an iterative

Organizational Culture evolution, driven by change initiatives promoted in the scope of Operational Excellence, was proposed (Figure 16). This process, based on the idea of a cyclical relationship of influence between Operational Excellence (OpEx) and Organizational Culture, was evident in the case studies. Across the entire set of case studies, it was observed that higher levels of maturity for Operational Excellence capabilities corresponded to clearer cultural orientations to Excellence. This was observed to happen as the continued development of OpEx capabilities helped to orient the Organizational Culture towards Excellence. In its turn, this Excellence-oriented Culture allowed new, more ambitious OpEx initiatives and strategies to be deployed.

This iterative evolution finds matching perspectives in the literature, most notably in the theory proposed by Edgar H. Schein (1995) that an Organizational Culture is shaped by the strategies and initiatives that, over time, prove to be successful in responding to the needs of the market. As they are repeated and updated, contributing to the long-term success of an organization, they will set into the Organizational Culture (E. H. Schein, 1995). At the inception of this cyclical process, the role of the founder(s) or early leaders in shaping the culture is essential. These people will have their own bias and background to refer to and will deploy their vision into the way the organization works. If this vision is successful in addressing both internal and external challenges, it becomes perceived as the correct way to act (E. H. Schein, 1984, 1995).

As a result of this process, each organization will develop a unique Culture, influenced both by its leadership team and by the business environments in which it operates. It is in this scope that different strategies are formed, with organizations selecting and prioritizing different approaches and initiatives to support the vision of the leaders and connect to the needs of the market. This study was initiated with a clear focus on Operational Excellence initiatives. Organizations prioritizing the development of Excellence (and showing some proof of a continued focus on it) were amongst the first identified for the elaboration of case studies. They allowed to observe and confirm the ability of Operational Excellence initiatives to integrate with the Organizational Culture, creating a cultural orientation to Excellence. Furthermore, these organizations showed how the results of this interaction – a sustainable Operational Excellence approach, based both on cultural support and the development of technical capabilities – was able to support the development of Organizational Agility capabilities.

However, in the course of this project, the fact that Organizational Agility was not only influenced by Operational Excellence and Organizational Culture, but able to influence their relationship itself became evident. As more organizations were added to the case study set, evidence collected from

organizations prioritizing Organizational Agility became available and led to the identification of a new cultural orientation – a cultural orientation towards Organizational Agility.

According to the literature, an Organizational Agility-supportive Culture is marked by a broader workforce understanding of Organizational Agility (OA) (Hermansen & Caron, 2004) and supported by the deployment of its principles, criteria, and methods (Sherehiy et al., 2007). Accordingly, and more than the need to fit Organizational Agility efforts and initiatives with the elements of an Organizational Culture – such as was the case of the development of an Excellence-oriented culture – the alignment between OC and AO is dependent on the creation of an Agility mindset (Van Hoek et al., 2001; Dikert et al., 2016) and the development of the necessary skills, tools and technology to support it (Martin, 2015; Rigby et al., 2018). However, and despite some attention to the interaction between Organizational Culture and Organizational Agility, there is little focus on the specific topic of an Agility-oriented culture, especially if compared with the attention on the narrower Agile-oriented Cultures, more focused on the cultural assimilation of Agile methods and tools (Siakas & Siakas, 2007; Soundararajan & Arthur, 2011; Rebentisch, Schuh, Dölle, Mattern, & Abel, 2018). This reality limits the understanding of the development process of a cultural orientation to Organizational Agility. Nevertheless, the main characteristics of such an orientation are identified – and most authors agree that an OC is able to support AO if it creates, amongst the workforce, a positive attitude towards change, new ideas and new technology (Sherehiy et al., 2007; Worley & Lawler, 2010).

As it was observed in this study, mature and well-developed Excellence-oriented cultures proved to support the pursuit of Organizational Agility and the development of its capabilities. These findings mean the existence of organizations that develop both an Excellence-oriented Culture and an Agility-oriented Culture. These two cultural orientations have been explored separately in the literature (Gimenez-Espin, Jiménez-Jiménez, & Martínez-Costa, 2013; Dikert et al., 2016), as has been the cultural change process that shifting to one to the other requires (Lindvall et al., 2002). However, no reference in literature has been found supporting the idea of organizations developing orientations to both Excellence and Agility. The novel and deep understanding of the relationships between Operational Excellence, Organizational Culture, and Organizational Agility developed by this study thus leads to a significant finding that had been unexplored before. Nevertheless, some works help to sustain that such cultural orientations are possible. Vinekar and Huntley (2010) explore how organizations may bridge between a stable and dynamic project approach, regardless of the orientation of their Organizational Culture. An organization with a mechanistic Culture, more focused on standardization and operating procedures, may opt for a dynamic approach if it is dealing with unstable project requirements. In the

same sense, an organization with an organic and agile Culture may opt for more formal methods if the project is stable. According to the authors, selecting a project approach should depend more on the nature of the project and its market requirements, leading to the creation of a hybrid approach that influences the Organizational Culture. In another work, and looking at the interaction between Agility, Lean and Quick Response Manufacturing, Powell and Strandhagen (2012) have demonstrated that from a strategic point of view, it is possible to integrate elements of all three of these approaches in pursuit of Operational Excellence, without contradicting their core objectives. According to the authors, the creation of an Operational Excellence framework for the 21st century should consist of the combination of elements of these three paradigms, supported by a Culture of continuous improvement.

Despite these examples, the integration of the two cultural orientations is not always straightforward. Different authors claim that amongst the main reasons for not pursuing Agility or implementing Agility and Agile practices and methods is the inability to change the Organizational Culture (Vinekar & Huntley, 2010; Spayd, 2014). However, and as argued by Vinekar and Huntley (2010), this happens mostly because practitioners understate the importance of the Organizational Culture while doing this shift. Furthermore, this work identified that organizations pursuing both Excellence and Agility may have varying Cultures, with different characteristics subject to the prioritization that is put in one concept or the other and to an organization's market needs. Being Excellent or Agile means different things in different market contexts and across different organizational maturity levels.

This logic finds a strong alignment with the existing literature. Operational Excellence means creating value for customers (Jacobson et al., 2004; European Foundation of Quality Management, 2019) and is best achieved when the entire organization is aligned with its principles and practices (Martín-Castilla & Rodríguez-Ruiz, 2008; European Foundation for Quality Management EFQM, 2017). However, the way it is pursued is not the same under all circumstances. Organizations operating in highly unstable markets or business circumstances may quickly understand that they need to focus on Quality and Excellence, but realize that the ability to innovate and rapidly respond to market changes in the business environment is more critical for their success (Edivandro Carlos Conforto et al., 2016). In this sense, and as observed in several of the case studies, these organizations prioritize Agility and flexibility. In contrast, organizations operating in highly regulated business environments will prioritize regulatory and compliance-led Quality and Excellence, and have a more limited focus on Organizational Agility.

At this point, it matters to revisit the relationship between Organizational Agility and Operational Excellence. In the scientific literature, several works support the relationship between the two. For some authors, Excellence is seen as an indicator of success in a globally competitive environment where organizations deal with highly volatile and unstable marketplaces (Ahmed, Yang, & Dale, 2003; Vinodh et al., 2010). For others, Operational Excellence is a key to develop the organizational capabilities and resources of Organizational Agility (Vokurka & Fliedner, 1998; Gleich & Sauter, 2008). This happens as Organizational Agility needs to be built on previously developed capabilities, many of which fall within the scope of Quality and Excellence (Zhang & Sharifi, 2000). These two views align with the findings of this project, with the evidence collected across the ten case studies supporting both these perspectives. On the one hand, organizations with higher levels of maturity for Operational Excellence showed superior market sensitivity and awareness, allowing them to comprehend their business environments better and find new ways to offer value, thus becoming better able to develop Organizational Agility capabilities (example: *Organization B*). On the other, organizations prioritizing Organizational Agility have shown to have also invested in process optimization and integration, operational flexibility, and a series of other Operational Excellence capabilities that proved to be essential for the further development of OA capabilities (example: *Organization C*).

Despite this relationship, this study also identified perceptions, especially amongst founders and leaders, of a clash between Agility and Quality and Operational Excellence. They proved not to be isolated perspectives, and there are some works in scientific literature exploring it. While some authors mention trade-offs such as Quality and speed (da Silveira, 2005), process rigor and process Agility (G. Lee, Delone, & Espinosa, 2010), or Agility and process maturity (Vinekar & Huntley, 2010), others claim that such trade-offs are a false perception. According to this second view, managers do not have to choose between (a) speed and flexibility and (b) the stability and scale inherent in fixed organizational structures and processes (Aghina, De Smet, & Weerda, 2015). Lee, Delone, and Espinosa (2010) also argue that the integration of process rigor, standardization, and Agility is possible and beneficial, having been increasingly suggested by recent literature (examples are Gibson & Birkinshaw, 2004; Im & Rai, 2008). In this sense, the authors suggest that the trade-off perspective should be replaced by one of ambidexterity. Following a similar rationale, Conforto, Rebentish, and Amaral (2016) studied how improvisation capabilities, traditionally related to the ability to innovate and rapidly respond to changes in the marketplace, may be used by organizations that pursue more disciplined approaches to project and program development efforts. The authors conclude that any organization can develop and enhance improvisation competencies if it is able to create the right team structure and project

environment, provide management practices and tools, and – circling back to the importance of Organizational Culture – build a Culture that recognizes and views changes positively.

The relationships between the concepts of Operational Excellence, Organizational Culture, and Organizational Agility were initially proposed with basis on the knowledge existing both in the scientific and professional literature. The selection of a case study methodology and the particular use of a structured-case approach allowed the theory to be further developed, and a broader understanding of the relationship between the three concepts to be achieved. The reflection at the end of each case study or fieldwork phase, the cross-case analysis, and the theory development and discussion provided strong support for the findings of this study. However, it was essential to ensure that the newly developed theory fitted the state-of-the-art on these concepts and integrated with subjects bordering their scientific fields. In this subsection, the findings of this study, and the resulting theory in particular, were compared to the existing body of knowledge in these areas. As an outcome, the fit between the existing literature and the results of this study is confirmed.

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7. Conclusions

Different research objectives and questions were defined in the early chapters of this thesis, guiding the research phases until the results were presented, analyzed, and discussed within the relevant research fields in the previous section. In this chapter, the final piece in the main body of this document, these results are initially compared against the research objectives and then used to answer each of the research questions. The general conclusions of this work are then outlined, being then highlighted the contributions to the field. Finally, the limitations of this study and relevant future work are shared.

7.1 Research Objectives

Two main research objectives were defined in the early stages of this project. They helped to set the scope of the research project, frame the ambitions for scientific development, and define the targets to be achieved within the areas under study.

The first objective of this project was “*to understand if and how can the implementation of Operational Excellence (OpEx) initiatives promote an Excellence orientation in the Culture of an organization, in the long term*”. This means understanding the impact of implementing Operational Excellence (OpEx) initiatives in the *modus operandi* of an organization. This objective focused on comprehending if such an implementation leads to changes in the Organizational Culture (OC), steering it towards Excellence and influencing the strategies and behaviors within that organization in the long term. As a result of this work, it was confirmed that the implementation of Operational Excellence initiatives is able to promote in an organization an enduring orientation towards Excellence. As observed in the case studies, for this to happen, these excellence initiatives have to be adapted to the reality of each organization. Additionally, there must be in the organization an active focus on Excellence and continuous improvement. The combination of these two factors, over time, creates an iterative, evolutionary process that further develops Operational Excellence capabilities and leads to the creation of an Excellence-oriented culture. Accordingly, there needs to be a clear focus on the promotion of the sustainability of Operational Excellence (OpEx) programs.

The second objective of this research project aimed to establish “*if a cultural orientation to Excellence helps to make an organization more agile and fit to adapt to changes in the business environment*”. Building on the previous goal, this second objective aimed at understanding if an organization that was able to create a sustainable and long-lasting cultural orientation to Excellence was, in consequence, capable of developing superior abilities to deal with changes in their business

environments. This second objective was also met, and it was concluded that companies with a greater orientation to Operational Excellence also see their Organizational Agility capabilities boosted. This is a result of the above-mentioned process, and it is based on the existence of both the cultural orientation to Excellence and the existence of stable Operational Excellence capabilities.

The dynamics studied under each objective are deeply related. Organizations with more mature Operational Excellence capabilities consistently showed a stronger cultural orientation to Excellence. Additionally, organizations showing high levels of maturity for their OpEx capabilities and cultural orientation to Excellence proved also to achieve high scores in the maturity assessment of their Organizational Agility capabilities. Although Organizational Agility capabilities are not the exclusive result of a sustainable engagement with Operational Excellence and the creation of an Excellence oriented culture, their development is undoubtedly tied to these factors.

7.2 Research Questions

In order to set the research agenda and guide the activities of this project, the objectives outlined in the previous section were translated into research questions. One general research question was raised in the full scope of the project, enclosing both objectives and connecting them: *Do companies incurring in sustainable Operational Excellence initiatives have more capacity to be Agile, through the transformation of their Organizational Culture?*

This research question is central to the project and answering it summarizes the complete set of dynamics studied in it. However, and in order to allow a closer understanding of the relationships between Operational Excellence, Organizational Culture, and Organizational Agility – as well as their characteristics – this general Research Question was divided into Questions one to four.

Question 1 (*Q1*) addresses the ability of an Operational Excellence program to influence an organization to develop Agility capabilities, making it more agile and adaptable to its business environment. In this sense, it asks: *Is the implementation of an Operational Excellence program able to induce in an organization an enduring capacity to adapt to new business environments?*

As observed throughout this study, there is a positive answer to this question. Of the studied organizations, those that, after implementing Operational Excellence programs, engaged with them in a sustainable and continuous way, were able to develop their Organizational Agility capabilities further, becoming more adaptable. The results and analysis outlined in Chapter 6 show this reality, with organizations displaying a long-lasting and well-developed commitment to Operational Excellence showing advantages in the development of Organizational Agility capabilities.

However, it was understood that this result is not only dependent on the implementation and sustainable management of an Operational Excellence program or initiative. As discussed in the previous section and in Chapter 6, the development of Organizational Agility capabilities is reliant on both the support of previously developed Operational Excellence capabilities and the creation of a cultural orientation to Excellence. This reality, considered in the original theoretical framework, leads to the second research question (*Q2*): *Is the implementation of an Operational Excellence program able to induce in an Organizational Culture an enduring orientation towards Excellence?* This question, assuming the importance of an Excellence-oriented Culture to the creation or further development of Organizational Agility capabilities, aims at understanding if and how is an Operational Excellence initiative able to influence the Organizational Culture, creating in it a lasting orientation towards Excellence.

The outcomes shared in Figure 13 show that organizations assessed with higher maturity levels for Operational Excellence capabilities also score the highest levels on the orientation towards Excellence. These results support the idea that the implementation of Operational Excellence initiatives is able to induce in an organization a cultural orientation towards Excellence. In addition, the evidence collected in the ten organizations studied allowed a better understanding of how this process unfolds. Accordingly, and as argued in the previous section, the creation of cultural orientation to Excellence is dependent on two conditions. One, a sustainable commitment to Operational Excellence initiatives. And two, the ability of an organization to adapt these initiatives to the existing Organizational Culture. In this sense, and in the presence of these two conditions, it is argued that the implementation of an Operational Excellence program is, in fact, able to induce in an Organizational Culture an enduring orientation towards Excellence.

By providing a positive answer to this question, the results of this research process connect the three concepts under study. Nevertheless, there are still questions left unanswered in the effort to fully understand the relationships between Operational Excellence, Organizational Culture, and Organizational Agility. While it is understood how an Excellence-oriented culture is created and developed over time, it is also necessary to characterize it. Such characterization is not meant to define the enablers and critical success factors that promote a cultural orientation of Excellence, but rather the cultural characteristics found in organizations assessed with a strong orientation towards Excellence. This goal is expressed in the third research question (*Q3*): *What are the characteristics of an Excellence-oriented culture?* This question is important to ensure consistency in the designation and description of such a culture, not only across this work but also in any future research on the topic. The

characteristics of an Excellence-oriented culture are those that, although in different levels of development, were observed in multiple case studies, and that help to develop or sustain the cultural orientation towards Excellence. Organizations that showed such an orientation— whether already established or under development – shared a few characteristics that noticeably enabled Operational Excellence to penetrate into in their Organizational Cultures. As observed across the case studies (see Table 25), these included an active workforce commitment, a focus on talent and on the development of Operational Excellence skills and capabilities, and a strong balance of both the technical and cultural aspects of Excellence. Furthermore, one condition is essential to leverage the focus of Excellence and truly make it a cultural orientation. There needs to be an organization-wide cultural alignment with Operational Excellence, instead of a narrow focus on Quality and Process Excellence, restricted to a few departments or functional areas. This was one of the main indicators of an established Excellence-oriented Culture and helped to differentiate the organizations that truly invested in the development of a cultural alignment.

Finally, and in line with the integrative perspective of this work, it is crucial to identify what features of an Excellence-oriented culture relate to the particular development of Organizational Agility capabilities. In this sense, research question four (*Q4*) asks: *What features of an Excellence-oriented culture contribute to inducing in an organization an enduring capacity to adapt to new business environments?* It has been seen that certain characteristics can be found, with more or less intensity, in organizations that invested on the sustainable development of Operational Excellence capabilities and on the promotion of their alignment with the Organizational Culture. However, only a few of the organizations studied showed to be at a level of development where an excellence-oriented Culture clearly supports the development of Organizational Agility capabilities. In this sense, there are certain features in the Cultures of these organizations that need to be highlighted, as they more evidently contribute to inducing in an organization an enduring capacity to adapt.

These features differentiate the organizations that have attained such levels from those that are still pursuing them. Figure 14, in the previous chapter, highlights them, associating them to a combination of high maturity levels for Operational Excellence, Organizational Agility, and the development of a cultural orientation towards Excellence. The organizational approach to new challenges and the management of organizational capabilities have a strong presence in the features observed in organizations where the development of an Excellence-oriented culture was vital to the promotion of an enduring capacity to adapt. These organizations showed to have a clear focus on the collective, rather than on the individual. In this sense, there is a strategic human resource management

which is not focused on the talent and skills of its individual members, but rather in using knowledge management to extend those capabilities across the entire organization. This aligns with recent findings in literature that strategic human resource management and organizational knowledge management practices are vital in the development of Operational Excellence and Organizational Agility in organizations (Wahyono, 2018; Sony, 2019).

This focus on the collective is also observed in the way these organizations approach new challenges. One common feature observed among these organizations is the promotion of a systems approach, enabling the perception of a challenge from different points of view. A systems thinking approach promotes the understanding within the organization that processes are part of a bigger scheme, and that any decision on one end will have implications on the other (Conti, 2010; Skaržauskienė, 2010). By promoting it, these organizations foster the understanding that improving processes and operations cannot be done without an integrated view, and ensure better communication and easier collaboration between groups.

This systems perspective is itself based on another collective feature: a well-structured approach on teamwork. Organizations with an excellence-oriented Culture and well-developed capabilities of both OpEx and OA showed to have roles and activities clearly defined, and shared a focus on building well-balanced teams in terms of the skills (promoting a multidisciplinary approach), experience, and dedication of its members. Furthermore, this approach influences (and is observable) in the collaboration between sections and departments, in the efforts to integrate processes and different projects, and in the tackling of silos and organizational barriers.

These features separate this group of organizations from another set of firms studied in this project, which, despite showing high levels of development for Organizational Agility capabilities, had very limited levels of maturity for Operational Excellence capabilities and for their cultural orientations towards Excellence. This second group of firms, due to limited resources or fresh strategic focus, show a narrower, more problem-oriented focus. Accordingly, and as observable in Figure 14 (on the left-hand side), they have an approach to their operational challenges – and more particularly to those created by volatile, unstable, complex and ambiguous business environments – that is more focused on the development of Organizational Agility capabilities and in promoting their rapid development. In contrast, they show limitations in the development of Excellence in both its technical and cultural dimensions. The management of capabilities in these organizations showed to be centered on the individual talent of certain members, and on the promotion of a dedicated strategy to each problem – often using a project or program approach to deploy a new strategy.

In this sense, a different set of features was found in this second set of organizations. While they have reached similar or even higher levels of maturity in the management and development of their Organizational Agility capabilities, the features of the Organizational Culture and the way Operational Excellence capabilities function and integrate in the organization is very different. Rather than a focus on the collective, there is a clear focus on individual talent and skills, often regarded as unique within the company and oriented towards the problem-solving. This reality aligns with a clear project or program approach where challenges are approached individually, often in an isolated or poorly integrated manner. For this, teaming [defined as teamwork on the fly, or the creation of challenge-specific teams (Edmondson, 2012)] is often observed, closing the circle with individual talent and project-approach by highlighting the idea of teams built as a response to each problem that an organizations faces. In this sense, team are assembled in line with the characteristics of a project or the circumstances the organization is dealing with. This assembly is based on the availability of resources and centered around experts. As a result, and while these features allow the development of certain Excellence capabilities, and the creation of some alignment with the principles of Quality and Excellence, the truth is that its narrower problem-solving orientation limits the range of influence of these capabilities and the creation of organization-wide focus on Excellence that truly integrates processes and improves the operational performance.

7.3 General conclusions

The conclusions shared so far, in the scope of both the research objectives and questions, show the importance of the findings of this research project to the fields of Quality Management and Operational Excellence, Organizational Culture, and Organizational Agility. By uncovering the relationships between these concepts, these conclusions add important knowledge on the dynamics found in organizations as they look for ways to balance the need to maintain superior levels of operational performance while dealing with increased pressure to adapt to the changing business environments.

It has been established that Operational Excellence programs can change the behavior of an organization – first by integrating with the Organizational Culture and allowing the development of an Excellence-oriented Culture, and second by using the established OpEx capabilities and cultural orientation to support the development of Organizational Agility capabilities. As seen in the cross-case analysis and discussed afterward, these results are dependent on the reality of each organization, its experience in a determined product or market segment, and its strategic response to the external

environment. In the case of organizations that are well-established in the market, dealing with consecutive generations of a determined line of products and services, their Quality and Operational Excellence capabilities act as enablers and pre-conditions for the effective adoption or further development of Organizational Agility capabilities. In a contrasting scenario, young organizations, those that have undergone a recent large-scale transformation, or that are dealing with new and disruptive products find it easier to develop their Organizational Agility capabilities, but have difficulties in integrating them across the organization and attaining a level of Operational Excellence. In the face of these realities, the findings of this research project add essential insights for the management of organizations. They allow a broader understanding of the influence that the search for Quality and Excellence has in the behavior of an organization, its people, and its ability to cope with the business environments – and address existing managerial pre-conceptions on the challenges and trade-offs that this search encloses.

Important conclusions were also reached regarding the cultural features of these two scenarios/ groups of organizations. The previous section highlighted the features of an Excellence-oriented culture that enable Agility: the existence of a systems approach, with a strong focus on the collective, and the promotion of teamwork and integration between functional areas. At the same time, different features were observed in organizations that prioritized the development of Organizational Agility capabilities, and that showed a greater cultural orientation to Agility. These organizations showed to have a focus on individual talent, to promote the use of project or program methods to tackle challenges, and to approach problems based on teaming and improvisation. As a result, they achieve high levels of maturity in their Organizational Agility capabilities, but have limited development of Operational Excellence, both in terms of technical capabilities and Cultural orientation. While their reality does not impede some focus on Operational Excellence to be pursued by an organization, it poses barriers to its broadening and integration across the organization.

Finally, significant conclusions have been made on how organizations move between stages. As observed across the case studies, it is when organizations start to focus on the standardization of activities that they evolve from one set of features to the other. As this happens, and with the focus on defining their approaches, processes, and operations, they experience a period where their core strategic focus, so far more oriented towards Organizational Agility, starts to be shared with an increased focus on Operational Excellence. As this happens, some OA capabilities may be hard to scale up or take to other parts of the organization, creating a sense of stagnation or slowdown in their development. However, being aware of this process allows organizations to better plan for it, reducing

any adverse impact on the development of Organizational Agility capabilities, and balancing the three concepts as the organization scales up or broadens their deployment.

7.4 Contributions to the field

The contributions to the field provided by this work spawn from the novel approach it presents, integrating the concepts of Operational Excellence, Organizational Culture, and Organizational Agility. The relationship between Excellence and Culture has been well explored in literature, having cultural factors been identified as key in the implementation of Excellence programs and in promoting transformational change. Similarly, there are several works on the relationship between Organizational Culture and Organizational Agility, namely regarding the importance of the cultural support for the implementation of agile strategies. Finally, in an increasingly complex and unstable business environment, there is a growing number of publications integrating Operational Excellence and Organizational Agility. However, and until this research project, there was no integrative perspective joining the three concepts.

The results and conclusions achieved in this work offer essential additions to the existing knowledge by creating a broader understanding of the impact that Operational Excellence initiatives have in an organization, both in the development of its Culture and in making them more flexible and adaptable to today's highly unstable business environments. This work proved that if organizations can frame this search for Excellence into their cultural framework, all aspects of their work will be influenced by these principles, and they will ultimately have better capabilities to answer sudden market shifts, adapting to changes or even using them as opportunities. Accordingly, in highly dynamic markets, Organizational Agility is sustainably developed in organizations that have implemented, developed, and integrated into their Culture any Operational Excellence initiatives. The same was observed to happen in organizations that have already well-developed Organizational Agility capabilities, but that wish to expand them: while Agility capabilities exist, scaling them up and broadening their implementation across the organizations demands the support of a series of enablers and critical success factors that are associated with Operational Excellence.

These findings lead to another significant contribution of this study. While Operational Excellence capabilities support the development of Agility in an organization, they are not the source of Agile capabilities. Accordingly, they may co-exist even when the levels of maturity of Operational Excellence capabilities are low, and the cultural orientation to Excellence is diminute. In these cases, organizations are often concerned with being capable of adapting quickly, having yet little definition or

standardization levels in their processes. This finding is significant as it adds the important understanding that the relationships between these three concepts have varying dynamics, depending on the context an organization is inserted in. Furthermore, it explains the different behaviors that may be expected as they change from one context to the other and outlines the challenges and realities that may be observed in this process. By knowing this, researchers and practitioners can better align their activities and decisions with the business environment. In this scope, the different cultural features in the implementation and use of Excellence capabilities are shared.

In the pursuit of these conclusions, which are the direct answer to this project's research objectives and questions, other relevant contributions to the field were attained. First, it allowed to collect, summarize, and list the enablers and critical success factors of Operational Excellence, Organizational Culture, and Organizational Agility. Then, another important contribution comes from the review of literature in each of these topics, most notably in the case of the concept of Operational Excellence, which has allowed the publication of two review articles in peer-reviewed journals (articles #3 and #4, see next section). Furthermore, it gathered and shared evidence that helps to demystify some of the preconceived ideas that are found in Industry regarding the existence of a trade-off between Excellence and Agility. By doing so, and by broadening the understanding of the relationship between concepts, this project offers its contribution to managers that are faced with the need to adapt to changing business environment while maintaining high operational performance levels.

Finally, it is important to highlight some of the methods tools developed during this work, which can also be seen as an outcome of this work. In this sense, it is important to mention the the scales for measuring Operational Excellence, Organizational Agility, and the orientation of an Organizational Culture towards Excellence), to the extent that these are unique, they have been piloted in this study and can serve as the basis for future research and practice, including efforts to employ them in a large-sample survey effort to generalize your findings with the case studies.

7.5 Promotion and dissemination

In terms of the promotion and dissemination of the results of this research project, efforts have been made to reach the different audiences with potential interest in it. While the publication of the research work in top-tier, peer-reviewed journals or scientific conferences comprises most of these efforts, the findings of this work offer important insights also to practitioners. In this sense there was an effort to target also professional audiences.

Since the early stages of the project, it was agreed that the feedback of the experts in fields related to the concepts under study was essential for the development of the theory and the advancement of the research work. In this sense, there was an active strategy for reporting the ongoing activities and partial findings of this research project. This was done both in an optic of sharing the ongoing activities and results of the research project, setting its space in the scientific world; and in an effort to promote and foster the debate around its guiding ideas.

To achieve the first goal, the different stages of the research process were defined, with the activities and results of each stage being then shared. In this sense, the outcomes of the state-of-the-art (article #4), literature review (article #3), conceptual model and theory development (articles #1 and #2), and methodology and field work (article #5), were published in peer reviewed journals as the work advanced and solid conclusions for each phase were achieved. Table 27 lists these publications. The overall findings of the research project, as shared in this thesis monograph, are expected to be published soon.

Table 27 - Thesis-related publications in peer reviewed scientific journals.

#	<u>Title</u>	<u>Authors</u>	<u>Journal</u>	<u>Data Published</u>
1	<u>Operational excellence, organisational culture and agility: the missing link?</u>	André M. Carvalho, Paulo Sampaio, Eric Rebentisch, João Álvaro Carvalho & Pedro Saraiva	Total Quality Management & Business Excellence Vol. 30, no. 13-14 (2019): pp. 1495-1514	Online: Sep. 2017 Print: Nov. 2019
2	<u>Operational excellence as a means to achieve an enduring capacity to change – revision and evolution of a conceptual model</u>	André M. Carvalho, Paulo Sampaio, Eric Rebentisch & Pedro Saraiva	Procedia Manufacturing Vol. 13 (2017), pp. 1328-1335.	Online (final): Sep. 2017
3	<u>35 years of excellence, and perspectives ahead for excellence 4.0</u>	André M. Carvalho, Paulo Sampaio, Eric Rebentisch & Pedro Saraiva	Total Quality Management & Business Excellence	Online: Nov. 2019
4	How are Excellence Models and Awards doing 30 years later?	André M. Carvalho & Paulo Sampaio	ASQ Quality Progress	Accepted: Sep. 2019

5	The influence of operational excellence on the culture and agility of organizations: evidence from industry	André M. Carvalho, Paulo Sampaio, Eric Rebentisch, João Álvaro Carvalho & Pedro Saraiva	Total Quality Management & Business Excellence	Accepted: Nov. 2019
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As for the second objective, and to promote and foster the debate around the ideas, proposed theory, research activities and findings of this research project, several conferences, congresses and symposiums were attended. These events offer to opportunity to exchange ideas with peers in Academia and counterparts in Industry, and the presentation of the ongoing work offers the opportunity to gather the feedback of colleagues and experts, and to then reflect on the work developed so far. Additionally, and when the participation in a conference or congress is tied to the submission of full papers, an opportunity to write, review and publish an article in a shorter time frame is available. As in the case of indexed conference proceedings the quality of the review process is ensured, conferences offer the possibility to publish ongoing work that may not yet be concluded to the point that is often expected by top tier journals, but that has already significant quality and important contributions to offer to the field. Furthermore, and together with the presentation sessions, conferences generate quick and important feedback that can be immediately incorporated in the work. Table 28 lists the conferences attended for the duration of the Ph.D. Program.

Table 28 - Thesis-related conference papers, abstracts and presentations.

#	Title	Authors	Conference	Date and Location
6	Operational Excellence, Culture and Agility: key concepts to manage Technical Industries (Abstract)	André M. Carvalho, Paulo Sampaio & Eric Rebentisch	2016 MIT Portugal Conference	June 2016. Braga, Portugal.
7	Operational Excellence Programs influence on Organizational Culture Change: a conceptual model proposal (Full Paper)	André M. Carvalho, Paulo Sampaio & Eric Rebentisch	2nd International Conference on Quality Engineering and Management	July 2016. Guimarães, Portugal.
8	Building an agile culture of excellence to address the unstable business environments of the XXI century (Abstract)	André M. Carvalho, Paulo Sampaio & Eric Rebentisch	7th International Conference on Industrial Engineering and Operations Management	April 2017. Rabat, Morocco.

9	Quality, Excellence and Culture in the Pursuit of Organizational Agility (Full Paper)	André M. Carvalho, Paulo Sampaio, Eric Rebentisch & Pedro Saraiva	2017 IEEE International Conference on Industrial Engineering and Engineering Management	December 2017. Singapore.
10	Are Excellence-Oriented Organizations More Adaptable? (Abstract)	André M. Carvalho & Paulo Sampaio	2018 ASQ World Conference on Quality and Improvement	April/May 2018. Seattle, USA.
11	Business Excellence Models: supporting the cultural perspective to operationalize excellence sustainability in manufacturing organizations (Full Paper)	André M. Carvalho, Paulo Sampaio, Eric Rebentisch & Pedro Saraiva	3rd North American Conference on Industrial Engineering and Operations Management	October 2018. Washington, D.C., USA.
12	Perspectives, opportunities and limitations of Operational Excellence in Pharma (Abstract)	André M. Carvalho, Paulo Sampaio & Eric Rebentisch	30th Annual Production and Operations Management Society	May 2019. Washington, D.C., USA.
13	Rediscovering Quality in unstable and complex business environments (Abstract)	André M. Carvalho, Paulo Sampaio, Eric Rebentisch & Pedro Saraiva	63rd European Congress of Quality	October 2019. Lisbon, Portugal.
14	On Agile metrics for Operations Management: measuring and aligning Agility with Operational Excellence (Full Paper)	André M. Carvalho, Paulo Sampaio, Eric Rebentisch & Pedro Saraiva	2019 IEEE International Conference on Industrial Engineering and Engineering Management	December 2019. Macau, PR China.

7.6 Limitations and future work

This research project offers evidence that highlights, for organizational contexts of high volatility and complexity, the importance of Operational Excellence in promoting Organizational Agility and helping to make organizations more adaptable to the shifting business environments. It reinforces the importance of Organizational Culture for sustaining Operational Excellence in the long term, uncovering the limitations that organizations face as they look to sustain their performance levels. Moreover, it defines the conditions that influence the relationship between Operational Excellence, Organizational

Culture, and Organizational Agility, considering the different dynamics that may be observed between them – depending on the stage of the life of an organization, its characteristics, and its business environment contexts. With these findings, this research project creates a new understanding of the relationships between these concepts, and informs managers and practitioners of the challenges and opportunities their organizations may face, at one stage or the other, as they pursue Excellence and Agility in response to their market requirements.

There are, however, some limitations that should be mentioned. The first note goes to the absolute number of organizations studied. Considering the intensive data collection and time dedication required by an immersive case study approach, a reasonable number of organizations was studied. Furthermore, the use of a structured-case approach (SCA) methodology adds confidence to the theory development process, building on the findings of consecutive studies and reflections that favor the integration and ensure the consistency between observations. However, the truth is that the set of case studies provided evidence for only so many conclusions – and expanding the number case studies or increasing the total number of organizations studied, for example through questionnaire, could lead to a broader understanding of the relationships under analysis. Since a limited number of companies was studied, this study did not seek to reach any statistical conclusions, such as, for example variable correlation analysis. In this sense, and in a more specific note, a large-sample survey of organizations using the scales you've developed to verify the trends identified using the case studies sets as a clear future research opportunity.

Nevertheless, it is important to note such results in an exploratory data analysis context, especially when based in an incremental, theory building approach, allows a significant level of confidence in the development of the theory. Accordingly, these conclusions allow a better understanding of the relationship between the three individual maturity dimensions under consideration: operational Excellence, Organizational Agility, and the creation of a cultural orientation to Excellence. In this scenario, one may also derive from these findings that an organization will not be able to outperform in one of these dimensions if not also handling appropriately the other two, at least for the types of organizations that have been studied in detail in this project.

The second note considers precisely the type of the studied organizations, as well as their geography. All organizations studied deal with highly technological and technically complex business environments. Furthermore, all of them operate mostly in markets with an advanced level of industrial and consumer protection laws and regulations. Understanding if there are significant differences across companies operating in other markets/sectors, and under different national/regional cultures and

regulatory frameworks, offers exciting opportunities to explore both differences and similarities. Nonetheless, it is essential to highlight that this project studied organizations centered in the European Union and North American markets. In this scope, and according to the 2017 report on the World State of Quality (Saraiva, Sampaio, Cubo, Reis, & D'Orey, 2018), it depicts the reality of those markets that are some of the more advanced in terms of Quality development, and thus more prone to the implementation of Excellence initiatives. Here it should be highlighted also that these regions are the origin of some of the most well-known Excellence programs, such as the European Excellence Award, the Malcolm Baldrige National Quality Award, and the Shingo Prize for Operational Excellence.

The third and final note goes to the study of a cultural orientation to Agility. While it was identified that organizations in earlier stages of their activity (both concerning the market, *i.e.*, being new organizations; or dealing with early product generations) have a strong cultural and strategic alignment with Organizational Agility, it was not possible to identify the enablers and the critical success factors (CSF) that compose it. As the identification of a cultural orientation to Agility was found halfway through the theory building, and due to timeline and resource limitations, it was not possible to create a maturity assessment scale, and to assess the development of a cultural orientation to Agility, thus considering it as the fourth dimension in this study. Nevertheless, and in the scope of the central motivation of this work – to explore the organizational-level relationships between Operational Excellence, Organizational Culture, and Organizational Agility, in order to understand the organizational dynamics produced by the relationships between these concepts – important findings have been made regarding the influence that an increased cultural orientation towards Agility has in the development of Operational Excellence capabilities. The cultural features in these scenarios proved to be different from those observed in organizations with an Excellence-oriented culture. By differentiating them, but also by listing the common features found in each one, this project offers a broader perspective on the varying scenarios that organizations may face in different development stages and business contexts. Furthermore, by highlighting the changes that happen between these different stages, it offers a better understanding of the relationships between Operational Excellence, Organizational Culture, and Organizational Agility, guiding the expectations of managers and practitioners as they explore these dynamics in their organizations.

Accordingly, it is assumed that these limitations, *per se*, do not put the findings of this project at stake. However, and for a more inclusive understanding of these phenomena, and in a comprehensive effort to provide a more comprehensive picture of today's market reality, the

suggestions made in this section may deliver interesting inputs, and should be considered in the scope of future research work.

7.7 References

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Appendix I – Types of Assessment Scales

Five types of assessment scales were created as general guides to help define the maturity levels of each CSF, according to the being constructs being assessed: processes, behaviors and alignment, change initiatives, awareness and compliance, and governance/ management. These five types of maturity assessment scales are inspired in existing maturity assessment scales that are used by organizations in different industries to assess the development level of their capabilities in a variety of different dimensions. Tables 29 to 33 present these scales.

Table 29 - Process Maturity Assessment Scale. Inspired by: Capability Maturity Model Integration; Shingo Model Measures Assessment Scale (Software Engineering Institute Carnegie Mellon University, 2006; Shingo Institute, 2016).

Process	
Level 1	Unpredictable and unstable process; poorly controlled and reactive, if existing. Isolated from the rest of the organization, no integration or systematics feedback.
Level 2	Processes are characterized by a project approach. Process definition is mainly centered around experts and experienced people. There is planning, documentation, monitoring and control, but actions are still often reactive.
Level 3	Processes have begun to stabilize, and defined through standards, procedures, tools and methods at an organizational level. People rely on defined processes an understand them, but organizational silos are still common. Industry focused benchmark, regular feedback in some areas.
Level 4	Processes are controlled qualitatively, through statistical or other quantitatively measures. Greater sense of teamwork and integration.
Level 5	Process performance is continuously revised to continuously improve. Measures are aligned with corporate goals and defined down to the lowest level. Benchmarking and use of feedback are commonly observed.

Table 30 - Behaviors and Alignment Maturity Assessment Scale. Inspired by: Shingo Model Behavior Assessment Scale; Keikendo Maturity Model (Carraro, 2014; Shingo Institute, 2016).

Alignment	
Level 1	The organization is unaware or rejects a concept, idea or approach. Behaviors are focused on attaining results and solving problem; not in the development or implementation of new ideas. If any efforts exist to implement them, they are highly isolated and infrequent.
Level 2	An idea or concept starts to transpire into the discourse, but its practical application is still limited. There are limited resources and capabilities for its implementation. Efforts and related behaviors are event-based, experimental and seen at an individual level.
Level 3	Formalization, deepening and expansion of an approach/ idea within the organization, with techniques supporting the behaviors and turning into practices as they become frequent, repeated and predictable. Managers and leaders are increasingly involved and help set the direction. Training is provided to the workforce to help support the dissemination of the behavior/ cultural aspect.
Level 4	An idea becomes shared throughout the organization and related behaviors are supported (and observable) in discourse, techniques and processes. Managers and leaders are involved and focus on driving behaviors. Actions are consistent, and well established across the organization.
Level 5	A concept is distributed across the organization and is seen in discourse, techniques, processes and business strategy. Managers and leaders focus on integrated the concept into the culture, and it is well understood by the workforce. Efforts are constant, uniformed and show a high level of commitment.

Table 31 - Change Initiative Maturity Assessment Scale. Inspired by: Capability Maturity Model Integration; Prosci Change Management Maturity Model (Software Engineering Institute Carnegie Mellon University, 2006; Prosci, 2013).

Change initiative	
Level 1	<i>Ad hoc</i> or absent. Little or no change management is applied, being people dependent and highly undefined. High failure rates or project failure, turnover or productivity loss.
Level 2	Elements of change management are applied in isolated projects, and a large variation of change management practices exists between these projects. Reactive, typically used in response to a negative event. Managers and leader have no formal change management training; absence in training or coaching for employees.
Level 3	Defined, structured change management approach in use in different projects. Best practices are identified, but some methods may still be different. Leadership and management have an active role in sponsoring change initiatives, and training and tools become available for those involved in the project.
Level 4	Organizations standards for change management projects and initiatives are defined. Formal training in change management, and availability of tools and technology. Broad organizational alignment, although some resistance and lack of understanding can be observed in some areas/projects.
Level 5	The organization shows high levels of competency in driving change initiatives and projects. Change initiatives are aligned with the organizational goals. Data and feedback are gathered to improve tools, training and capabilities to improve change initiative.

Table 32 - Compliance and Awareness Maturity Assessment Scale. Inspired by: Security Awareness Maturity Model; Shingo Model Behavior Assessment Scale (Shingo Institute, 2016; Spitzner, 2018).

Compliance and Awareness	
Level 1	Non-existent. There is no awareness and no defined or planned efforts to train the organization.
Level 2	The organization starts to be compliant, taking efforts to meet specific compliance, industry or audit requirements. Training is limited or even unstructured, and there is no attempt to change behavior. Employees are unsure of organizational policies and managers' involvement is limited and focused on meeting minimum industry requirements.
Level 3	The organization meets industry requirements and certification. Defined efforts and initiatives to promote awareness and change start to be seen in different areas, as the organization aims to align behaviors. High impacting training topics are identified and structured in order to promote awareness consistently. There is planning, training, and involvement and support from top organizational levels.
Level 4	The organization focus is now long-term sustainability, measuring the processes and awareness of its human resource. Established metrics in place to track progress and measure its activities in promoting compliance and awareness.
Level 5	The organization goes beyond the measurement of the compliance and awareness metrics, and is proactive in assessing the impact of its efforts and in anticipating potential challenges and changes, adapting rather than reacting.

Table 33 - Governance/ Management Maturity Assessment Scale. Inspired by: Specialized IT Resources Governance Maturity Levels; Management Guidelines Maturity Model; Information Governance Maturity Model (Misra & Dhingra, 2002; IT Governance Institute, 2007; Schumacher, Erol, & Sihm, 2016).

Governance / Management	
Level 1	Governance is based on <i>ad hoc</i> , undocumented and unpredictable processes. No evidence or poor use of tools.
Level 2	The organization has started to identify and measures capabilities and resource availability, actively initiating a management process. Response is still mainly reactive.
Level 3	Mature problem, configuration, change, resource and performance management. Organization starts to be proactive, predicting problems and planning how to address them.
Level 4	Advanced and standardized governance /management practices are in place. Metrics are defined and followed, information quality dashboards are in place. Process are integrated, measured and reported. Costs and resources are well defined and understood.
Level 5	Governance and management practices are considered mature and integrated. Information and measures are used in the scope of continuous improvement.

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Appendix II - Construct Scales: Operational Excellence

In order to assess the maturity, in terms of Operational Excellence, of each of the organizations studied in this project, the analysis of the collected data needs to be guided on clearly defined descriptions of each critical success factor. Whether this data has been identified via observation, analysis of documentation, questionnaire, or through interviewing or focus group conversations, it needs to be translatable to defined scales that allows the assessment of the capabilities of an organization in terms of Operational Excellence.

Accordingly, there needs to be a clear definition of the different levels of maturity of these critical success factors, a narrative of their meaning, a listing of the possible sources of evidence, and of the data collections methods use to gather information. The results of these efforts can be found in this section.

Example:

Enablers

Critical Success Factors (Measurement Scale Type)¹
(Authors, year)

¹ See Appendix I.

Brief description and conceptual review of the critical success factor.

Measures and evidence: a listing of the possible sources of evidence.

Methods and data sources: a listing of the data collections methods use to gather data.

Table 34 - Example of a maturity scale used to describe each of the maturity levels for the assessment of Operational Excellence critical success factors.

Example	
Level 0	Description of the realities and behaviors that are found in organizations to be considered in each level.
Level 1	“
Level 2	“
Level 3	“
Level 4	“
Level 5	“

Leadership and Top Management Commitment

Sustainability of excellence initiatives (2)

(Pojasek, 2007; Asif, Searcy, Garvare, and Ahmad, 2011; EFQM, 2017)

Excellent organization focus on the long-term and in sustaining results throughout time, fitting and managing together opportunities, processes and tools or techniques, old or new, in search of sustainable organizational results. The organization's strategy should consider the continuous pursuit of excellence, so that companies can stay excellent over time. In this sense the motivation and the reasons for implementing excellence initiatives and engaging with Excellence Programs and awards will have a strong impact in the sustainability of the approach to excellence.

Measures and evidence: Sustainability plan (strategic planning), leadership and workforce climate, discourse and questionnaireed perceptions regarding sustainability, prevalence of sustainability mindset in personal discourse and in corporate documentation, awareness of sustainability as a cultural aspect (spontaneous and total).

Methods and data sources: Interviews and corporate documents analysis (reports, charters, posters, handouts, internal newspapers/magazines, *etc*): text analysis, word count, frequency distributions and patterns recognition, Questionnaires, analysis of results corporate documentation; observation of the built environment and decoration (symbols, statements, promotion of suitability).

Table 35 - Description of the maturity levels for the Operational Excellence critical success factor "Sustainability of excellence initiatives".

Sustainability of excellence initiatives	
Level 0	Non-existent or no evidence.
Level 1	There is little to now sustainability in the way leadership and top management regards and promotes excellence initiatives.
Level 2	There are a few references to excellence and its sustainability, but highly unstructured and more based on marketing and communication efforts than on a clear strategy and long-term planning.
Level 3	Top management enforces a plan to ensure the sustainability of excellence initiatives, with planned deployment through process formalization. The organization is not yet entirely proactive. More focused in meeting standards and maintaining the status quo than in improving it.
Level 4	There is a well-established sustainability plan in the organization, driving the vision of top leadership. Organization is proactive and measures its achievements, deployment may need adjustments due to unequal development throughout the organization.
Level 5	Promoting the sustainability of excellence initiatives is a consistent goal of top management, and is deeply embedded in the vision of the leadership cupula. Efforts are well-structured and deployed throughout the organization, with documents and measures in place to follow up its results and promote specific improvement measures in the areas lagging behind.

Leadership Development (1)

(Melum, 2002, Leskiw and Singh, 2007; Liker and Convis, 2011; Shingo Institute, n.d.)

Leaders play a major role in delivering the organizational strategy, namely through the search and promotion of alignment between the strategy and the daily operations, effective resource allocation and the development of others. To better do this, leaders need to fully understand and be committed to the prevailing organizational culture. Having leaders that are familiar with an organizations' processes, values and mindset is an advantage in this process. Leadership development will be responsible for identifying, training and develop human resources that, within the organization, show the necessary characteristics and potential to lead the others in search of performance excellence.

Measures and evidence: Leadership development programs, number of in-house developed (absolute number and trend), leadership and workforce climate, discourse and questionnaireed perceptions.

Methods and data sources: Interviews and corporate documents analysis (reports, charters, posters, handouts, internal newspapers/magazines, *etc*): text analysis: word frequency and patterns recognition; questionnaires; analysis of HR documentation and processes.

Table 36 - Description of the maturity levels for the Operational Excellence critical success factor "Leadership Development".

Leadership Development	
Level 0	Non-existent or no evidence.
Level 1	Leadership remains with the founder or within their close circle, or any leaders are outsourced.
Level 2	Some leadership development is in place, but most leadership roles are still filled by hiring experts.
Level 3	Leadership development plans exist, but mainly at lower and middle levels, with little vertical progression up to top management. Still a limited number (up to 30%) of in-house developed leaders in top positions.
Level 4	Considerable number of leadership positions occupied by people developed within the organization. Leadership development is a strategic effort of the company. There are defined goals and follow up metrics to ensure that these are met.
Level 5	Leadership development is a strategic goal of the company, and metrics and approaches are revised to allow their continuous improvements. Most senior positions are occupied by people that grew and learned within the organization.

Silo Reduction (3)

(Beecroft, Duffy & Moran, 2003; Brown, 2013, Shingo Institute, n.d.)

Silos will normally lead to the duplication of processes and the creation of redundant tasks, wasting time, and resources in an organization. Performance excellence is achieved only by organizations that promote a process-based culture *versus* a silo culture. All functions and process in the organizations should be integrated help create value.

Measures and evidence: Silo reduction strategies and plans, number of redundant operations, projects or roles, leadership and workforce climate, discourse and questionnaire perceptions; number of cross-functional and collaborative work projects.

Methods and data sources: Interviews; process analysis; process and department goals and organizational structure analysis; non-participant observation of meetings, teamwork and daily routines.

Table 37 - Description of the maturity levels for the Operational Excellence critical success factor "Silo Reduction".

Silo Reduction	
Level 0	Non-existent or no evidence.
Level 1	Limited efforts or resources to eliminate silos. The organization is divided in functional silos or knowledge is heavily concentrated on key people and their teams.
Level 2	Low levels of commitment or proactivity. The organization has several silos between departments or processes or is starting to expand and silos may become a problem in the future.
Level 3	Initially defined approaches to address silos. Silos are still rule in the organization or are becoming more evident as the organizations scales up.
Level 4	There are concrete and well-established leadership-driven change efforts to avoid or eliminate silos, and there are already some results to show the success of these initiatives.
Level 5	The organization has high levels of competency in eliminating or avoiding silos.



Workforce needs and expectations

Satisfaction & perceptions over benefits (4)

(Evans, 2010; Goméz, Costa & Lorente, 2011; Shingo Institute, n.d.)

The people in an organization have a strong impact on customer results. Employee satisfaction is essential for an organization wishing to attain a level of excellence for their operations. Organizations should monitor and measure employee well-being and motivation, as well as potentiate employee benefits to further involve the workforce.

Measures and evidence: Wages and benefit plans; workforce climate, discourse and questionnaireed perceptions.
Methods and data sources: Interviews and corporate documentation (charters, posters, handouts, internal newspapers/magazines, *etc*) analysis: text analysis, word count, frequency distributions and patterns recognition; questionnaires, HR documents, corporate documents (reports, lists/databases of corporate benefits, internal newspapers/magazines, *etc*).

Table 38 - Description of the maturity levels for the Operational Excellence critical success factor "Satisfaction & perceptions over benefits".

Satisfaction & perceptions over benefits	
Level 0	Non-existent or no evidence.
Level 1	Satisfaction is low and there are no benefits systems in place. There are no systems in place to measure workers motivation levels.
Level 2	Satisfaction is low, initial plans to revert the situation may include more benefits and wage increases.
Level 3	Satisfaction levels are stable but score lower in comparison to other constructs related with the workers' expectations. Efforts to improve satisfaction are in place but are limited, with poor perceptions from the workforce, both in terms of benefits and wages.
Level 4	Satisfaction levels are in line or above other workforce climate dimensions. Benefit systems are broad and include personal development and leisure opportunities, focusing on improving the quality of life of workers. The workforce has an increasingly positive levels of satisfaction, but the trade-off between benefits and wages may still be a concern.
Level 5	Satisfaction levels are high. Benefits systems are well structured and besides personal and professional development, focus on helping to balance work and provide lives of their workers (ex: personal and family time, kindergarten, gym, restaurant, supermarket/take away).

Health, Safety & Hygiene (2,4)

(Robson, 2007; Domingues et al., 2013; Shingo Institute, n.d.)

Although Health, Safety and Hygiene Management Systems normally integrated in with those of Quality and Innovation Management systems, truth is that several times the level of commitment of the top management is not the same, with higher emphasis clearly in the Management Systems related to product quality and develop. However, Health, Safety & Hygiene have a deep impact in the perceived work environment, and thus in the motivation of workers.

Measures and evidence: Health, Safety and Hygiene management processes; Health, Safety and Hygiene Managements Systems certification and integration; workforce climate, discourse and questionnaireed perceptions; decoration and built environment.

Methods and data sources: Health, Safety and Hygiene management process analysis; evaluation of audit results, feedback and certifications; observation of decoration and built environment (health, safety or environmental awareness, accident proofing, environmental promotion, *etc.*); Interviews and corporate documentation (charters, posters, handouts, internal newspapers/magazines, *etc*) analysis: text analysis, word count, frequency distributions and patterns recognition.

Table 39 - Description of the maturity levels for the Operational Excellence critical success factor "Health, Safety & Hygiene".

Health, Safety & Hygiene	
Level 0	Non-existent or no evidence.
Level 1	Health, safety and hygiene-related processes do not meet the industry's minimum standards or certifications. Workers show little awareness level regarding Health, Safety or Hygiene processes and initiatives. Ongoing efforts to meet certification criteria of health, safety or hygiene system requisites. Employees are unsure of organizational policies.
Level 2	Understanding of health, safety and hygiene management systems is still residual and training is at an initial phase. There is lack of a defined planning, and initiatives are promoted essentially in a project approach.
Level 3	Health, safety and hygiene management systems meet the industry standards, but awareness and understanding are limited in some areas. Perceptions are positive, but the organization is not engaged in further improving systems and perceptions.

Level 4	Health, safety and hygiene management systems are certified and integrated, practices are well established, indicators measured and efforts and behaviors are common and understood among the workforce. Highly positive perceptions, but limited proactivity.
Level 5	Health, safety and hygiene management systems are certified but are seen also as an organizational effort involving everyone, with suggestions and continuous improvement involving the workforce. There is a well-established follow up systems to measure (and improve) the impact of the activities, both in terms of practical results and workforce awareness.

Teamwork (2),(4)

(Oakland, 2007; Goetsch and Davies, 2014)

Teamwork is one of the pillars of TQM and, in the same way, it becomes one essential characteristic of organizations that pursue performance excellence. The lack of capacity for an organization to promote and sustain a culture of team work will be a barrier to the implementation of excellence programs, as the complexity of most processes and initiatives will require capacity and knowledge that are beyond a single individual.

Measures and evidence: Employee and leaders' perceptions about teamwork, observation of behaviors, analysis of HR documents and results.

Methods and data sources: Interviews and documentation analysis: text analysis, word count, frequency distributions and patterns recognition; Questionnaires; non-participant observation of meetings and project teams.

Table 40 - Description of the maturity levels for the Operational Excellence critical success factor "Teamwork".

Teamwork	
Level 0	Non-existent or no evidence.
Level 1	The organization is mostly based in (and values) an individualistic behavior.
Level 2	Teamwork is necessary and used, but self-led initiatives are still seen as the recipe for success.
Level 3	Teamwork is used is promoted throughout the organization, but teams and their efforts still revolve around the expertise of one person.
Level 4	Teamwork is the natural approach to most projects and tasks, and its use and perceptions are followed and assessed.
Level 5	Teamwork is part of the culture of the organization, and even when a team is centered around on expert, there is a clear focus on learning and developing individual and team skills in each project.



Learning Organization

Training Plan and Individual Development (5)

(Zaugg and Thom, 2002; Leonard and McAdam, 2002; Shingo Institute, 2016.)

Employee training and development is essential to any organization and is regarded as one of the top priorities of organizations wishing to improve, despite several difficulties in its implementation and follow-up. The benefits of training will not only be for the employees, but also will be reflected in the collective skills and intelligence in the organization.

Measures and evidence: Training plan; training hours p/ employee, Actual participations in trainings; Coaching Programs, Employee Development Programs; Talent attraction and retention; Internal feedback, awards and recognition; External entities feedback and recognition; training hours per employee (total and trend).

Methods and data sources: Interviews: text analysis, word count, frequency distributions and patterns recognition; questionnaires; analysis of HR documents and processes; training plans and structure; non-participant observation of trainings and onboarding.

Table 41 - Description of the maturity levels for the Operational Excellence critical success factor "Training Plan and Individual Development".

Training Plan and Individual Development	
Level 0	Non-existent or no evidence.
Level 1	Poor or no training plan is established in the company.
Level 2	Unstructured training plan, seen at a local level and with focus on individuals and not in the organization. Project-like approach.
Level 3	Training plan is established but not seen transversely across the organization. Focus on core activities.
Level 4	Training plan is tested and deployed across the organizations, with follow-up metrics defined.
Level 5	Broadly used, complete training plan, with efforts to improve its results. Allows some level of customization without impacting the overall results.

Mentoring and Coaching (2)

(Savolainen, 2000; Allen, Eby, and Lentz, 2006; Isner, Tout, Soli, Quinn, Rothenberg, and Burkhauser, 2011).

Mentoring and Coaching are essential in training specialists within the workforce of the organization, providing new teaching strategies and fostering quality improvement. They can be associated with an idea or philosophy, and championed by people who are actively driven by that idea in their daily work; or with the need to support people in highly specialized projects or task. Mentoring and coaching supports the transmission of ideas to the organization, the winning of support of the workers about those ideas, and the attraction of talent.

Measures and evidence: Employee and leaders' perceptions about coaching, observation of behaviors, analysis of HR documents and results. Mentoring and coaching Programs, Internal feedback, awards and recognition; External entities feedback and recognition.

Methods and data sources: Interviews: text analysis, word count, frequency distributions and patterns recognition; questionnaires; non-participant observation.

Table 42 - Description of the maturity levels for the Operational Excellence critical success factor "Mentoring and Coaching".

Mentoring and Coaching	
Level 0	Non-existent or no evidence.
Level 1	No evidence of mentoring or coaching, most skills are self-developed or acquired through the recruitment of specialists.
Level 2	Coaching and mentoring is expected in certain cases, but mostly dependent on the availability of co-workers. No defined approach.
Level 3	Some definition on coaching and mentoring procedures, but not yet fully implemented across the organization. Common at higher organizational levels or in some departments but limited in other areas.
Level 4	Coaching and mentoring are seen throughout the organization; it is defined through a set of activities and with regular follow up by the section head, HR or responsible coach.
Level 5	Coaching and mentoring are part of the company culture, going beyond a planned set of activities or the role of a single coach or responsible HR proxy; the whole organization is engaged in helping colleagues develop skills to their best level and to champion new ideas or philosophies in search of quality and improvement.

Recruitment and succession plan (5)

(Yang, Dale, and Siow, 2001; Grooves, 2007; EFQM, 2012)

Organizations are constantly at risk of losing valuable people in their workforce, either because they leave for another organization, retire, become sick or even die. Succession planning efforts are essential to identify and develop people to take over the issues and tasks left behind. Succession planning will help identify gaps in the knowledge base of an organization and work to close them. World class organizations integrate recruitment and selection, training and succession planning.

Measures and evidence: Employee and leaders' perceptions about recruitment and succession plans; observation of behaviors; analysis of HR processes, documents and results.

Methods and data sources: Interviews and documentation analysis: text analysis, word count, frequency distributions and patterns recognition; questionnaires; process and result analysis; employee satisfaction reports and internal feedback, awards and recognition; External entities feedback and recognition.

Table 43 - Description of the maturity levels for the Operational Excellence critical success factor "Recruitment and succession plan".

Recruitment and succession plan	
Level 0	Non-existent or no evidence.
Level 1	Recruitment is severely limited due to financial, operational or governance reasons, creating severe constraints to workforce renewal and succession planning.
Level 2	There are some limitations to recruiting, most problems come from poor process definition or limited resources.
Level 3	Recruitment and succession processes and plans are structured, but face internal and external constraints such as budgeting, market circumstances and competition. Limitations in planning the succession at top levels, any changes would be highly disruptive.
Level 4	Recruitment processes and succession plans are well established. The company is able provide and cover for most roles, however, it does occasionally show some difficulties in promoting and planning smooth succession to certain core roles and top positions.
Level 5	Succession and new job opportunities are filled quickly, allowing time for proper training and knowledge transfer.

Talent Management (5)

(Ashton and Morton, 2005; Kontoghiorghes and Frangou, 2009).

Talent Management is the effort taken by organizations to develop, attract and retain people with the necessary skills to face market needs. Talent Management is of strategic importance and can differentiate an organization, as keeping talent in the workforce significantly improves strategy execution and operational excellence. At all levels, environmental and financial constraints are an issue.

Measures and evidence: Employee and leaders' perceptions about talent management and retention; observation of behaviors; analysis of HR processes; employee turnover and new contacts; documents and results.

Methods and data sources: Interviews and documentation analysis: text analysis, word count, frequency distributions and patterns recognition; questionnaires; process and result analysis; employee satisfaction reports and internal feedback, awards and recognition; External entities feedback and recognition.

Table 44 - Description of the maturity levels for the Operational Excellence critical success factor "Talent Management".

Talent Management	
Level 0	Non-existent or no evidence.
Level 1	The organization does not show enough commitment to keep and develop its talent base, or to attract talent and high-potential employees.
Level 2	Organizational mindset is starting to change, with increased efforts being to acquire or retain talent.
Level 3	There is effort to retain talent at higher levels or in regards to specialist roles, but younger, developing talent is not explored enough.
Level 4	The company is focused and engaged in acquiring and keeping talent and has developed processes and strategies to retain and develop its people.
Level 5	Talent is a central strategic concept to the organization, going up to its limits to acquire and retain valuable workers.



Promoting Workforce Engagement

Suggestions and Ideas Programs (5)

(Schuring, Luijten, 2001; Arthur and Huntley, 2005; Shingo Model, n.d.)

Suggestion and ideas programs are systems that create a channel of communication between employee and management and allow employees to suggest and propose solutions to previously identified improvement opportunities, either in their working areas or at an organizational level. Suggestion systems promote employee engagement and are common sources of disruptive or innovative improvement ideas, benefiting from both the perspectives of those who work with a process at a closer distance or the retain an external, less biased look over it.

Measures and evidence: Participation in suggestion and ideas programs; Employee and leaders' perceptions about suggestion systems; Questionnaire results: workforce engagement.

Methods and data sources: Interviews: text analysis, word frequency distributions & discourse pattern recognition; Questionnaires; Talent attraction and retention plans; Employee satisfaction reports and internal feedback, Awards and recognition; External entities feedback and recognition.

Table 45 - Description of the maturity levels for the Operational Excellence critical success factor "Suggestions and Ideas Programs".

Suggestions and Ideas Programs	
Level 0	Non-existent or no evidence.
Level 1	Workers ideas and suggestions are not gathered or explored by the organization.
Level 2	Workforce can share suggestions and ideas, but there is no structured process or continued practices in place to manage suggestions.
Level 3	Opportunities for idea sharing and associates' suggestions are implemented and functional. May be of limited reach and not fully structured as programs.
Level 4	Suggestions and idea sharing are common and have structured processes and programs across the organization.
Level 5	Ideas and suggestion programs are well established and have showed positive results, most workers engage in these programs and believe in them even if their own ideas have never been implemented.

Managing the potential for engagement (5)

(Bakker and Demerouti, 2008; Alfes, Shantz, Truss, and Soane, 2013)

Organization needs to understand the existing motivation of its workers as a source of potential engagement. In many cases, understanding this potential will be key for the organization to safely feel towards moving to fostering the deployment of further employee engagement actions. By providing and promoting perceived organizational support, organizations can take advantage of the existing motivation to turn the potential engagement into active engagement. Organizations pursuing operational excellence are proactive in identifying the opportunity and closing the existing gap.

Measures and evidence: Employee perceptions over engagement programs and opportunities; participation in excellence, and continuous improvement initiatives; perceptions over quality, excellence and improvement programs and initiatives; willingness and motivation to further engage with quality, excellence and improvement programs and initiatives.

Methods and data sources: Interviews; Questionnaires; HR processes and tools.

Table 46 - Description of the maturity levels for the Operational Excellence critical success factor "Managing the Engagement Potential".

Managing the Engagement Potential	
Level 0	Non-existent or no evidence.
Level 1	The organization is unaware of the potential, having no processes or metrics to assess the motivation of the workforce of promote opportunities for further engagement.
Level 2	Some metrics for measuring employee motivation towards taking an active part on improvement efforts are only visible at project level.
Level 3	The organization has defined processes and management systems to identify the existing potential for engagement in quality, excellence and improvement efforts amongst its workers, even if at initial level of definition or with long and/or irregular intervals. The organization starts to be proactive.

Level 4	The organization regularly assesses the potential and measures how efficiently it has been able to close the gap, making clear efforts to take the most of employee's motivation.
Level 5	The organization takes efforts to continuously and systematically assess and identify opportunities and deploying clear strategies to turn motivation into active engagement.

Motivation, reward and recognition (4)

(Allen and Kilmann, 2001; Bartol and Abhishek, 2002; Shingo Institute, n.d.)

Organizations should compensate their member for their efforts and accomplishments, both individual and as a team. Rewarding is essential to motivate and engage the workforce in knowledge-oriented and quality-focused organizations. Reward systems may also include extrinsic (monetary/financial) benefits, but excellent organization should focus on intrinsic benefits (related with benefits such as time-offs, training or personal development), and thus foster the sense of employee security, motivation and engagement.

Measures and evidence: Existence of reward systems, reward and recognition systems processes and results; Employee and leaders' perceptions about rewards; questionnaire results: workforce engagement.

Methods and data sources: Interviews; questionnaires; employee satisfaction reports and internal feedback, awards and recognition; External entities feedback and recognition.

Table 47 - Description of the maturity levels for the Operational Excellence critical success factor "Motivation, reward and recognition".

Motivation, reward and recognition	
Level 0	Non-existent or no evidence.
Level 1	There is no recognition for extra efforts or innovative ideas coming from the workforce.
Level 2	Recognition is given to workers that do outstanding jobs or present disruptive ideas, but it translates in little to no reward.
Level 3	The organization has systems in place to reward and recognize workers for excellent performances, the identification of continuous improvement opportunities or for disruptive ideas, but part of the workforce does not see the compensation as motivating enough. Differences in the way reward and recognition are given in sections and departments may subside.
Level 4	Reward and recognition are given in most cases and are based on measuring the impact of an idea, financial savings or other operational results. Some workers may still feel that their ideas are not given the expected consideration.
Level 5	Rewards and recognition have well-defined processes that cover the entire organization and differentiate based on the impact the idea has in the organization's operations.

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Value Chain

Supply Chain Integration (5)

(Kannan and Tan, 2005; Cagliano, Caniato, and Spina, 2006)

Supply chain integration are a set of efforts and initiatives meant to shorten distance between the different stakeholders along the supply chain, and often includes shared product and process development, management information systems. Improving the integration of activities across the supply chain can help reducing the response time, foster better product design and development, and help manufacturing improvement.

Measures and evidence: supplier delivery metrics; customer results; customer satisfaction; number of joint product development projects; supplier development projects; joint projects with customers.

Methods and data sources: Value chain analysis; supply chain processes and results; projects with external stakeholders; awards and recognition; external entities feedback and recognition, excellence awards applications and feedback; interviews; questionnaires.

Table 48 - Description of the maturity levels for the Operational Excellence critical success factor "Supply chain integration".

Supply chain integration	
Level 0	Non-existent or no evidence.
Level 1	There are no integration efforts to bring suppliers, customers or service providers closer to decision and value creation processes. The organization focus on large scale production and operations and gets little feedback from the market and its partners.
Level 2	Emerging activities to promote supply chain integration, but still rather isolated in the organizational structure.
Level 3	Supply chain integration efforts are observed in the organization and show some level of frequency across the organization; common at logistics and operations levels, but still limited in other functional areas.
Level 4	Supply chain integration is controlled and under development with a clear focus on communication and operational systems and networks.
Level 5	Supply chain integration is well-established and proficient, with a sustained used of information and communication system and the continuous promotion of partnerships and networks.

Focus on value creation (1)

(Ulaga and Chacour, 2001; Smith and Colgate, 2007)

Creating value to customers is way for companies to differentiate themselves, setting it as essential effort to most organizations that want to increase their competitive advantage. To do that, organizations need to understand their stakeholder needs and expectations, and work in order to deliver or overcome them. In this sense it is essential to understand where value resides, how to develop it and understand the feedback that is given on each product or service.

Measures and evidence: Customer questionnaires and feedback; value creation process; stakeholder feedback analysis; Net Promoter Score; new contracts, customer retention; customer assistant efficiency and performance; Sales evolution; customer engagement.

Methods and data sources: Interviews; questionnaires; group talks; annual report; financial reports; customer questionnaire results and feedback analysis; market and consultants' reports, excellence awards applications and feedback.

Table 49 - Description of the maturity levels for the Operational Excellence critical success factor "Focus on value creation".

Focus on value creation	
Level 0	Non-existent or no evidence.
Level 1	Focus on creating value is unstructured and lack common methodologies, with redundant or even conflicting efforts in different departments.
Level 2	Evidence of sporadic efforts to define value creation approaches, but considerable isolated form the rest of the organization.
Level 3	Value creation is a core strategic goal in several departments, but with different approaches still in place.
Level 4	Value creation is a core strategic goal at organizational level, with standardized procedures to help different areas create and integrate value.
Level 5	Mature approach to value creation, innovative efforts to promote further competitive value.

Customer Relationship Management (5)

(Wang, Po Lo, Chi, and Yang, 2004; Zineldin, 2005).

In line with delivering superior value to the stakeholders in products and services, managing the relationship with customer is another essential concern for organizations in order to retain them, while exploiting that relationship to get better feedback and have access to better, faster feedback. A good customer relationship management (CRM) performance will have a great impact in promoting closer integration along the value/supply chain and in creating value for customers.

Measures and evidence: Customer questionnaires and feedback; value creation process; stakeholder feedback analysis; Net Promoter Score; new contracts, customer retention; customer assistant efficiency and performance; Sales evolution; customer engagement.

Methods and data sources: Interviews; questionnaires; group talks; annual report; financial reports; customer questionnaire results and feedback analysis; market and consultants' reports, excellence awards applications and feedback.

Table 50 - Description of the maturity levels for the Operational Excellence critical success factor "Customer Relationship Management".

Customer Relationship Management	
Level 0	Non-existent or no evidence.
Level 1	Customer relations are limited to marketing efforts or complaints management.
Level 2	Customer relationship processes are not defined. Centralized for all activities due to operational, financial or other resource constrains.
Level 3	Customer relation efforts are defined, but not used thoroughly for all cases, or, if decentralized, in all departments/areas.
Level 4	Customer relation efforts are defined, distributed by functional area and integrated in order to provide the fastest and most complete response. Follow-up and measurement.
Level 5	Customer Relationship Management is one of the core activities of the organizations, with constant follow up and improvement across the organization and with innovative efforts to engage and retain customers.

Stakeholders involvement in process design (1)

(Ravichandran and Rai, 2000; Beierle, 2002)

In the scope of meeting stakeholders needs and expectations, promoting their inclusion in the design (or revision) of processes can be highly valuable. Bringing stakeholders into the discussion of a process will provide a better understanding of the tasks and parts of the process that are dependent on external players, and can consider clients, suppliers or any third part service providers (as for example with logistics). Greater stakeholder participation will mean more realistic lead times, help identify constraints and limitations, and eliminate redundant tasks or parallel processes.

Measures and evidence: supplier feedback; customer feedback results; number of projects involving external stakeholders; process revision methodologies and inclusion of external stakeholders; number of joint product development projects; supplier development projects.

Methods and data sources: analysis of processes revision methodologies; analysis of methodologies and results of projects with external stakeholders; awards and recognition; external entities feedback and recognition, excellence awards applications and feedback.

Table 51 - Description of the maturity levels for the Operational Excellence critical success factor "Stakeholders involvement in process design".

Stakeholders involvement in process design	
Level 0	Non-existent or no evidence.
Level 1	Process design is done internally and with participation limited to management levels.
Level 2	The design of processes that directly include external partners and stakeholders occasionally; process design is mostly done internally.
Level 3	Key stakeholders are involved in process design and revision efforts, however there is no common approach or guidelines on how to manage and promote their engagement.
Level 4	Key stakeholders are treated as partners and their participation in process (re)design is seen as essential, but most decision are still done internally and passed on to them.
Level 5	Stakeholders are commonly an integral part of process design, with innovative projects to further integrate processes and deepen partnerships. Partner are seen as experts and information is shared in order to maximize the benefits of their suggestions.

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Product and Market Development

Design for manufacturing (1)

(Herrmann, Cooper, Gupta, Shayes, Ishii, Kazmer, Sandborn and Wood, 2004; Wang, Chang, Williams, and Qu, 2015)

Creating value to meet market expectations is becoming increasingly challenging, as besides product or service quality new demands arise: shorter time to market, lower costs and higher flexibility. In order to help meet these objectives, product design can no longer rely only on meeting the physical and functional characteristics expected by customers, but also tackle the whole manufacturing process, reducing its production lead times, preventing mistakes and defects and cutting costs. Design for manufacturing can be further integrated with other metrics and goals, such as sustainability.

Measures and evidence: product design process; cross functionality in product design teams; cost structure evolution; production costs evolution; production cycle and lead times evolution; market share, market position, turnover, growth, profitability.

Methods and data sources: product design process analysis; analysis of product development teams' constitution; interviews; questionnaires; excellence awards applications and feedback; customer and external feedback, recognition and awards; benchmarking results, awards and recognition.

Table 52 - Description of the maturity levels for the Operational Excellence critical success factor "Design for manufacturing/ usability".

Design for manufacturing (or usability – software)	
Level 0	Non-existent or no evidence.
Level 1	Product or service design activities are distant from the production/ deployment, leading to communication problems, delays, and technical difficulties during production ramp up.
Level 2	Product or service design activities include process specialists, but efforts are rather isolated and do not follow a general procedure.
Level 3	Product or service design activities seen are defined, but are not used consistently. Integration of external stakeholders, if used, may be inconsistent.
Level 4	Design processes are consistently defined, and integrate several stakeholders. Use of qualitative control of indicators.
Level 5	Product or service development efforts strongly mind usable design as a strategic goal of the organization, and integrate all key stakeholders. Focus on continuous improvement.

Stakeholder participation in product design (1)

(Purvis, Zagenczyk, and McCray, 2015; Lundmark, 2017).

Involving stakeholders in product design will allow an organization to have a closer match to customers' expectations and to the capabilities and limitations of suppliers. Involving stakeholders in the product design and development will have a similar result as the involvement of stakeholder in process design in terms of reducing cost, time and waste.

Measures and evidence: supplier feedback; customer feedback results; number of product development projects involving external stakeholders; number of joint product development projects.

Methods and data sources: analysis of product development processes and methodologies; analysis results of projects with external stakeholders; awards and recognition; external entities feedback and recognition, excellence awards applications and feedback.

Table 53 - Description of the maturity levels for the Operational Excellence critical success factor "Stakeholder participation in product/ service design".

Stakeholder participation in product/ service design	
Level 0	Non-existent or no evidence.
Level 1	Product or service design and development is done internally and does not consider inputs from suppliers, partners, or service providers.
Level 2	Product or service design and development includes external partners and stakeholders but is normally very limited. Further participation is infrequent and not defined.

Level 3	Stakeholders are involved in product/service design and development in a defined but limited way, normally regarding special projects, when their expertise is needed or highly demanding parts or components are to be supplied.
Level 4	Stakeholders are treated as partners and their participation in product development is seen as essential to ensure product success, but most decision are still done internally.
Level 5	Stakeholders are commonly an integral part of product design and treated as experts to help in the definition of materials, processes and components. Innovative projects to further integrate processes and deepen partnerships are in place.

Cross Functional Integration (1)

(Troy, Hirunyawipada, and Paswan, 2008; Nakata and Im, 2010)

Cross-functional integration is an important element in a successful new product development program. The integration of different functional specialists in a product development team will help to boost collectively creativity. As a result of a broader, integrated knowledge base, cross functional product development teams should be able to develop more successful or high-performing new products.

Measures and evidence: product design process; cross functionality in product design teams; new product portfolio, new product success, number of product development projects; market share, market position, growth.

Methods and data sources: product design process analysis; analysis of product development teams' constitution; analysis of product and market results; interviews; questionnaires.

Table 54 - Description of the maturity levels for the Operational Excellence critical success factor "Cross functional integration".

Cross functional integration	
Level 0	Non-existent or no evidence.
Level 1	Cross-functionality in teams is inconsistent and <i>ad hoc</i> when existent. No/poor metrics to help identify the team's requirements for a new project/strategic challenge.
Level 2	Initial efforts to identify core functionalities and team requirements. Lack of resources may lead to external specialists being occasionally brought in to the team, but with limited participation. Project approach.
Level 3	Teams are structured with basis on identified requirements, with a strong focus on cross functionality. Metrics are defined to identify the team's requirements in face of the project or challenge ahead. Silos, limited resources or others may be limitation to full cross functionality.
Level 4	The metrics used to identify team's requirements are consistently defined and measured. Cross functionality is promoted across the organization, and limitations have been reduced.
Level 5	The organization works mostly based on cross functional teams, and there are no silos or barriers preventing integration of the different functional areas.

Market Development (1)

(Asiedu, 2016; Janasz, Koschmider, Born, and Uhl, 2016)

The changes in the marketplaces in the last decades led companies to continuously try to find new market opportunities while adapting to them. Globalization and technological disruption are two examples of the drivers of this need: globalization means new opportunities but also new challenges and competitors, and technological disruption is changing even the more traditional market sectors. In face of such realities, market development is no longer only a matter of expanding consumer bases and becomes a true requirement for the survival of organizations.

Measures and evidence: market development processes and strategies; product portfolio; innovation processes and capabilities; new product success; market share; market position, growth and profitability in new markets.

Methods and data sources: analysis of market development strategies; analysis of product and market results and evolution; interviews; questionnaires; annual reports; financial reports; excellence awards applications and Feedback; customer and external feedback, recognition and awards; internal benchmarking results, awards and recognition.

Table 55 - Description of the maturity levels for the Operational Excellence critical success factor "Market Development".

Market Development	
Level 0	Non-existent or no evidence.
Level 1	The organization has an established market position and does take efforts or has no resources to further explore the market potential.
Level 2	The organization takes efforts to improve its market position mainly by engaging in further projects with existing customers.
Level 3	The organization takes clear efforts to develop and improve its position both through exploring its current markets and by searching and developing new opportunities. Defined approach and metrics, but may be difficult to track or to replicate as the organization grows.
Level 4	The organization takes clear efforts to develop and improve its position in the marketplace, exploiting its current market options and exploring new opportunities. These efforts are supported in well-defined follow-up and assessment metrics to measure the success of its initiatives to improve efficiency of those efforts. Challenges in scaling up and applying metrics to all customers.
Level 5	The organization is highly efficient in developing new markets, using its expertise and gains from its current markets and clients. Well-defined metrics are reviewed consistently to help the organization remain proactive and successful, even if scaling up.



Quality Systems

Quality assurance and error proofing (1)

(Inman, Blumenfeld, Huang, and Li, 2003; Chao and Ishii, 2004)

Quality assurance focuses on ensuring that quality requirements will be fulfilled. This is done both in an internal scope, with error proofing being an essential part of the manufacturing and development processes, and externally, ensuring the quality standards of products and services procured outside the organization.

Measures and evidence: Questionnaire results: perceptions of quality and OpEx; interviews; error proofing systems, tools and methods; internal quality metrics (supplier, Field & O-km claims), implementation of quality tools; process variability; defects, scrap rates, returns and complaints, internal feedback on quality; awards and recognition; external entities feedback, awards and recognition.

Methods and data sources: Questionnaires, interviews, group talks, observation, internal communication documents; internal technical documents; work instructions; excellence awards applications and feedback; customer and external feedback, recognition and awards; Internal benchmarking results, awards and recognition.

Table 56 - Description of the maturity levels for the Operational Excellence critical success factor "Quality assurance and error proofing".

Quality assurance and error proofing	
Level 0	Non-existent or no evidence.
Level 1	No methods, tools or devices are in place to prevent errors, defects or other quality problems in products and processes.
Level 2	Some methods, tools or devices to prevent errors or defects are observed sporadically.
Level 3	Methods, tools or devices to prevent errors or defects are set across different functional areas, but not properly integrated; They lack in some areas while existing in other.
Level 4	Strong use of methods, tools or devices to prevent errors.
Level 5	The organization has strong experience and is committed with quality assurance and error proofing, taking all efforts to avoid any defective products to reach the customers – as well as reducing or eliminating the needs for rework or scrapping. It focuses on continuous improvement, and in looks at error (even human errors) as process flaws and opportunities for improvement. It involves all workers in this effort.

Maintenance Engineering (1,5)

(Bennett and Rajlich, 2000; Ireland and Dale, 2001; Alsyouf, 2007).

In market where cost and short delivery times are becoming increasingly important, being able to reduce or eliminate reactive maintenance hours is essential for companies to be successful. Production stoppages for eminence have a high impact in several indicators – such as productivity, efficiency, overtime working hours, quality or on-time delivery – thus severely impacting the overall performance of an organization. Unexpected and reactive maintenance hours can mean incurring in extra costs or even losing clients.

Measures and evidence: Maintenance plans, maintenance teams; maintenance costs; hours of maintenance (preventive vs. reactive).

Methods and data sources: Interviews, internal technical documents; work instructions; quality reports, excellence awards applications and feedback; customer and external feedback, recognition and Awards; Internal benchmarking results, awards and recognition.

Table 57 - Description of the maturity levels for the Operational Excellence critical success factor "Maintenance Engineering".

Maintenance Engineering	
Level 0	Non-existent or no evidence.
Level 1	Poor or no maintenance planning, most maintenance is reactive.
Level 2	Some degree of maintenance planning, but highly unstructured. Tendentially reactive.
Level 3	Efforts to plan and promote proactive maintenance in place. Unable to avoid reactive maintenance and customer complaints. Methods as agile project management in place, may help further reduce Impact in final customer.
Level 4	Structured proactive maintenance plan, but with a few limitations and constraints preventing the elimination of production stoppages or customer complaints due to breakdown or bugs.
Level 5	Strong, well-planned proactive maintenance, virtually eliminating reactive maintenance episodes and customer complaints.

Quality Management (5)

(Evans and Lindsay, 2013; Rusu, 2016)

Quality Management includes all organizational efforts that guarantee product or service quality, i.e., that they are consistent with the desired goals and customers' requirements. Quality management is focused not only on product and service quality, but also on processes that are followed and the means deployed to arrive there.

Total Quality Management takes QM to another level, by focusing on every and each member of the workforce as responsible part in achieving these objectives.

Measures and evidence: Perceptions of quality and OpEx; training hours and modules on quality; use of quality tools and methods; internal quality metrics (Field & O-km claims), implementation of quality tools; process variability; defects, scrap rates, returns and complaints, internal feedback on quality; awards and recognition; external entities feedback, awards and recognition.

Methods and data sources: Questionnaires, Interviews, group talks, observation, internal communication documents; internal technical documents; work instructions; excellence awards applications and feedback; customer and external feedback, recognition and awards; Internal benchmarking results, awards and recognition.

Table 58 - Description of the maturity levels for the Operational Excellence critical success factor "Quality Management".

Quality Management	
Level 0	Non-existent or no evidence.
Level 1	Quality is poorly managed, and the workforce is not seen as resource for quality improvement.
Level 2	Some examples of quality management in key departments. Very initial phase and with poor or unproven results next to the workforce.
Level 3	Quality management efforts are being deploy across the organization, but no single approach is implemented across the organizing; involvement of the workforce is still limited.

Level 4	Quality is managed in the entire organization, and workers are valued as key resources for quality.
Level 5	Total Quality Management has been pursued, and a strong culture of quality is seen in the organization.



Management, control and optimization

Process Revision (1)

(Al-Mashari, and Zairi, 2000; Damij, Damij, Grad, Jelenc, 2008)

Business process modelling, revision, and reengineering are essential in the scope of continuous improvement, as organizations focus in creating a successful and competitive enterprise. At the same time, most of the emphasis of BPR is on redesigning business processes using a new, technologically based approach to organizational change.

Measures and evidence: Perceptions of quality and continuous improvement; process revision frequency; results from process improvement (waste eliminations, lead time shortening, *etc.*).

Methods and data sources: Questionnaires, interviews, group talks, observation, internal communication documents; internal technical documents; work instructions; excellence awards applications and feedback; customer and external feedback, recognition and awards; Internal benchmarking results, awards and recognition.

Table 59 - Description of the maturity levels for the Operational Excellence critical success factor "Process Revision".

Process Revision	
Level 0	Non-existent or no evidence.
Level 1	Process are weakly defined; no signs of process revision.
Level 2	Major processes are defined but not revisited sporadically; process revision seen in isolated cases.
Level 3	Major processes are revised in several departments and areas, but no common approach is used to the revision of smaller and local processes.
Level 4	Standardized approach to process revision, with defined protocols, cycles and goals. Regular use, seen throughout the organization.
Level 5	Process revision in an essential part of an established continuous improvement culture, seen consistently across all areas.

Lean Management (5)

(Oehmen et al., 2012; López-Fresno, 2014; Fullerton, Kennedy, and Widener, 2014)

Lean is a philosophy that emphasizes excellence through the elimination of waste and a focus on continuous improvement systems. Lean Management promotes continuous and systematic process improvement, helping organizations to seek operational excellence through such tools and methods as optimization, 5S, visual management and others.

Measures and evidence: Perceptions on Lean Management; Use of Lean management tools and methods (5S, visual management, JIT, SMED, Pull Production, *etc.*).

Methods and data sources: Questionnaires, interviews, group talks, observation; documentation, archival records, Gemba walks/shop floor visits.

Table 60 - Description of the maturity levels for the Operational Excellence critical success factor "Lean Management".

Lean Management	
Level 0	Non-existent or no evidence.
Level 1	Little to now evidence of the organization being engaged with lean management. If any efforts exist, they will be local and erratic.
Level 2	There are a few examples of implementation of the principles of Lean in a few organizational areas, but they are isolated between themselves and from the rest of the organization.

Level 3	Top management sponsored approaches to promote lean thinking and implement lean methods and tools across the organization. A few best practices from local groups have been taken to the organizational level.
Level 4	The organization is mature in the implementation of lean methodologies and embraces lean thinking across different departments sections and functional units. The processes are measured and followed-up, with focus on control and improvement seen in initiatives such as the integration lean-six sigma and other data driven approaches for process control and improvement.
Level 5	Mature implementation and management of lean activities, going beyond the manufacturing and development areas and influencing support activities (such as operations) or administrative areas. Strong focus on improving by integrating with different tools and adapting to the needs of each area.

Process control and optimization (5)

(Fullerton, and McWatters, 2001; Thawani, 2004)

Data-driven process control methodologies allow organizations to eliminate defects in their process. These methods are measurement-based strategy that focuses on process improvement and variation reduction, allowing not only to control a process a reduce defects (wasteful and costly), but also to optimize them, improving performance and quality. Six-sigma is the most common example of such methods.

Measures and evidence: Use of data-driven methodologies for process control and optimization (six-sigma, statistical process control, etc.); Perceptions over the use of tools and methods.

Methods and data sources: Questionnaires; Interviews; Observation; Process analysis; observation; documentation, archival records, Gemba walks/shop floor visits.

Table 61 - Description of the maturity levels for the Operational Excellence critical success factor "Process control and optimization".

Process control and optimization	
Level 0	Non-existent or no evidence.
Level 1	The organization is not proficient in using Data-driven methodologies in the scope of process control and optimization. Little to no evidence is observed, and where existent is isolated and event-based.
Level 2	Initial effort to introduce process control and optimization methodologies in a few organizational areas, but still isolated form the rest of the organization and with limited impact in other sections and departments.
Level 3	Data-driven methodologies are used in organizational level process but see different levels of use in different departments.
Level 4	The organization has well established practices of using data-driven methodologies process control and optimization. Use and results of these methodologies are measured and there are efforts to integrate them with other waste reduction and improvement methodologies.
Level 5	Integration of data-driven methodologies with lean methods and tool to measure and improve and waste reduction across the entire organization.

Scheduling and capacity management (5)

(Olhager and Persson, 2006; Barua, Konana, Whinston, Yin,2001)

Excellence-oriented organizations need to actively plan their production with concern to their resource availability and production capacity, managing and measuring the outcomes of the scheduling process sin order to improve it and have a more realistic idea of the effective production capacity. Companies that fail in doing so – for example, by always planning at maximum capacity and not considering the effects of certain events (regular or unexpected) will have problems in keeping their delivery schedules, incurring in extra costs for increasing the output or covering the cost of urgent transportation.

Measures and evidence: Analysis of production planning and scheduling processes; perceptions on planning and scheduling; Production schedule fulfillment.

Methods and data sources: Questionnaires; Interviews; Observation; Process analysis; planning and scheduling performance metrics.

Table 62 - Description of the maturity levels for the Operational Excellence critical success factor "Scheduling and capacity management".

Scheduling and capacity management	
Level 0	Non-existent or no evidence.
Level 1	Capacity management and scheduling are mostly <i>ad hoc</i> processes that vary in different production areas. No evidence or poor use of tools.
Level 2	The organization has started to identify and measures for managing resource capacity, actively initiating a management process and improving scheduling capabilities. Response is still mainly reactive.
Level 3	Approaches and methods to improve scheduling and capacity management have been standardized across the organization. Organization starts to be proactive, predicting problems and planning how to address them.
Level 4	Scheduling is done with basis on clear metrics that help define the real, effective production capacity of the system. These measures are defined and followed, information quality dashboards are in place. Process are integrated, measured and reported. Costs and resources are well defined and understood.
Level 5	Having as basis the collected data form the production processes measurements, scheduling and capacity simulation are used to allow improved, more realistic planning. Production scheduling and resource management activities are considered mature and integrated across the organization.



Process assessment and data validity

Data Reliability and Fact Driven Decision (5)

(Batini, Cappiello, Francalanci, Maurino 2009; Kennet and Shmueli, 2014)

The reliability of data plays a critical role in helping organization do the right decisions. The improvement of processes must be done over factual, high quality data in order to be efficient. Poorly reliable data will lead to bad decisions, negatively influence performance and operations. Reliable data is associated with data quality, which represents the potential of a data set to help an organization achieve a certain goal. Organizations need to work in order to guarantee that not only the correct, relevant data is identified and selected for analysis, but also that the goals, measures and methods that frame this analysis are conveniently integrated and outlined to give the right answers to the right questions.

Measures and evidence: Decision-making processes; methods to ensure data quality; perceptions over data quality and fact driven decision making; integration of information systems; processes and projects associated with Big Data, Industry 4.0 and data security.

Methods and data sources: Questionnaires, Interviews, group talks, observation, internal communication documents; internal technical documents; work instructions; benchmarking results.

Table 63 - Description of the maturity levels for the Operational Excellence critical success factor "Data Reliability and Fact Driven Decision".

Data Reliability and Fact Driven Decision	
Level 0	Non-existent or no evidence.
Level 1	Decision is impulsive and based on little data (or with regard to it).
Level 2	Data gathering systems are in place, but little data is collected to be used in making decisions.
Level 3	Data reliability is part of the discourse in the organization, and techniques are in place to ensure it. Lack of follow-up metrics and systematics may lead to limited results.
Level 4	Data reliability and fact driven decision are ensured by specialists, and their influence on decisions is observable in several areas. Well-defined metrics.
Level 5	The search of reliable information is key for the organization, which uses data to improve both the decision process and the optimization of the data collection efforts.

Benchmarking (1)

(Talluri, 2000; Moriarty, 2011)

Benchmarking helps organizations find potential targets for improvement.

Benchmarking allows learning best practices from clients, suppliers or partners; and should be the initial approach in process reengineering and improvement.

Benchmarking for processes and operations can be done within the same industry or in different industries where the level of maturity in certain processes is higher (for example, an industrial organization can learn best practices for logistics process from a retail company).

Measures and evidence: Benchmarking perceptions, Benchmarking processes; Benchmarking metrics and follow up; number of benchmarking project and partners; Frequency of benchmarking activities; benchmarking results.

Methods and data sources: Questionnaires, interviews, group talks, observation, internal communication documents; internal technical documents; work instructions; excellence awards applications and feedback; customer and external feedback, excellence recognition and awards.

Table 64 - Description of the maturity levels for the Operational Excellence critical success factor "Benchmarking".

Benchmarking	
Level 0	Non-existent or no evidence.
Level 1	The organization does not engage in benchmarking activities.
Level 2	Benchmarking activities are limited, may be under planning and/or at early phase.
Level 3	Benchmarking activities are defined and regular, but yet confined to some areas.
Level 4	Benchmarking activities are seen throughout the organization and managed to acquire best practices in most areas.
Level 5	Benchmarking activities are common throughout the organization and part of the organization's <i>modus operandi</i> , and results are measured in and efforts to improve benchmarking practices. Most departments proactively seek new benchmarking opportunities to help them face new challenges.

Self-assessment (1)

(Samuelsson and Nilsson, 2002; Hides, Davies, and Jackson, 2004)

Excellence models promote the use of self-assessment in order to maintain a comprehensive, systematic and regular review of an organizations' processes and results.

Self-assessment process allows the organization to identify areas in which improvements can be made, to follow-up processes, or to prepare before an external audit. Self-assessment efforts are more successful if are used continuously and in a participative way.

This provides deeper insights into processes and fosters workforce engagement.

Measures and evidence: Self-assessment practices and routines, perceptions over self-assessment and motivations; engagement in excellence initiatives promoting self-assessment.

Methods and data sources: Questionnaires, interviews, group talks, observation, self-assessment reports and results; excellence awards applications and feedback; customer and external feedback, recognition and awards.

Table 65 - Description of the maturity levels for the Operational Excellence critical success factor "Self-assessment".

Self-assessment	
Level 0	Non-existent or no evidence.
Level 1	Self-assessment is not promoted in most cases, and there is no definition of processes for initiating self-assessment activities.
Level 2	Self-assessment is use for major processes and projects but used inconsistently and with lack of process definition.
Level 3	Self-assessment activities are formalized, but there are still different perspectives in use. Best practices are identified but not deployed broadly.

Level 4	Approaches to self-assessment of processes are well defined and used consistently across the organization.
Level 5	Process self-assessment activities are themselves subject to continuous improvement, with regular revision from management and inputs/suggestion from the workforce.



Promoting strategy alignment with Operational Excellence

Process Orientation (2)

(McCormack, 2001; Reijers *et al.*, 2006)

The management of business process systems will help organizations achieve reduced lead times, less hand-off errors, and more flexibility in their processes. Creating a process orientation will help organizations achieve these results, promoting and understanding and focus within the organization for managing processes rather than simply performing tasks and activities. A business process orientation will help in defining roles, procedures and documentation to measure, control and improve processes.

Measures and evidence: Orientation and perceptions about processes; integration of business processes; business process systems.

Methods and data sources: Questionnaires; interviews; group talks; observation; process analysis.

Table 66 - Description of the maturity levels for the Operational Excellence critical success factor "Process Orientation".

Process Orientation	
Level 0	Non-existent or no evidence.
Level 1	Process orientation is residual and seldom seen, with a few occasional efforts being made in face of urgent process revisions.
Level 2	Process orientation is at an initial stage, and only core processes are considered.
Level 3	Process orientation is promoted across the organization, but the scope had limited expression beyond core processes.
Level 4	Process orientation is seen widely, and is well defined, documented, and managed. Room for improvement namely in integrating processes, both internally and externally.
Level 5	The organization is highly focused on processes, and sees it as vital for promoting efficiency, effectiveness, and the achievement of competitive advantage. Focus on integrating processes, both internally and externally.

Focus on Organizational Excellence (2)

(Miles, Russell, and Arnold, 1995; Alrubaiee, Zuobi, and Abu-Alwafa, 2013)

The orientation of an organization towards quality and excellence will influence its strategies and have an impact in value creation, employee motivation engagement and in the alignment of the entire workforce in search of value creation, continuous improvement, superior quality and performance.

Measures and evidence: Employee perceptions on excellence and quality; prevalence of principles of quality and excellence in discourse, internal media and documents; Process and operational excellence initiatives.

Methods and data sources: Interviews, Questionnaires, Observation, Corporate Documents; Analysis of processes.

Table 67 - Description of the maturity levels for the Operational Excellence critical success factor "Focus on Organizational Excellence".

Focus on Organizational Excellence	
Level 0	Non-existent or no evidence.
Level 1	Excellence is unrecognized as an opportunity for further improvement.
Level 2	Initial level of commitment to excellence; limited resources effectively dedicated to pursuing excellence.
Level 3	Initial level of commitment to excellence; there is a comprehensive set of people, tools and techniques deployed to pursue it.
Level 4	The organization is committed to excellence has achieved stable results – mainly in terms of operational improvement, but eventually including external recognition.
Level 5	The organization sets the pursuit of excellence has one of its main goals, it has achieved significant success in terms of organizational improvement and has been recognized externally for its best practices.

Organizational Strategy Alignment (1,2)

(Shih and Chiang, 2005, Zheng, Yang, and McLean, 2010)

The strategy of an organization needs to fit with cultural and technical context of an organization.

New strategies that do not fit the organizational culture will face resistance from the workforce, putting in jeopardy their effectiveness. At the same time, if the strategy does not effectively integrate the different technical capabilities and skills of the organization, it will be unable to achieve its full potential, and even leading to the creation of silos or subcultures.

Measures and evidence: perceptions over strategy alignment; efficient integration of technical capabilities, alignment between cultural aspects and values and strategies.

Methods and data sources: Strategy development process analysis; analysis of tools, methods and results; interviews; group talks; observation.

Table 68 - Description of the maturity levels for the Operational Excellence critical success factor " Organizational strategy alignment".

Organizational strategy alignment	
Level 0	Non-existent or no evidence.
Level 1	Poor organizational alignment; unstructured alignment efforts.
Level 2	Project approach, often limited or at local level, to explore actions to promote an organizational strategy alignment. Strategy alignment observed mostly at leadership level.
Level 3	Strategy alignment is promoted through a series of efforts based on identified best-practices. Uneven alignment across the organization.
Level 4	Actions and processes to promote strategy alignment are well defined and are deployed consistently. Strong organizational alignment, although some areas may show resistance.
Level 5	Strong organizational alignment, with efforts to improve processes and expand or maintain a consistent alignment across the organization.

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Strategy Development

Strategic objectives definition (1)

(Alogan, G. B., & Yetidots, 2006; Quezada, Cordova, Palominos, Godoy, and Ross, 2009)

Identifying opportunities and defining strategic goals is an essential step in strategy development. Establishing the wrong objectives, either in scope or in their quantification can have several and serious implications: underperforming due to too ambitious goals and having a negative impact on motivation, over performing in face of small-scale objectives and losing the

opportunity to gain further competitiveness, and poor allocation of resources are a few examples. Organizations should carefully define their strategy objective definition process, and continuously work to improve them.

Measures and evidence: Strategic objectives definition processes; strategic results and efficiency; Strategic objectives follow-up, measurement and revision processes and tools.

Methods and data sources: Process analysis; analysis of tools, methods and results; interviews; group talks; observation.

Table 69 - Description of the maturity levels for the Operational Excellence critical success factor “Strategic objectives definition”.

Strategic objectives definition	
Level 0	Non-existent or no evidence.
Level 1	Strategic objectives are defined in an <i>ad hoc</i> , unpredictable way, and with little data support.
Level 2	The definition of strategic objectives is based on previous experiences and strategy definition cycles, but the process is still poorly defined and lack important inputs.
Level 3	The process to develop and define strategic objectives is defined at the leadership level, but the structures and processes are fragile at local level. Different approaches may be in used, an integration is not always observed.
Level 4	Strategic objectives definition process is well-defined and based on clear follow up measures and data. Strategic objectives definition is seen across the organization, helping not only to define strategic goals at organizational, but also at departmental and section levels.
Level 5	Strategic objectives are well defined and are continuously reviewed and updated in order to take the most of the organizational capabilities, allow some flexibility and taking the most out of organizational resources.

Strategy development (1)

(Demeester, De Meyer, and Grahovac,2014; Mack and Szulanski, 2017)

Strategy development processes are an essential part of the lives of organizations. However, the process is often poorly defined, or it is exclusive, little transparent and centralized. Organizations should try to define open strategy making processes, allowing different perspectives to be brought to the process, effectively managing the time and expectations of experts and managers in different areas while bringing their knowledge and insights into the process.

Measures and evidence: strategy making process; openness and integration of strategy making processes; strategic development at organizational and departmental level; perceptions over strategy making process.

Methods and data sources: Strategy process analysis; analysis of tools, methods and results; interviews; group talks; observation.

Table 70 - Description of the maturity levels for the Operational Excellence critical success factor “Strategy development”.

Strategy development	
Level 0	Non-existent or no evidence.
Level 1	Strategy formulation process is still poorly defined, strategies are formulated mostly as a reactive process.
Level 2	Strategy formulation process is at an experiential phase, with strategy development being mostly planned for key objectives with main customers/market or activities. Lack of a single approach for all strategic objectives.
Level 3	Strategic formulation processes are seen across the organization, as departments and sections develop their own strategies. However, there is no definition of a common approach, leading to differences in the ways different units define and plan their strategies, the information and data used in the delimitation, and creating limitations to integration.
Level 4	Common approach to strategic planning allows integration between the strategies formulated across the organization and at different levels. Strategy planning is based on clear data measurements.
Level 5	Strategy definition process is based on clear measures, information and resource availability, and in under constant revision in the scope of continuous improvement. Strategy definition consider not only the guiding principles, but helps to set the mission, vision and the working values.

Systems thinking (2)

(Skaržauskienė, 2010; Conti, 2010).

Systems thinking promotes an integrated view across the organizations, enabling the perception of reality from many different perspectives. A system thinking approach will promote the understanding that processes are part of bigger system, and that decision on one end will have implications on the other. Improving processes and ensuring their quality cannot be achieved without this integrated view, and system thinking will promote better communication and easier collaboration between groups.

Measures and evidence: Perceptions over systems thinking; use cross functional teams in projects and process development;

Methods and data sources: Questionnaires, interviews, group talks, observation.

Table 71 - Description of the maturity levels for the Operational Excellence critical success factor “Systems thinking approach”.

Systems thinking approach	
Level 0	Non-existent or no evidence.
Level 1	The organization shows little to now evidence of systems thinking. A few isolated examples may be found, related to engineering activities, but with insufficient follow up from the rest of the firm.
Level 2	A few examples of systems thinking are found in engineering and technical areas or top levels, mostly in the scope of projects showing only an initial engagement.
Level 3	Systems thinking is observable in a few areas but approaches to foster it are not sufficiently defined to be effectively transferred and established across the organization.
Level 4	Systems thinking is the common perspective at Management, Engineering and Operational levels. Approaches to promote systems thinking are well established and planned out, but shop floor workforce still shows some limitation in adopting it.
Level 5	Systems thinking is part of the mindset of the organization and is present at all levels. Strong systems thinking is observed at higher levels, but the workforce presents a broad an integrated systems perspective.

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Strategy deployment

Deployment action plan (1)

(Carpinetti, Gerolamo, and Dorta, 2000; Saunders, Mann, and Smith, 2007)

Good strategy making is not over with the final definition of the strategy: it ends with successful implementation. Action plans are essential in taking the strategy out of the paper and into the organization. An action plan should describe how the organization converts its strategic objectives into action, including all key performance indicators that will be used to measure its deployment.

Measures and evidence: Strategy deployment process; strategy deployment action plans; strategy deployment process; perceptions over strategy deployment; strategic results.

Methods and data sources: Strategy deployment process analysis; analysis of tools, methods and results; interviews; group talks; observation.

Table 72 - Description of the maturity levels for the Operational Excellence critical success factor “Deployment action plan”.

Deployment action plan	
Level 0	Non-existent or no evidence.
Level 1	Action plan for strategy implementation is poorly defined, causing several delays in the deployment of strategies.

Level 2	There are a few examples of action plans to implement strategies, but are isolated within their functional areas.
Level 3	“Best” approaches have identified and turned into a standard approach to follow up, management and control are still inexistent or limited.
Level 4	Strategy deployment action plans are defined and seen across the organization common. Metrics in place to control and manage the process, but revision is limited and reactive.
Level 5	Action plans to deploy strategies and achieve organizational and departmental goals are common across the organization. Strategy deployment is well planned, and constantly revised and adjusted proactively.

Contingency planning (1)

(Ahlstrand, Lampel, and Mintzberg, 2001; Skipper and Hanna, 2009)

While deploying strategy, several aspects of the plan can be influenced and changed by unexpected conditions or events. These events vary on their magnitude and thus on the detail and dimension of the necessary alterations. They can be due to the loss of a big client, a new policy, economic recessions or catastrophic event that disrupts the supply chain. Contingency planning helps organizations account for those events by setting alternative strategies to accommodate them.

Measures and evidence: Strategy deployment process; analysis of contingency plans at organizational and departmental levels; strategy deployment process; perceptions over strategy deployment; strategic results.

Methods and data sources: Strategy deployment process analysis; analysis of tools, methods and results; interviews; group talks; observation.

Table 73 - Description of the maturity levels for the Operational Excellence critical success factor “Contingency planning”.

Contingency planning	
Level 0	Non-existent or no evidence.
Level 1	No contingency plan is defined, strategy deployment considers only strategy implementation activities; failure and problems are mainly dealt with through firefighting.
Level 2	Different tactics are used to deal with strategic failure or drift, but none is considered as optimal; actions are mostly reactive.
Level 3	Occasional examples of contingency planning, mainly in regards to the core activities of strategy deployment. Several options and alternatives are presented in these cases, in an effort to minimize the impact of deviations.
Level 4	Contingency planning efforts are well defined, and used for most strategic processes.
Level 5	Contingency planning is part of the strategic deployment process, with the plan considering several options for deploying a strategy.

Resource Allocation (5)

(Okumus, 2003; Harrigan, 2005)

Resource allocation involves all planning activities for managing and using available resources - human or physical - in the scope of fulfilling the strategic planning and attain the strategic goals.

A good resource allocation should consider the different needs of departments and sections, and the existing resources limitations, in order to avoid constraints and reducing tradeoffs in results.

Measures and evidence: Strategy deployment process; analysis of contingency plans at organizational and departmental levels; strategy deployment process; perceptions over strategy deployment; strategic results.

Methods and data sources: Strategy deployment process analysis; analysis of tools, methods and results; interviews; group talks; observation.

Table 74 - Description of the maturity levels for the Operational Excellence critical success factor "Resource allocation".

Resource allocation	
Level 0	Non-existent or no evidence.
Level 1	Resource allocation is poorly controlled or planned and is often reactive.
Level 2	Resource allocation is limited to core and management roles, leaving part of the allocation process undefined, unplanned and eventually reactive. Severe limitations in terms of resources are a constraint.
Level 3	Resource allocation is defined at higher levels and covers most roles; however, by being centralized it lacks full understanding at the realities at department levels, leading to unbalanced allocation.
Level 4	Resource allocation is a well-defined process that is led in close contact with the immediate managers of human and technical resources. Resources limitations may still be a problem.
Level 5	Resource allocation is done in complete alignment with the sections and resources involved. Balanced allocation across the organization.



Organizational Communication

Strategy Communication (1), (4)

(Peng and Litteljohn, 2001; Li, Guohui, and Eppler, 2008)

The success of strategy will be deeply dependent not only its development process and deployment action plan, but also on its alignment with the efforts and goals of the entire workforce. Strategy communication is an essential requirement for effective strategy implementation, either by creating the context and sharing the objectives with the workforce, or through well-established hands-on approaches and training, knowledge dissemination and learning during the process of strategy implementation.

Measures and evidence: Strategy communication process; perception on strategy communications; Methods and means for strategy communication.

Methods and data sources: Interviews, Questionnaires, Process Analysis; Corporate documentation analysis.

Table 75 - Description of the maturity levels for the Operational Excellence critical success factor "Strategy Communication".

Strategy Communication	
Level 0	Non-existent or no evidence.
Level 1	Limited efforts to communicate strategic choices with the workforce.
Level 2	Strategy communication is not seen regularly, happening sporadically and in the scope of major events or in preparation for major strategic shifts.
Level 3	Strategy communication is promoted in the organization with some regularity, but there is limited follow up regarding the efficiency of this communication, and no revision of cycles and processes used.
Level 4	Strategy communication is seen as being central in the organization, supporting workforce understanding for several organizational efforts focused on quality and improvement and in managing change.
Level 5	The organization strongly promotes and shares the strategies it uses with its workforce, actively measuring the understanding and taking the feedback to improve the how strategy is shared.

Communication processes (5)

(Argenti, Druckenmiller, 2004; Welch, M., & Jackson, 2007)

Organizations have to be proficient at managing information, both internally and externally, in order to keep or improve their position in the market. If on the one side, a slow and unstructured internal communication process can lead to employee disengagement and lack of motivation, an unstable communication process with clients can be fatal, and lead to a damaged external reputation can harm customer loyalty and sales. In times of strong public scrutiny of businesses, demands for

increased transparency and social responsibility, organizations need to mind their external communication even more efficiently.

Measures and evidence: Communication processes and metrics; Information Management; Perceptions over communication processes (employees, benchmarking, external audits).

Methods and data sources: Questionnaires; Interviews; evaluation of audit results, feedback and certifications; Process analysis.

Table 76 - Description of the maturity levels for the Operational Excellence critical success factor "Communication processes".

Communication processes (internal and external)	
Level 0	Non-existent or no evidence.
Level 1	Communication processes are loosely defined, leading to redundant tasks, delays and other operational and technical complications. Workforce reports feeling uniformed and distant from other levels or departments.
Level 2	Initial steps to define a strategy communication process have been established, but not at organizational level. A majority of the workforce shows low levels of awareness with the organization's strategy and have poor perceptions regarding strategy communication.
Level 3	Standardized processes based on best approaches have been established, creating a common approach across the company. The processes may have difficulty in penetrating some areas or levels, and lower level of awareness and perceptions over the strategy and its communication are found within some groups. The organization shows proactivity in taking efforts to improve the situation.
Level 4	Well established process for communicating strategy are implemented across the organization. Measures are defined to follow up and control the efficiency and effectiveness of the communication process. Strong awareness of the strategic path and goals within the workforce, and positive perceptions regarding the communication of strategy.
Level 5	The organization has taken the efforts to revise and intervene to improve the process. The workforce shows a strong understanding and alignment with the strategy and contributes to improve the strategy communication process.

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Appendix III - Construct Scales: Cultural Orientation to Excellence

In order to assess the maturity, in terms of the orientation of the Organizational Culture towards Excellence, of each of the organizations studied in this project, the analysis of the collected data needs to be guided on clearly defined descriptions of each critical success factor. Whether this data has been identified via observation, analysis of documentation, questionnaire, or through interviewing or focus group conversations, it needs to be translatable to defined scales that allow the assessment of the cultural elements of an organization in terms of their orientation to Operational Excellence. Accordingly, there needs to be a clear definition of the different levels of maturity of these critical success factors, a narrative of their meaning, a listing of the possible sources of evidence, and of the data collections methods use to gather information. The results of these efforts can be found in this section.

Example:

Enablers

Critical Success Factors (Measurement Scale Type)¹
 (Authors, year)

¹ See Appendix I.

Brief description and conceptual review of the critical success factor.

Measures and evidence: a listing of the possible sources of evidence.

Methods and data sources: a listing of the data collections methods use to gather data.

Table 77 - Example of a maturity scale used to describe each of the maturity levels for the assessment of the critical success factors leading to a Cultural orientation towards Operational Excellence.

Example	
Level 0	Description of the realities and behaviors that are found in organizations to be considered in each level.
Level 1	“
Level 2	“
Level 3	“
Level 4	“
Level 5	“

Principles

Values and Beliefs (2)

(Schein, 1984; Kotter and Heskett, 1992; Sørensen, 2002; Zahra, Hayton, and Salvato, 2004)

Beliefs, together with the shared values of an organization, refer to the coherent thought process that will lead to the creation of a pattern of norms that represent acceptable solutions and behaviors in face of major organizational challenges. Some authors see beliefs as being a similar concept to values, forming with the shared values the “invisible side of an organization”. Strongly shared cultures minimize heterogeneity in the beliefs of its members, working to clarifying them next to old members and to integrate new members. An excellence-oriented culture will be observed in an organization that show a homogeneous belief in the tools, methods and benefits of operational excellence efforts. Although not so visible as artifacts, beliefs and shared values have some level of awareness and can be brought back to awareness by focused inquiry and observation.

Measures and evidence: Identification of corporate beliefs and shared values; Presence or relation of operational excellence principles in the corporate beliefs and values; Identification and comparison of rationalized values between different groups; Analysis and comparison between published espoused values and workers’ rationalized values.

Methods and data sources: Questionnaires; Interviews; Analysis of corporate publications and built environment (related to organizational values).

Table 78 - Description of the maturity levels for the Cultural orientation towards Operational Excellence critical success factor "Values and Beliefs".

Values and Beliefs	
Level 0	Non-existent or no evidence.
Level 1	Organizational beliefs and shared values are unrelated with quality and performance/ operational excellence across the organization.
Level 2	Beliefs and espoused values in some areas of different levels of the organization show some alignment with quality and performance/ operational excellence.
Level 3	Espoused values and beliefs across the organization show alignment with principles of quality and operational excellence. However different principles are observed as values in different departments, levels or functional units.
Level 4	Alignment between organizational belief and share values and the principles of excellence. Transversal to the entire organizations, across different departments of levels.
Level 5	Major influence of excellence principles in the beliefs of the organization. The organizational values and beliefs are strongly aligned with operational excellence, both horizontally and vertically. Revision of values is observed and compensated with training and communication efforts to re-align the beliefs of the workforce.

Norms (2)

(Cooke and Rousseau, 1988; Balthazard, Cooke, and Potter, 2006; Schein, 2006)

Norms are the typical, expected standard approaches to challenges and problems. They are based on the organizational beliefs and can be seen as the “unwritten rules” that are expected to be observed, but have a more direct impact on the day-to-day activities and work situations. While every organization develops norms relating to how influence, power and influence are distributed, some ideas and beliefs that can be considered fundamental knowledge may not practically occur if they are not recognized norm or expected behavior as part of the organization’s culture.

Measures and evidence: Identification of corporate norms; comparison of identified and espoused norms with beliefs and shared values; influence of operational excellence principles in the corporate norms.

Methods and data sources: Questionnaires; Interviews; Analysis of corporate documents.

Table 79 - Description of the maturity levels for the Cultural orientation towards Operational Excellence critical success factor "Norms".

Norms	
Level 0	Non-existent or no evidence.
Level 1	Norms are unclear for a great part of the workforce. No connection few between existing and recognizable norms and quality and operational excellence.
Level 2	Norms in some areas of the organization show a clear concern with quality and operational excellence, but they stand out of the regular understanding and normative panorama of the organization. Some distancing between rationalized values and beliefs and existing norms.
Level 3	Norms and behaviors across the organization show different focus on operational excellence. Since it is not homogeneous, it might lead to some confusion and clashes between different organizational units. Due to this, gaps between espoused values and norms may exist in some areas.
Level 4	Most norms and unwritten rules of the organization lead to consistent behaviors framed in the scope of operational excellence. Norms are aligned with espoused values.
Level 5	Norms are deeply and broadly aligned with the espoused values and principles of operational excellence. Evidence of critical thinking and revision of behavioral norms in face of negative responses form the environment.

Vision and Mission (2)

(Balthazard & Cooke, 2004; Atkison and Clarke, 2006; Shingo Institute, n.d.)

Cultural values and systems have to be carefully integrated and aligned in order to ensure that they support each other in terms of achieving the organization's strategic mission. It is important to promote integration and alignment of the vision and mission with the organizational goals and values.

Big organizations or with distant physical structures between different functional areas might lead to the creation of subcultures. In those cases, the efforts to integrate and promote the understanding of the vision, mission and central organizational values becomes even more critical.

Measures and evidence: Workforce climate and perceptions regarding culture and values, prevalence of cultural aspects in personal discourse and in corporate documentation, workforce awareness and capacity to interrelate and recognize of mission, vision, values and cultural aspects.

Methods and data sources: Interviews and corporate documentation (charters, posters, handouts, internal newspapers/magazines, *etc*) analysis: text analysis: word frequency and patterns recognition; Questionnaires; observation and analysis of culture-related decoration and built environment (symbols, statements, organization).

Table 80 - Description of the maturity levels for the Cultural orientation towards Operational Excellence critical success factor "Vision and mission".

Vision and mission	
Level 0	Non-existent or no evidence.
Level 1	The mission and vision of the company do not carry a clear and practical concern with quality, operational excellence, value creation for costumers. No apparent or little connection between rationalized values, mission or vision and the organization's policies.
Level 2	Although aligned with the principles of operational excellence or the improvement of organizational performance, the mission, vision or with espoused values and policies do not overtly communicated them. Part of workforce may not recognize them as transmitting their personal experiences.
Level 3	The mission, vision or values and policies of the organization align or even mention operational excellence, but do not make them central topics, or do not integrate them between each other.
Level 4	Broader integration and understanding of the mission and vision across the organization. Although subcultures may be observed, the principles of quality and excellence are present in the values across the entire structure.
Level 5	The organization's mission and vision clearly focus on the importance of quality and organizational excellence for the success of the organization. Mission, vision and values are clearly integrated with the strategy and are well understood and shared by all workers.

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Practices

Use of quality tools (5)

(Bamford and Greatbanks, 2005; Thia, Chai, Bauly and Xin, 2005).

Much as error proofing techniques, quality tools have a great impact in processes, product development and production. Basic quality tools are a simple, cost efficient way to assure quality and understand (and eliminate) the root causes of problems and deviations.

Measures and evidence: Perceptions of quality and OpEx; availability, use and understanding of quality tools.

Methods and data sources: Questionnaires, interviews, group talks, observation, internal communication documents; internal technical documents; work instructions; excellence awards applications and feedback; customer and external feedback, recognition and awards; Internal benchmarking results, awards and recognition.

Table 81 - Description of the maturity levels for the Cultural orientation towards Operational Excellence critical success factor "Use of Quality Tools".

Use of Quality Tools	
Level 0	Non-existent or no evidence.
Level 1	Use of quality tools is poor and isolated; no training is provided to workers.
Level 2	Some areas show initial engagement and use of quality tools, but unable to influence other areas in the organization.
Level 3	Quality tools are used consistently and in a mature way in the more technical departments, but other areas may lack some training and broad understanding of their full capacity.
Level 4	The use of quality tools shows a strong and integrated across the organization. Evidence of adaptation to each functional area and of proper training being given to most employees.
Level 5	Quality tools are recurrently used, adapted, and integrated between departments and functional areas, showing a strong focus on developing Quality Systems.

Engagement with quality and excellence initiatives (2)(6)

(Tesluk et al., 1997; Carrier, 1998; Shingo Institute, n.d.)

The extent at which people participate and feel involved in quality excellence and initiatives is essential for their success and sustainability. Organizations that promote excellence in a limited scope and intensity are normally focusing on achieving short term results, and fail to involve the organization in a way the it supports further commitment to excellence beyond implementation and after the initial cycles.

Measures and evidence: Workforce climate and perceptions regarding quality and excellence, perceptions about the engagement and personal participation in quality and excellence initiatives; existence of initiatives and programs to involve associates in quality and excellence initiatives.

Methods and data sources: Interviews: text analysis: word frequency and patterns recognition; informal talks, Questionnaires; non-participant observation; documentation analysis; feedback reports excellence programs and awards.

Table 82 - Description of the maturity levels for the Cultural orientation towards Operational Excellence critical success factor "Engagement with quality and excellence initiatives".

Engagement with quality and excellence initiatives	
Level 0	Non-existent or no evidence.
Level 1	Major quality and excellence initiatives are isolated from the rest of the organization, driven by the efforts of specialist teams.
Level 2	Quality and excellence initiatives start to involve more people, but still limited to technical departments and involvement a limited number of associates.
Level 3	Several initiatives in place to ensure the participation of the entire workforce, mostly still at local level and running in parallel, with limited integration. Results are shared and celebrated by the entire organization. Different levels of engagement are common.

Level 4	Initiatives are deployed throughout the organization. Engagement and participation are measured and followed up on. Major, organizational-level quality and excellence initiatives, although recognized by the entire workforce, may raise perceptions of limited participation in certain sectors.
Level 5	The workforce is highly engaged with quality and excellence initiatives, with the organization taking consistent steps to improve the participation of the entire workforce and ensure that there are visible, practical results of that engagement. Very strong feeling of participation and engagement amongst the workforce.

Commitment to quality and excellence (2)(5)

(Tutuncu & Kucukusta, 2007; Shingo Institute, n.d.)

Beyond the usage of quality tools and the active participation in quality initiatives, true commitment to quality is the ultimate achievement for organizations that wish to create a quality-oriented culture. A strong commitment to quality and excellence is seen in every single task that an associate performs, and cuts the boundaries of departments and sections, being observable in the speech and actions of the workforce across the organization

Measures and evidence: Workforce climate and perceptions regarding quality and excellence.

Methods and data sources: Interviews: text analysis: word frequency and patterns recognition; informal talks, Questionnaires; non-participant observation; analysis of corporate documentation.

Table 83 - Description of the maturity levels for the Cultural orientation towards Operational Excellence critical success factor "Commitment to quality and excellence".

Commitment to quality and excellence	
Level 0	Non-existent or no evidence.
Level 1	No or low levels of commitment with quality and excellence across the organization.
Level 2	Commitment to quality and excellence limited to dedicated roles, teams or sections. General perception in the organization that quality is a responsibility of a specific department.
Level 3	Commitment to quality and excellence initiatives starts to be seen across the organization. Different perception and levels of engagement across the organization.
Level 4	Strong commitment to quality and excellence initiatives across the organizations. Efforts to manage and improve the commitment of the associates with quality and excellence in areas where it is lagging behind. Metrics in place to help measure and control organizational commitment.
Level 5	Commitment to quality is one of the pillars that support the culture of the organization, and is seen throughout the organization, independently of role, functional area of department.

Commitment to organizational culture (2)(5)

(Dobni et al., 2000; Araújo and Sampaio, 2014)

Organizational culture influences every aspect of a corporation's work. The real implementation of excellence models happens when they are fully integrated with the regular practices of the organization. Such integration can be better achieved as the principles and practices that are promoted by the excellence programs are assimilated by the culture of the organization and effectively implemented.

Measures and evidence: Workforce climate and perceptions regarding culture, prevalence of cultural aspects in personal discourse and in corporate documentation, awareness of cultural aspects (spontaneous and total).

Methods and data sources: Interviews analysis: text analysis: word frequency and patterns recognition; Questionnaires; non-participant observation.

Table 84 - Description of the maturity levels for the Cultural orientation towards Operational Excellence critical success factor "Commitment to organizational culture".

Commitment to organizational culture	
Level 0	Non-existent or no evidence.
Level 1	The topic of culture is largely ignored.

Level 2	Most workers have a difficulty in defining or recognizing the value and importance of the organizational culture. Limited efforts to promote culture and workforce commitment and alignment with it.
Level 3	Although there are formalized approaches around organizational culture aspects, commitment is still limited in some areas (especially at lower levels). Efforts are necessary to tackle the existence of different perceptions the organization's activities.
Level 4	There is a well-established understanding across the organization around the understanding of cultural principles and values; cultural perception, awareness and commitment are associated with clear measures and KPI's and are followed consistently.
Level 5	The vast majority of workers recognizes and takes daily efforts to represent the culture of the organization. Culture and cultural commitment are actively managed and updated according to organizational needs.



Behaviors

Role (6)

(Shingo Institute, n.d.)

Role relates to the focus and commitment that is observed in different organizational levels in regards to the principles, tools and systems of operational excellence. Looking at different organizational levels and roles allows to understand how deeply the associates, managers and leaders are committed to Operational Excellence, and assess the differences between these groups, and between discourse and practices at different levels.

Measures and evidence: Commitment with operational excellence at different levels; practical use of systems, tools and methods within different organizational roles; assessment of the correspondence between discourse and practice in regards to operational excellence methods, tool and systems.

Methods and data sources: Questionnaires, Interviews, Observation and process analysis.

Table 85 - Description of the maturity levels for the Cultural orientation towards Operational Excellence critical success factor "Role".

Role	
Level 0	Non-existent or no evidence of behaviors in any groups .
Level 1	Associates focus mostly on doing their jobs are mostly treated as expense. Managers are oriented at getting things done at all costs. Leaders focus on fire-fighting and are absent from improvement efforts.
Level 2	Associates occasionally get involved in improvement efforts, normally led by experts external to their areas/departments. Managers are deeply dependent on specialists to create improvement. Leaders are aware of improvement initiatives, but remain uninvolved.
Level 3	Associates are formally trained to participate in improvement initiatives. Managers are involved in managing systems and helping people promote improvement. Leaders set the direction for improvement and support efforts of others.
Level 4	Associates are involved every day in using tools and identifying improvement opportunities in their areas. Managers focus on driving behaviors through systems' design. Leaders are involved in improvement efforts and in aligning principles and practices.
Level 5	Associates deeply understand the meaning and objectives of tools, methods and the philosophies of quality and improvement. Managers strongly focus on improving systems and driving behaviors. Leaders focus on ensuring the principles of operational excellence are deeply embedded in the culture of the organization.

Frequency (6)
(Shingo Institute, n.d.)

Frequency relates to how often behaviors focused the pursuit and use of general quality tools, methods and frameworks are observed across the organization. It looks to behaviors to understand if they remain sporadic, event-based efforts or if they have become culturally-bound practices, uniform and observed in the entire organization as frequent behaviors.

Measures and evidence: Process speed and improvement metrics; Process improvement and revision methods; existence of speed enabling tools and methods.

Methods and data sources: Questionnaires, Interviews, Observation and process analysis.

Table 86 - Description of the maturity levels for the Cultural orientation towards Operational Excellence critical success factor "Frequency".

Frequency	
Level 0	Non-existent or no evidence.
Level 1	The frequency of behaviors related with operational excellence, quality, and improvement are infrequent or even rare.
Level 2	Behaviors are highly variable, being essentially event-based.
Level 3	Behaviors and practices of quality and improvement start to be more common and frequent, but not yet observable constantly.
Level 4	Quality and improvement practices and related behaviors highly frequent are predominant in the organization throughout time.
Level 5	Uniform and constant behaviors and practices of quality, operational excellence and improvement.

Duration (6)
(Shingo Institute, n.d.)

The duration of the behavior allows the understand the presence of a behavior across time, allowing us to understand if we are looking at an initial, developing behavior or a consistent, long-standing and well established one. It provides a temporal understanding of the excellence initiatives and the cultural and behavioral penetration in the organization.

Measures and evidence: Duration and repeatability of excellence-bound behaviors across time: perceptions, evidence from documentation (processes, archival records, corporate media and means of communication).

Methods and data sources: Questionnaires, Interviews; Corporate documentation analysis; Observation.

Table 87 - Description of the maturity levels for the Cultural orientation towards Operational Excellence critical success factor "Duration".

Duration	
Level 0	Non-existent or no evidence.
Level 1	Improvement efforts and excellence initiatives remain largely undeveloped, if already initiated.
Level 2	Most efforts and initiatives occur in an experimental basis, or at best a in formative, initial stage of development.
Level 3	Improvement initiatives are repeatable and behaviors follow the same trend, starting to be predictable.
Level 4	Most initiatives are well established, and behaviors stable.
Level 5	Principles of quality, excellence and improvement are culturally ingrained, leading to mature behaviors supporting well established, consistent initiatives.

Intensity (6)
(Shingo Institute, n.d.)

The intensity of the behaviors relates to the degree of emotional commitment and the importance that the workforce puts into any efforts and practices related with quality, improvement, and operational excellence.

Measures and evidence: Commitment and perceived importance given by the workforce to behaviors and practices related with quality and organizational excellence: perceptions, evidence from documentation (processes, archival records, corporate media and means of communication).

Methods and data sources: Questionnaires, Interviews, Observation and process analysis.

Table 88 - Description of the maturity levels for the Cultural orientation towards Operational Excellence critical success factor "Intensity".

Intensity	
Level 0	Non-existent or no evidence.
Level 1	The workforce is indifferent to excellence initiatives, with most of the workforce remaining uninterested.
Level 2	Proof of commitment with operational excellence is dependent of an individual level of interest (a manager, leader or quality champion), with most of the workforce following. Project/initiative dependent.
Level 3	Moderate intensity. Commitment has expanded from individual to local level, but is still limited to a few areas.
Level 4	Determined commitment, with strong importance being given to operational excellence. Deviation from these behaviors could signal a problem. Wide commitment across the organization, and integration of efforts.
Level 5	Behaviors in all organizational levels show a full commitment with operational excellence. Tenacious commitment, influences all organizational behaviors.

Scope (6)

(Shingo Institute, n.d.)

The scope lenses look at where the behaviors are observed across the organization. Lower levels will observe behaviors just in a few cells or organizational areas, while higher maturity levels will show behaviors to be widespread across the organization.

Measures and evidence: Prevalence of excellence-bound behaviors across the organization: perceptions, evidence from documentation (processes, archival records, corporate media and means of communication).

Methods and data sources: Questionnaires, Interviews, Observation and process analysis.

Table 89 - Description of the maturity levels for the Cultural orientation towards Operational Excellence critical success factor "Scope".

Scope	
Level 0	Non-existent or no evidence.
Level 1	Any observed behaviors are infrequent and isolated from the rest of the organization, being related with the search for solutions to specific, exceptional problems.
Level 2	While some areas show excellence bound behaviors, organizational silos or tunnel vision in some areas prevent them to become widespread and contaminate the entire organization equally.
Level 3	Most operational areas across the value chain show behaviors consistent with quality and operational excellence principles. Limited integration between efforts in different function areas.
Level 4	Operational excellence practices are well-established and integrated, with behaviors observable in multiple areas and different business processes. Behaviors start to spread across the value chain, potentiating its functionality and performance results.
Level 5	Operational excellence practices and behaviors to be widespread across the organization.

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Artifacts and Creations

Built Environment, layout and decoration (5)

(Mallak, Lyth, Olson, Ulshafer, and Sardone, 2003; Zerella, von Treuer, and Albrecht, 2017)

The built setting, the layout of an office or shop floor layout, and their decoration have a huge impact in providing strength to a culture – which can be defined as the homogeneity of a culture. At the same time, there has been studied and proved relation between the built environment and job satisfaction, and impacting performance in a similar sense to what process quality. does In the scope of identifying and describing a culture of excellence, it is important to understand any existing relation between the culture of an organization and the environmental setting of a company.

Measures and evidence: Decoration, Architecture and Built Environment, Corporate Media; workforce perceptions considering all the§ above.

Methods and data sources: Questionnaires, Interviews and corporate documentation analysis: text analysis: word frequency and patterns recognition; Observation and analysis of culture-related decoration and built environment.

Table 90 - Description of the maturity levels for the Cultural orientation towards Operational Excellence critical success factor "Built environment, layout and decoration".

Built environment, layout and decoration	
Level 0	Non-existent or no evidence.
Level 1	The conditions of most workplace settings are seen by most employees as a problem, promoting employee dissatisfaction. The workforce is unable to establish a relation between the workplace physical environment and the culture of the organization.
Level 2	Different workplace conditions have an impact in the workforce motivation and in its ability to relate them to the organizational culture.
Level 3	The organization tries to provide good and modern working conditions to its workforce, but the built environment mostly follows a functional point of view that can be seen as industry standard. Still limited impact in job satisfaction and organizational culture alignment.
Level 4	New offices, production or operational areas are developed with a strong emphasis in being a vehicle of cultural transmission. The impact on job satisfaction is positive for those working in new areas, but those working in older facilities might feel demotivated and left behind.
Level 5	The built environment, office layouts and decoration are modern, and have been developed or renewed with a deep influence, and as an active vehicle, of cultural reinforcement and transmission. Visible, strong alignment with a culture of quality and excellence.

Internal Communication and Media (2)

(Yates and Orlikowski, 1992; Linke, and Zeffass, 2011)

In order to create a strong culture (a homogenous culture) it is necessary to align the workforce with the organizational values, principles and goals. The diffusion of espoused ideas and values within an organization can be done through a series of different means of information and communication, from internal media to corporate documents, to formal meetings to less formal gatherings. Internal media is one of the most common vehicles for transmitting, sharing and creating or changing a culture, namely through constant presence and remainder of the guiding principles of an organization; for sharing and celebrating corporate success, and to create a cultural transformation.

Measures and evidence: Relationship between internal media and the information and communication efforts focusing in transmitting an enduring culture of excellence: Advertising; Corporate TV, Corporate journals, newspapers, and magazines, Handouts, and Multimedia; Perceptions of managers, leaders and associates.

Methods and data sources: Interviews; Analysis of internal media and corporate documentation (charters, posters, handouts, internal newspapers/magazines, etc) analysis: text analysis: word frequency and patterns recognition; Questionnaires.

Table 91 - Description of the maturity levels for the Cultural orientation towards Operational Excellence critical success factor "Internal Communication and Media".

Internal Communication and Media	
Level 0	Non-existent or no evidence.
Level 1	Internal means of communication and media are poorly used, not being vehicles of cultural transmission. Events to promote and share the culture of the organization are rare.
Level 2	There are occasional events and meetings used in the purpose of transmitting culturally-bound ideas, such as values and principles, or a new vision and mission. These events, however, are related with

	major cultural and strategic shifts, and are rare otherwise. Internal media is used to complement such initiatives.
Level 3	Meetings, events and informal gatherings exist but are sporadic, and the organization relies mostly in internal medias to share the main values principles of culture. Higher emphasis still seen in face of new cultural initiatives or bigger cultural shifts. A cultural focus on quality and excellence is expressed, but the perceptions of its practical deployment across all areas is still somewhat flimsy. Internal media is consistently used at this level.
Level 4	Internal media is one of the most important vehicles for sharing and transmitting the culture. Quality and operational excellence are communicated and shared as essential part of the culture, and have high levels of recognition amongst the workforce.
Level 5	The organization puts a strong effort in the transmission and sharing of the organizational culture. Internal media is a recurring source of cultural information.

Stories, symbols and heroes (2)

(Schein, 1983, 1984; Hofstede, Neuijen, Ohayv, and Sanders, 1990)

Stories, symbols and heroes are essential for the formation and development of a culture, and thus, for its understanding. Stories are an important means for the transmission of a culture. Many times, these stories will be about a person or a group of people that possess characteristics highly prized in the culture and that thus serve as role models: the heroes. It is normal that the founders and leaders that had a high impact in the organization, leading it to success, are seen as heroes, although people in other roles may reach that place. Finally, symbols are words, actions, images, or objects that carry a particular meaning within a culture. For all these dimensions, a strong relation between quality and improvement and the actions of those regarded as heroes - and that became symbols present in the imaginary of an organization and raised during storytelling - will indicate a stronger orientation of the culture towards excellence.

Measures and evidence: Discourse and questionnaireed perceptions regarding symbols and heroes of the Organization; Analysis of success stories and their relation with Quality, Operational excellence and improvement; Presence of important people in the organization (leaders, founders) in the organizational communication and working environment; Presence of excellence-bound actions, practices and principles ins storytelling, in the characteristics of those regarded as heroes and in the symbols of the organization.

Methods and data sources: Questionnaires; Interviews; Analysis of the discourse and storytelling in regards to organizational successes and heroes; Analysis of corporate publications and built environment (related to organizational symbols and heroes).

Table 92 - Description of the maturity levels for the Cultural orientation towards Operational Excellence critical success factor "Stories, symbols and heroes".

Stories, symbols and heroes	
Level 0	Non-existent or no evidence.
Level 1	The organization has difficulties to identify heroes and symbols, mainly as it misses a clear definition of the personal and professional characteristics that are to be valued within the organization.
Level 2	The organization starts to identify those personal and professional characteristics that are to be seen as symbols of the organization. Quality, continuous improvement and excellence have a limited presence in these characteristics.
Level 3	The workers easily identify the characteristics that make an individual or group be valued inside the organization, recognizing a few of those people, mainly by storytelling. Focus on quality, continuous improvement or excellence have fair presence in these characteristics.
Level 4	Operational excellence, quality and improvement are sometimes referred as valued characteristics in the organization, but yet with limited overall importance.
Level 5	Operational excellence, quality and improvement are amongst the top characteristics considered as being crucial to the organization and being highly valued in its members. Deep relation between stories, heroes and symbols and the principles of quality and excellence.

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Appendix IV - Construct Scales: Organizational Agility

In order to assess the level of maturity of Organizational Agility capabilities in each of the organizations studied in this project, the analysis of the collected data must be supported on clearly defined critical success factors. Whether this data has been identified via observation, analysis of documentation, questionnaires, or through interviewing or focus group conversations, it needs to be relatable to well-defined scales that allow a repeatable and reliable assessment.

Accordingly, there needs to be a clear definition for each of the different levels of maturity of these critical success factors, a narrative of their meaning, a listing of the possible sources of evidence, and of the data collections methods use to gather information. The results of these efforts can be found in this section.

Example:

Enablers

Critical Success Factors (Measurement Scale Type)¹
 (Authors, year)

¹ See Appendix I.

Brief description and conceptual review of the critical success factor.

Measures and evidence: a listing of the possible sources of evidence.

Methods and data sources: a listing of the data collections methods use to gather data.

Table 93 - Example of a maturity scale used to describe each of the maturity levels for the assessment of Organizational Excellence critical success factors.

Example	
Level 0	Description of the realities and behaviors that are found in organizations to be considered in each level.
Level 1	“
Level 2	“
Level 3	“
Level 4	“
Level 5	“

Orientation and Work Environment

Agile mindset (2)

(I. van Hoek, Harrison, and Christopher, 2001; Dikert, Paasivaara, and Lassenius, 2016)

An agile mindset is one of the structural pillars of an agile workforce. A mindset of agility is supported by an acceptance of change and a strong organizational alignment with the ideas of adaptability, resilience and entrepreneurship. Agile mindset favors a team orientation, a clear focus on the speed and quality on the development of new solutions.

Measures and evidence: Discourse and questionnaireed perceptions regarding agility, prevalence of agile mindset in personal discourse and in corporate documentation, awareness and alignment with agility (spontaneous and total).

Methods and data sources: Interviews and corporate documents analysis (reports, charters, posters, handouts, internal newspapers/magazines, *etc*): text analysis: word frequency and patterns recognition; Questionnaires; Analysis of corporate results and associated documentation; Observation of the built environment and decoration (symbols, statements, promotion of suitability).

Table 94 - Description of the maturity levels for the Organizational Agility critical success factor "Agile Mindset".

Agile Mindset	
Level 0	Non-existent or no evidence.
Level 1	The organization does not show practical signs engagement with agility. Discourse shows some initial and limited focus on agility.
Level 2	The idea of agility (and the need to be more agile) starts to transpire into the discourse, but its practical application is still limited. There are limited resources and capabilities for its pursuit. Any practical efforts to push agility are individually driven.
Level 3	Behaviors and practices are starting to be repeatable in throughout the organization, supported by a few tools and techniques. Managers and leaders are increasingly involved and help set the direction and training opportunities are either deployed or planned.
Level 4	Agile practices and behaviors are consistent and supported in well-defined and broadly used techniques and processes. Managers and leaders focus on driving behaviors.
Level 5	Agile efforts are seen across the organization and influences discourse, techniques, processes and business strategy. There are efforts to further improve the organizational performance through the focus on agility.

Agile-style work environment (3)

(Beck, Beedle Van Bennekum, Cockburn, Cunningham, Fowler, Grenning, Highsmith, Hunt, Jeffries, Kern, 2001; Dikert, Paasivaara and Lassenius (2016))

People need an agile-friendly environment to feel motivated to embrace agility, to gain trust on its methodologies and do a good job. Support from leaders, managers and colleagues is essential, as well as the team's organization, the tools and the strategies that are promoted. Making the organizational environment more agile friendly is essential to motivate and engage people and promote cultural commitment.

Measures and evidence: Leadership support for agile; Workforce climate in regards to agility; Presence of agile tools; Communication of agility and agile strategy and goals; Promotion of an agile/flexible physical work environment (physical barriers, team work spaces, *etc.*); Rigidity and formality of hierarchy and organizational structure.

Methods and data sources: Interviews and corporate documents analysis (reports, charters, posters, handouts, internal newspapers/magazines, *etc*): text analysis: word frequency and patterns recognition; Questionnaires; observation of the built environment (Workspaces, rooms, *etc.*) and decoration (symbols, statements, promotion of suitability); Organizational Structure.

Table 95 - Description of the maturity levels for the Organizational Agility critical success factor "Agile-style work environment".

Agile-style work environment	
Level 0	Non-existent or no evidence.
Level 1	Little or no efforts to promote a change in behaviors, tools, and structures to promote an agile environment. If any, efforts are <i>ad hoc</i> and with high resistance and failure rates.
Level 2	Elements of an agile-style work environment are seen isolated projects, with large variation on practices and behaviors in each case. Managers and leader have no formal training and efforts are deeply dependent on experts.
Level 3	Defined, structured approach to promote environmental and methodological efforts to create a more agile-friendly work environment. Best practices are identified, but in some cases, methods may still vary. Leadership and management have an active role in sponsoring these changes.
Level 4	Agile-style workplaces are the norm within the organization. Broad organizational alignment, although some resistance and variability can be between areas.
Level 5	The organization shows high levels of competency in driving change to create a more agile work environment. Feedback are gathered to improve tools, training and capabilities to improve the environment.

Collaborative work (2)

(Forsythe, 1997; Highsmith and Cockburn, 2001)

Collaborative work allows people in an organization to work together in a more efficient way, simplifying the workflow and the communication process. Collaborative work is sustained by a series of systems and practices, including the use of agile and collaborative work tools, but perceptions and understanding of the enclosed benefits are essential for its success.

Measures and evidence: Discourse and questionnaireed perceptions regarding collaborative, Awareness around collaborative work methods and tools; Availability and use of tools for collaborative work.

Methods and data sources: Interviews and corporate documents analysis (reports, charters, posters, handouts, internal newspapers/magazines, *etc*): text analysis: word frequency and patterns recognition; Questionnaires; identification of available collaborative work tools and systems; Observation of usage of collaborative work tools and methods.

Table 96 - Description of the maturity levels for the Organizational Agility critical success factor "Collaborative work".

Collaborative work	
Level 0	Non-existent or no evidence.
Level 1	There is no awareness of the benefits of collaborative work. No defined or planned efforts to train the organization or deploy tools for its promotion.
Level 2	Initial approaches to promote collaborative work. Some tools and methods are available, but employees are still unsure about its use, and organizational policies and managers' involvement is limited.
Level 3	The organization takes efforts to promote awareness on the benefits of collaborative work, aiming to have an impact and change behaviors, making people use to use the tools and methods available. Planning and approaches are defined and stable, training is available, and involvement and support from top organizational levels is seen.
Level 4	Collaborative work is well set in the organization, with processes defined and tools available. The use of collaborative tools is part of daily work of a significative part of the workforce, and the outcomes are followed and measured.
Level 5	The organization has established metrics to track progress and measure the impact of its activities in promoting the use and communicating the benefits of collaborative work. Awareness is measured through the collection of feedback, allowing continuous revision to ensure better results.

Adequate reward for agile use (5)

(Crocitto and Youssef, 2003; Vázquez-Bustelo, Avella and Fernández, 2007)

Agility requires the integration and support of its principles by the workforce.

Organizations must try to engage the workforce by recognizing agile practices and rewarding those who use it consistently, accept change and quickly adapt to meet the market needs.

Measures and evidence: Discourse and questionnaireed perceptions regarding reward of agile use; inclusion of the use of agility as a criterion on the existing rewards systems.

Methods and data sources: Interviews: text analysis: word frequency and patterns recognition; Questionnaires; Analysis of reward systems documentation.

Table 97 - Description of the maturity levels for the Organizational Agility critical success factor "Adequate reward for agile use".

Adequate reward for agile use	
Level 0	Non-existent or no evidence.
Level 1	Poor use of reward and recognition in the scope of fostering agility.
Level 2	The organization has started to identify and measures and resources for rewarding the use of agility. The organization has actively initiating a new process or planning the inclusion of agility in the current reward systems.
Level 3	Organization starts to be proactive in recognizing individual and group efforts in the promotion of agility; limited but standardized approaches to rewarding agility.
Level 4	Advanced and standardized reward practices are in place for agility, with defined metrics and constant follow up. Process are integrated, measured and reported. Costs and resources are well defined and understood.
Level 5	Adequate reward for agile is promoted by a mature governance structure, under constant revision for adaptability and improvement.



Agile Resources and Capabilities

Development and deployment of new capabilities (3)

(Prosci, 2013; Adeleye and Yusuf, 2006)

Organizations need a wide set of competitive capabilities to face the instable markets and growing product complexity. Agile organizations need to develop and deploy quickly new capabilities to face the challenges.

Measures and evidence: Awareness and identification of agile capabilities; Training and individual development plan focused on agile capabilities; Process characteristics (speed, frequency) for the development and deployment of new capabilities.

Methods and data sources: Interviews, Questionnaires, Process analysis; Training and development systems analysis.

Table 98 - Description of the maturity levels for the Organizational Agility critical success factor "Development and deployment of new capabilities".

Development and deployment of new capabilities	
Level 0	Non-existent or no evidence.
Level 1	Development and deployment of new capabilities is driven by individual efforts isolated within the workforce, with no integration or systematic feedback.
Level 2	The development of new capabilities is characterized by a project approach, being dependent on champions, experts or experienced people. In these cases, there is some degree of planning and monitoring, but at an organizational level actions are still mostly reactive.
Level 3	The development and deployment of new capabilities has begun to be approached in a structured way, being defined by some standardized procedures, but mostly at technical areas.

Level 4	The development and deployment of new capabilities has been stabilized and is consistently used organization-wide. Greater sense of teamwork and integration of these capabilities. Processes are controlled quantitatively, having associated performance metrics.
Level 5	The performance on the development and successful deployment of new capabilities allows constant revision and the identification of improvement opportunities to help the organization develop and deploy faster the necessary competences to be more agile. The process for identifying, developing and deploying these capabilities is aligned with the strategy and defined at different organizational levels.

Talent to support agile strategies (talent retention/management) (5)

(Horney, Pasmore and O'Shea, 2010; Martin, 2015)

Being able to attract, hire, develop and retain top talent is a key goal within any organization that is concerned about maintaining a competitive advantage and achieve excellence. But the same is valid for the specific case of agility. Organizations need to promote a growing focus on attracting or retaining talent to support agile strategies, and – as exposed in the previous construct, “Knowledge Management” – feed the knowledge transfer systems that will allow the organization to further develop in-house talent.

Measures and evidence: Employee Development Programs focused on agility; Talent attraction and retention of agile experts; Workforce feedback and perceptions on agile talent retention, awards and recognition; External entities feedback and recognition.

Methods and data sources: Interviews; Questionnaires; Analysis of HR documents and processes; Training and development systems analysis (focus on agile); Turnover and rotation in agile-related teams and activities; Talent attraction and retention plans (focus on agile).

Table 99 - Description of the maturity levels for the Organizational Agility critical success factor " Human capital/talent to support agile strategies".

Human capital/talent to support agile strategies	
Level 0	Non-existent or no evidence.
Level 1	The support of agile strategy is very poorly defined in regards to the availability of human resources. Identification of human capital is done in an unstructured way.
Level 2	The organization has started to identify and measure human resource availability, actively initiating a talent management process to support agile strategies.
Level 3	Standardized approaches to the identification of existing talent to support agile strategies, or in detecting the existing gaps needing to be closed. The organization starts to be proactive, but a few differences in the approaches used are visible across the organizations.
Level 4	Standardized measures and controlled approach used broadly across the organization for the identification or sourcing of human capital to support agile strategies. Metrics are defined and followed, and process are integrated, measured and reported.
Level 5	Human capital management practices are considered mature and integrated, but are systematically reviewed to keep relevance in regards to the changing environments.

Knowledge Management (5)

(Nerur, Mahapatra, and Mangalaraj, 2005; Conforto, Salum, Amaral, Sila and Almeida, 2014)

Leveraging organizational capabilities and definition of sustainable and reachable strategies need the identification of the right individuals to lead, train and orient the workforce. In that sense, the management of the existing knowledge will be essential for the success of organization. At the same time, it will be necessary to ensure that there is adequate learning, supported by Learning Organization capabilities. By ensuring this, organizations guarantee also that knowledge is passed on, and reduce their dependency from expert individuals or groups.

Measures and evidence: Analysis of knowledge transfers systems; Identification of agile training opportunities and systems, Perceptions, awareness and correct use of agile methods by workforce.

Methods and data sources: Interviews, Questionnaires, HR process analysis; Training and development systems analysis (focus on agile).

Table 100 - Description of the maturity levels for the Organizational Agility critical success factor "Knowledge Management".

Knowledge Management	
Level 0	Non-existent or no evidence.
Level 1	Knowledge Management is <i>ad hoc</i> , based undocumented and unpredictable processes. Evidence is always isolated in each case, with no evidence of the use of tools.
Level 2	The organization has started to identify and measure capabilities and resource availability to help define the management of knowledge. Response and timing are still mainly reactive.
Level 3	Knowledge Management efforts have allowed to defined approaches for the identification and systematics for sharing existing knowledge in the organization. Inconsistent deployment and use across the organization.
Level 4	Knowledge management is centralized, but in close contact with departmental and sections in order to identify local needs. Information on existing knowledge is readily available and allows the organization to deploy or share the necessary knowledge in the right places. Process are integrated, measured and reported.
Level 5	Knowledge management practices are consistently revised in order to optimize and integrate them. Information and measures are used in the scope of anticipating knowledge gaps and working to eliminate them.

Job rotation systems (5)

(Tsourveloudis and Valavanis, 2002; Lui, T. W., & Piccoli, 2007)

Job rotation represents the frequency with which employees transfer between existing positions or from existing to new roles, in the scope of better knowing the organization, transmitting new ideas and perspectives, or developing new organization capabilities. Job rotation in different positions allows the organization to develop new capabilities and a systems vision that allow to take rapid but balanced action when changes are needed. Job rotation can be related to training, individual development and leadership formation.

Measures and evidence: Job rotation frequency; training and development program promoting job rotation.

Methods and data sources: Interviews; Questionnaires; Analysis of HR documents and processes; Training and development systems analysis.

Table 101 - Description of the maturity levels for the Organizational Agility critical success factor "Job rotation systems".

Job rotation systems	
Level 0	Non-existent or no evidence.
Level 1	No evidence of planned job rotation.
Level 2	A few goals for job rotation are identified, and approaches are planned. Job rotation is sparked by reaction of sudden organizational needs.
Level 3	Organization starts to be proactive. Although best practices identified for promoting job rotation, usage is limited to promote associates or prepare them for management positions.
Level 4	Standardized job rotation systems used in most areas of the organization. Expected goals and metrics are defined and followed, and job rotation is integrated with other processes and governance efforts, balanced with such constructs as the availability of resources.
Level 5	Job rotation systems are well implemented and promoted across the organization. Information and feedback are used in the scope of improving benefits.

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Process/ Project Team

Team dedication (5)

(Chen, Damanpour, and Reilly, 2010; Almeida, Conforto, Silva, and Amaral, 2012)

The resources available for the team are an important measure to understand the commitment and gauge the potential success of agile project and process management. This includes, for example, team's members dedication (full or part time) to the project/process, its size, or the existence of a location where the team meets.

Measures and evidence: Team turnover, Team commitment (part- or full-time) and dedication (hours); Team size; Workspaces; Team work routines.

Methods and data sources: Interviews; Questionnaires; Documentation analysis and historical records (product and process development teams); Observation.

Table 102 - Description of the maturity levels for the Organizational Agility critical success factor "Team Dedication".

Team Dedication	
Level 0	Non-existent or no evidence.
Level 1	Resources management for project teams is poorly defined or based on unrevised criteria.
Level 2	The organization has started to identify and measure resource availability for project and process development teams, actively initiating a management process. Response is still mostly reactive.
Level 3	Measures for identifying and calculating resource needs in each project are defined and followed more or less consistently in several functional areas. Organization starts to be mostly proactive, predicting problems and planning how to address them, but difficulties to balance availability and dedication to projects/teams still subsist.
Level 4	Well-developed approaches for identifying and deploying the necessary resources for each project. Costs, resource availability and needs are well defined and integrated at an organization-wide level.
Level 5	High maturity in managing and deploying resources according to both short-term and long-term needs. Follow up and outlooks for constant improvement.

Autonomy and empowerment (5)

(Chen, Damanpour, and Reilly, 2010; Lee and Xia, 2010)

The degree of autonomy of team will have strong implications in its agility, implementing factors such as speed and flexibility. Autonomy refers to the degree of liberty that a project team and its manager have to make decisions without requiring for outside approval. Such can be decision regarding scheduling the work, allocating resources allocation, selecting procedures and methods or defining targets, among other project-related matters. It is deeply related with empowerment and the support of leadership.

Measures and evidence: Employee and project managers team leaders' perceptions about autonomy and the degree of liberty of teams to take decisions; Project and process development delays due to the need for external approval.

Methods and data sources: Interviews: text analysis: word frequency and patterns recognition; Questionnaires; Internal feedback; External entities feedback and recognition.

Table 103 - Description of the maturity levels for the Organizational Agility critical success factor "Autonomy and empowerment".

Autonomy and empowerment	
Level 0	Non-existent or no evidence.
Level 1	Team member's perceptions are that they have little autonomy. No leadership support or efforts for delegating or promoting shared autonomy.
Level 2	Some initial efforts in place to foster autonomy and empowerment. Pilot project, with a few project teams only.
Level 3	Limited, but established approaches to further give autonomy and promote empowerment is found in teams. Different approaches and levels of autonomy are found in teams of different sectors.

Level 4	Autonomy and empowerment see a consistent approach in most teams across the organization. Different approaches still exist, but rather due to adaptation to the team's reality than due to lack of established practices.
Level 5	The organization is highly efficient in promoting autonomy and empowerment of teams, handling responsibility and allowing them to make decisions and take (limited) risks in search for a solution.

Integration and Cross-functional teams and projects (5)

(Sarin and McDermott, 2003; Carbonell and Rodriguez, 2006)

Cross-functional teams allow organizations to deploy different capabilities in solving a problem, developing a new process or product. The presence of different specialist and representation of different departments and sections will allow not only to maximize knowledge availability but will also improve the communication between involved areas and improve the development speed.

Measures and evidence: Number and typology of functions represented in a team; Number of different departments or sections represent in a team; Number and typology of roles present in a team; Team constitution.

Methods and data sources: Interviews, Questionnaires; Development; Team formation processes.

Table 104 - Description of the maturity levels for the Organizational Agility critical success factor "Autonomy and empowerment".

Integration and Cross-functional teams and projects	
Level 0	Non-existent or no evidence.
Level 1	Metrics and approaches for promoting integration and cross-functionality of teams are poorly defined or based on unrevised criteria.
Level 2	The organization has started to identify integration and cross-functionality metrics. Efforts are mostly reactive.
Level 3	The organization starts to be proactive in integration and cross-functionality. Standardized metrics allow identifying and planning team's formation and are used consistently across the organization.
Level 4	Integration and cross-functional teams and projects seen widely across the organization in an integrated way. Resource availability or organizational silos might be challenges.
Level 5	The organization shows high level of maturity in integration and cross-functionally while forming teams and deploying resources. Management process are continuously under revision, in an effort to overcome resource availability limitations and balance costs.

Team Experience (5)

(Carbonell and Rodriguez, 2006; Hyung-Jin Park, Lim and Birnbaum-More 2009)

Having an experience team will be as important for the success and agility of a team as the knowledge, skills and functions of its members. The experience of the team will influence its capacity to provide fast, flexible answers to problems, as is based in previous experience in more or less similar projects and processes, individually or as a group, in using agile or hybrid methodologies.

Measures and evidence: Team formation; Team member's average experience in using agile or hybrid methodologies; Project leader experience in using agile or hybrid methodologies.

Methods and data sources: Interviews, Improvement team's formation processes.

Table 105 - Description of the maturity levels for the Organizational Agility critical success factor "Team Experience".

Team Experience	
Level 0	Non-existent or no evidence.
Level 1	Team members' experience is not seen as an important requirement in the formation of project or process teams. No/poor management process support.
Level 2	A few metrics to ensure experience is present amongst team members are seen, but in a rather isolated way. Concerns with the experience of team members is seen mostly at project level.

Level 3	Organizational wide efforts are observed throughout the organization, ensuring that there is a balanced experience ratio when establishing teams to develop new processes or projects. Resource limitations or organizational rigidity/silos might be problems.
Level 4	Organization-wide standardized metrics are in place for ensuring all teams have members with previous experience in dealing with innovation projects or agile methods and in managing and working as a team.
Level 5	The organization shows high proficiency in deploying and balancing experience in its teams. Team members' experience is balanced, ensuring learning opportunities for new members.



Organizational structure

Promoting a horizontal structure (3)

(Vazquez-Bustelo, Avella, and Fernández, 2007; Almeida, Conforto, Silva, and Amaral, 2012)

The type of organizational structure can help catalyze the adaptability of an organization. Horizontal structures support and promote highly-skilled, knowledgeable and motivated people in dealing with agility are better to deal with unpredictable business environments. Changing and making an organizational structure more horizontal will foster agility in decision-making, increase autonomy in processes revision and improve organizational communication.

Measures and evidence: Organigrams and organizational structure; rigidity of organizational structure; Revision and change management of organizational structure.

Methods and data sources: Interviews, Questionnaires, Analysis of corporate documentation; Analysis of organizational structure; organizational; Organizational structure change and revision process.

Table 106 - Description of the maturity levels for the Organizational Agility critical success factor "Promoting a horizontal structure".

Promoting a horizontal structure	
Level 0	Non-existent or no evidence.
Level 1	Little or no change efforts are seen in the scope of making the organization more horizontal.
Level 2	Elements of change management to promote a more horizontal structure are applied in isolated projects, but the organizational structure remains largely vertical and rigid.
Level 3	A more horizontal structure is seen mostly highly technical and technological areas where a highly-skilled workforce needs the autonomy and flexibility to operate faster and in a more adaptable way.
Level 4	A horizontal structure is seen in several departments of the organization. Leadership and management have an active role in the efforts to create/maintain the structure.
Level 5	The Organization has a stable and dynamic horizontal structure, able to reconfigure based on both internal and external needs.

Decentralized decision-making (1), (3)

(Lin, Chiu, Tseng, 2006; Sherehiy, Karwowski, Layer, 2007)

A decentralized decision-making organization will have more autonomy, thus being in a better condition to quickly adapt and respond to market changes. Decentralized decision-making will deeply depend on strong leadership support and on existing knowledge to make optimal decisions and organize the work.

Measures and evidence: Decision processes; Perceptions over decision making, autonomy and decentralization.

Methods and data sources: Interviews, Questionnaires, Analysis of Decision processes.

Table 107 - Description of the maturity levels for the Organizational Agility critical success factor "Decentralized decision-making".

Decentralized decision-making	
Level 0	Non-existent or no evidence.
Level 1	Decision making is centralized and heavily dependent on managers and leaders.

Level 2	Isolated examples of decentralized decision-making, but mostly originating in projects or highly technical areas.
Level 3	Decentralized decision-making seen in different areas of the organization. Difficulty in transferring decision making related with core strategies.
Level 4	Decentralized decision making is the actively promoted in different areas of the organization. New organizational capabilities that present technical challenges pave the way for decentralized decision making.
Level 5	New competencies on decision making are quickly transferred to departments and functional areas through a well-defined process. Results and feedback are used to revise the process.

Interdepartmental collaboration (4), (5)

(Jastroch, Kirova, Ku, Marlowe, and Mohtashami, 2011; Sangari, Razmi, and Zolfaghari, 2015)

Intra-organizational collaboration and inter-departmental integration are essential in promoting collaborative work and cooperative relationships, and will implicate on the capacity of the organization to provide the best solution first, avoiding turning speed into mistakes and thus losing time and other resources. Collaboration will also influence the effective communications between organizational units and the openness for team working within an organization.

Measures and evidence: Cross functionality in teams; Number of cross-functional and collaborative work projects; Number and typology of functions represented in a team; Number of different departments or sections represent in a team; Number and typology of roles present in a team; Team constitution process.

Methods and data sources: Interviews, Questionnaires; Analysis of cross-functional teams' constitution; Analysis of team's constitution process; Analysis of product and market results.

Table 108 - Description of the maturity levels for the Organizational Agility critical success factor " Interdepartmental collaboration ".

Interdepartmental collaboration	
Level 0	Non-existent or no evidence.
Level 1	Poor or no perceptions regarding the importance and benefits interdepartmental collaboration. No management structure or process to foster improvement.
Level 2	Initial efforts to foster interdepartmental collaboration. High resistance and/or lack of commitment to organizational collaboration.
Level 3	The organization takes efforts to promote awareness and change in behaviors in regards to interdepartmental collaboration. High impacting training topics are identified and structured in order to do this promotion consistently. Strong top management support.
Level 4	The organization focus not only on promoting better awareness towards interdepartmental collaboration, but also in sustaining already existent support.
Level 5	The organization has established metrics to track progress, measure and improve or adapt its efforts in promoting interdepartmental collaboration and in managing perceptions.



Manufacturing (or Development) Flexibility

Automation (3), (5)

(Gunasekaran and Yusuf, 2002; Vinodh, Devadasan, Reddy, and Ravichand, 2010)

Agile manufacturing promotes the use of technology systems capable of automatically performing or helping in asks traditionally executed by human beings, thus cutting production time, reducing human error or improving quality and accuracy. Automation can leverage manufacturing or support processes, from assembly to inspection to design. Automatization, however, demands investment not only in machinery but also in training and helping people integrating them in their daily jobs.

Measures and evidence: Investment in Automated systems; Use of automatized equipment and software; Automatization-related training.

Methods and data sources: Questionnaires, Interviews, Observation.

Table 109 - Description of the maturity levels for the Organizational Agility critical success factor " Interdepartmental collaboration".

Automation	
Level 0	Non-existent or no evidence.
Level 1	Process automation is poor and subject to availability. No management efforts to improve automatization or done with poor integration with the remaining processes of the organization.
Level 2	The organization has started to identify and metrics to foster and integrate automatization. Response is, however, still mainly reactive and dependent or needs promoted by new market demands.
Level 3	Organization starts to be proactive, identifying opportunities for further automation and predicting problems that can derive from it. Standardized metrics and planning. Training is provided to the workforce to help understand and integrate automatization tools.
Level 4	Strong investment and integration of automation in production and development processes. Advanced and standardized governance practices are in place, with a set of metrics defined and followed.
Level 5	Automation is systematically pursued across the different productive areas. People are well trained and help improve both automatization solutions and its integration with manufacturing processes.

Speed (3), (5)

(Carbonell and Rodriguez, 2006; Chen, Damanpour, and Reilly, 2010)

In fast-changing markets, speed is essential for managing innovation and make organization agile. Speed is worthless if it does not come to match the market requirements, but its correct use necessarily needs availability of resources, experience and clarity around goals. There are a series of tools and methods that allow organizations to improve speed and quality (SMED, JIT production, Rapid prototyping tools), but in order to use them the workforce needs to be trained.

Measures and evidence: Process speed and improvement metrics; Process improvement and revision methods; existence of speed enabling tools and methods.

Methods and data sources: Manufacturing process analysis; Interviews; Questionnaires; Shop floor visits.

Table 110 - Description of the maturity levels for the Organizational Agility critical success factor " Interdepartmental collaboration".

Speed	
Level 0	Non-existent or no evidence.
Level 1	Speed in manufacturing processes is limited and severely impacted by the lack of resources, methods and/or commitment of the workforce and leadership.
Level 2	Metrics and methods focusing on speed have been identified. Approach is still limited to a few areas.
Level 3	Tested methods and metrics have been implemented and allowed some improvement in terms of manufacturing/development process speed.
Level 4	Process speed is not only fostered but actively tracked. Metrics are defined and followed.
Level 5	Manufacturing process speed is seen as a relevant source for strategic advantage and is continuously monitored and revised in order to allow the identification of new opportunities and improve existing methods and approaches.

Flexibility and Reconfiguration (3), (5)

(EIMaraghy, 2005; Bernardes and Hanna, 2009)

Flexibility and reconfiguration allow organizations answer to market changes with timely, competitive actions and strategies. Flexibility and reconfiguration can be seen as a system's capability to rapidly change and adapt in face of sudden changes. A few of the approaches that allow manufacturing systems to do this include modular and cellular layouts, and flexible set-ups.

Measures and evidence: Process flexibility metrics; Manufacturing reconfiguration process metrics; Layout, machinery and manufacturing resource availability; Process improvement and revision methods; existence of speed enabling tools and methods.

Methods and data sources: Manufacturing process analysis; Interviews; Questionnaires; Shop floor visits.

Table 111 - Description of the maturity levels for the Organizational Agility critical success factor " Interdepartmental collaboration".

Reconfiguration	
Level 0	Non-existent or no evidence.
Level 1	Physical resources show low reconfiguration capabilities. No established processes to promote flexibility.
Level 2	Some opportunities for improving flexibility and reconfiguration have been identified and are being managed in isolated areas.
Level 3	Organizational wide approaches to manage and improve flexibility and reconfiguration in processes and operations. Most efforts are still reactive, and concern essentially resource management.
Level 4	Flexibility and reconfiguration are planned and are deployed through process and planning (such as the acquisition of new machinery or resource management).
Level 5	Flexibility and reconfiguration are strategic goal for improving agility in manufacturing processes. Strong support from the leadership and organization-wide integration and efforts to find constant improvement opportunities.



Process flexibility

Process concurrency (3), (5)

(Tatikonda, and Montoya-Weiss, 2001; Ni, Lu, Yarlagadda, Ming, 2007)

Process concurrency allows simultaneous in the processes and manufacturing engineering efforts. Process concurrency represents the degree to which different organizational functions simultaneously conduct project work, allow different tasks to be initiated in parallel with non-preceding actions and processes, integrating them and reducing lead times. One of the major challenges to concurrency is the difficult to create understanding and integrate the perceptions between functions or departments.

Measures and evidence: Analysis of processes; Analysis of Workflow; perceptions of the workforce and leadership regarding process concurrency.

Methods and data sources: Manufacturing process analysis; Interviews; Questionnaires.

Table 112 - Description of the maturity levels for the Organizational Agility critical success factor "Process Concurrency".

Process Concurrency	
Level 0	Non-existent or no evidence.
Level 1	Limited to a few areas. Lack of understanding of concurrency limits its deployment.
Level 2	Process concurrency is seen in in isolated cases. Evidence at organizational level is poor or absent. Poor understanding of process concurrency is still a problem.
Level 3	Best practices in process concurrency from projects or isolated areas are identified and deployed in different areas. Awareness of the importance of concurrency may still be limited.
Level 4	Standardized management process to foster process concurrency are in place. Metrics defined to control these processes and analyses the result of implementation approaches.
Level 5	Process concurrency is established across the organization. Mature level of management and integration of multiple processes. Metrics and feedback are used for improvement, with workforce engaged with these goals.

Process integration (5)

(Gunasekaran and Ngai, 2004; Sherehiy, Karwowski, and Layer, 2007)

The integration of critical functional areas with the help of advance manufacturing and design technologies and the alignment of strategies will foster organizational agility. Process integration will foster agility along the value and supply chains, in the information systems, and in the organizational communication. Process integration will also have a major role successfully engaging the workforce in agility-enabling technologies.

Measures and evidence: Integration along the value chain, Integration of supply chain processes; Degree of internal process integration; Degree of external process integration; Number of shared projects and processes with stakeholders.

Methods and data sources: Manufacturing process analysis; Supply and value chain analysis; Interviews; Questionnaires.

Table 113 - Description of the maturity levels for the Organizational Agility critical success factor "Process Integration".

Process integration	
Level 0	Non-existent or no evidence.
Level 1	Processes integration is ungoverned and <i>ad hoc</i> . Process owners or management show little involvement or support for the promotion of integration.
Level 2	The organization has started to identify and measures and benefits of promoting integration, actively initiating a management process. Processes integration is seen in isolated cases but is normally a reactive response to a negative event.
Level 3	A few standardized approaches for process integration, based on identified best-practices. Efforts focus on internal integration, with goals such as improving process speed or optimizing resources.
Level 4	Stable, result supported approaches allow the organization to start to look also at promoting external integration of its processes, involving customers, suppliers or other stakeholders. Process integration results are measured and controlled.
Level 5	Mature process integration capabilities, internally or externally. Processes integration and approaches are revised regularly in look for improvement.

Frequent Revision cycles (1)

(Kinny, 2004; Hill, Sinur, Flint, and Melenovsky, 2006)

Frequent revision cycles in manufacturing, business or support processes are essential to guarantee not only process flexibility and agility (processes need to be adapted continuously meet environmental shifts), but also in the scope of fostering alignment with the strategies of an organization.

Measures and evidence: Revision process and planned frequency; Number of process revisions; Integration of different revision cycles.

Methods and data sources: business, manufacturing and support processes analysis; Revision process analysis; Questionnaires; Interviews.

Table 114 - Description of the maturity levels for the Organizational Agility critical success factor "Frequent revision cycles".

Frequent revision cycles	
Level 0	Non-existent or no evidence.
Level 1	Process revision is unpredictable and unstable process; if existing, is as a reaction to a sudden or negative event.
Level 2	Project approach to process revision. Isolated to a few cases and areas, and still mostly reactive.
Level 3	Defined through standards, procedures, tools and methods for promoting processes revision. However, cycles are not completely defined, and different revision cycles can be observed across the organization without major integration.
Level 4	Process revision is frequent and methodology is well defined and supported in clear metrics. Revision cycles are not yet fully defined across the organization.
Level 5	Process revision cycles are well defined across the organization. Some process cycles may differ due to different needs in functional areas, but there are efforts to integrate revision cycles across the organization.

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New Product and Process Development

Newness (3)(5)

(Sarin and McDermott, 2003; Chen, Damanpour, and Reilly, 2010)

Newness measures the degree of difference between a new process or product and the processes and product previously developed by an organization. The capacity to manage this difference and close the gap between what is known by the organization and what is new relies on the experience and multidisciplinary of the team, the tools and methods available to analyze requirements, the capacity of learning and practically applying that knowledge.

Measures and evidence: Number of new processes; number of new products; Efficiency of new process; Marketing success of new products.

Methods and data sources: Product portfolio; Project Portfolios; Innovation Indexes; Process Portfolio.

Table 115 - Description of the maturity levels for the Organizational Agility critical success factor "Newness".

Newness	
Level 0	Non-existent or no evidence.
Level 1	The organization shows little to no capabilities in the management of newness. New products and process are characterized by high failure rates or and low productivity.
Level 2	A few isolated examples of teams able to manage new ness with some success. However, they cannot influence the rest of the organization.
Level 3	Development teams are capable of leveraging factors as the team's experience, multidisciplinary and learning abilities to cope with the uncertainty around new products and processes. Best practices are thus identified and promoted across the organization.
Level 4	Good organizational approach for the management of newness, including training. Strong knowledge base used to support to help the organization deal with the uncertainty around new products or processes.
Level 5	The organization shows a mature level in managing uncertainty in development. Newness is fostered as innovation in processes and products is seen as a key success factor in achieving strategic goals.

Complexity (4)(5)

(Swink, 2003; Arteta, Giachetti, 2004)

Organizations need to manage complexity efficiently in order to be agile. Complexity relates to a series of different levels of an organization: from organizational complexity, dealing with the structure, size and physical distribution of an organization, to product or process complexity, relating to the number of variables present when a product or process is being developed or revised. Complexity is related also with newness, and with the experience and characteristics of the team leading the project. The higher the amount of interdependencies in an organization, the greater the complexity in managing these processes, its resources and the communication.

Measures and evidence: Process interdependencies; Interdependencies management; Number of different functional areas involved in a project; Number of projects involving external stakeholders; Number of stakeholders involved in processes; number of different physical sites/ locations (organization or stakeholders) involved in the project; Perceptions on the technical complexity of project (team, project leaders, management and workforce).

Methods and data sources: Process Analysis; Project Portfolios; Interviews, Questionnaires.

Table 116 - Description of the maturity levels for the Organizational Agility critical success factor "Complexity".

Complexity	
Level 0	Non-existent or no evidence.
Level 1	Complexity is managed on an <i>ad hoc</i> basis, isolated in each area. Largely undocumented, there is evidence of tools or processes to manage it.
Level 2	The organization has started to identify capabilities and resource availability to actively manage complexity. Response is still mainly reactive.
Level 3	Best practices are identified and proactive efforts in place to help development teams to leveraging factors as the team's experience, multidisciplinary and learning abilities to cope with the increasingly complexity of new products and processes, and the uncertainty around them.
Level 4	Advanced practices for complexity management are in place. Metrics are defined and followed, information quality dashboards are in place. Initial integration of these approaches in processes with external stakeholders.

Level 5	Governance and management practices are considered mature and integrated for managing complexity both in internal and external projects. Information and measures are used in the scope of continuous improvement.
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Balance of project management methods (5)

(Boehm, 2002; Boehm and Turner, 2003)

While agile project management methods have gained a broad support in some industries – such as software development – other industries do not find the same level of fit with those methods. Mature organizations are capable of identifying the pros and con of each methodology, balancing different methods – waterfall, hybrid or agile – to find the best approach for each case.

Measures and evidence: Project management methodologies and plans; Interviews and discussions with project leaders and team members; Questionnaires.

Methods and data sources: Process Analysis; Analysis of project management planning and methods; Questionnaires; Interviews; non-participant observation.

Table 117 - Description of the maturity levels for the Organizational Agility critical success factor “Balance of project management methods”.

Balance of project management methods	
Level 0	Non-existent or no evidence.
Level 1	Traditional project management methods consistently used across the organization, with no evidence of an established promoting a balance with alternative methods. Changes in methodology are isolated, individually championed or driven by the need to react.
Level 2	Initial efforts to understand how project requirements, resources and goals may be fitted with different project management methods. Still limited to some areas or driven mainly by agile-motivated functional units (ex: IT or Software Development).
Level 3	Defined processes to help team identify the fitter approach(es) to a certain problem. Training provided to help team deal with integration and balancing do different methods. Still limited to a few organizational areas.
Level 4	Teams are able to define approaches to balance and integrate different project methodologies with bases on the specifications of the project.
Level 5	The organization shows a high capacity of searching, modifying and balancing project methodology approaches, customizing them to their needs and further looking for ways to improve and further develop their methods.



Technology and Information Systems

Use of technology (3)(5)

(Gunasekaran and Yusuf, 2002; Sambamurthy, Bharadwaj, Grover, 2003)

Agile manufacturing requires agile-enabling technologies such as machinery, automatization equipment and software or virtual machine tools. Besides manufacturing equipment, physically distributed manufacturing environments demand high level communication systems. In the scope of becoming agile, organizations rely more and more on information technologies such as Internet, electronic communication and data sharing systems to exchange information at various levels of manufacturing organizations.

Measures and evidence: Available tools for information sharing; In-site IT services and expertise; Technology readiness level; Production Machinery and Technology.

Methods and data sources: Process Analysis; Production Machinery and Technology; Available IT technology; Observation; Interviews; Questionnaires.

Table 118 - Description of the maturity levels for the Organizational Agility critical success factor “Balance of project management methods”.

Use of technology	
Level 0	Non-existent or no evidence.
Level 1	Limited use of technology as an enabling factor of production and operations flexibility. Low organizational support.
Level 2	Benefits and opportunities for the integration of technological tools have been identified in isolated cases. Initial efforts to take advantage of these opportunities are visible in some areas.
Level 3	Organizational level approaches to promote the use of technology and train the workforce accordingly. Efforts comprise management and implementation of new tools and physical resources but also the promotion of awareness. Initial level of training. Some efforts to benchmark internally.
Level 4	The outcomes of initiatives promoting the use of technology are measured and acted upon. The focus is not only in implementing new technological solutions but also in making them sustainable. Technological resources are not yet evenly spread across the organization, as its deployment is dependent on the success of these initiatives in pilot areas and the identification of best practices.
Level 5	The organization has established metrics to track progress and measure the impact of its activities in promoting awareness and use of technology. Technological resources are managed efficiently, integrated in the organization and its objectives and revised regularly.

Virtual enterprise (5)

(Arteta and Giachetti, 2004; Cao and Dowlatshahi, 2005)

Virtual Enterprises (VE) are defined as networks of organizations that join efforts in order to combine and potentiate competencies. It has been demonstrated that the development of virtual enterprise networks and the alignment between information technology and virtual organizations have a positive influence on an organization’s performance in an agile manufacturing environment.

Measures and evidence: Analysis of Virtual Enterprise networks, VE Projects; perceptions of VE implementation or management efforts. exploitation

Methods and data sources: Virtual Enterprise networks; Process Analysis; Interviews; Questionnaires.

Table 119 - Description of the maturity levels for the Organizational Agility critical success factor “Balance of project management methods”.

Virtual enterprise	
Level 0	Non-existent or no evidence.
Level 1	Limited, mostly theoretical efforts to understand and explore VE networks.
Level 2	Initial efforts to identify and assess VE opportunities. Response is still mainly reactive and limited to a few, non-strategic areas.
Level 3	Defined configuration for approaching the establishment of VE. By planning and deploying VE projects, the organization takes mostly advantage in terms of benchmarking and training.
Level 4	Advanced VE networks. The organization has established broad collaborative networks. Cost-benefit analysis and resources management are part of the VE efforts.
Level 5	The organization is highly mature and proactive in establishing and managing VE networks. Continuous integration and resource sharing/optimization, with stable alliances and collaborative networks.

Readiness for Connectivity and Digitalization (Industry 4.0) (3)(4)
 (Almada-Lobo, 2016; The Singapore Smart Manufacturing Readiness Index, 2017)

The advent of the 4th industrial revolution is driven by increased digitalization and connectivity. Organizations can improve their agility by taking advantage of new opportunities for leaner, connected and integrated processes. Eliminating waste and dependency from physical constraints (paperwork, etc.)

Measures and evidence: Number of projects related to Industry 4.0 challenges and necessary process changes; Number of teams with Industry 4.0 readiness-related goals; References to connectivity, digitalization, or Industry 4.0; Existence of established training courses; Number of employees engaging in Industry 4.0 related courses; Perceptions.

Methods and data sources: Process Analysis; Interviews and corporate documents analysis (reports, charters, posters, handouts, internal newspapers/magazines, etc.); text analysis: word frequency and patterns recognition; Questionnaires; Training plan and activities.

Table 120 - Description of the maturity levels for the Organizational Agility critical success factor “Balance of project management methods”.

Readiness for Connectivity and Digitalization (Industry 4.0)	
Level 0	Non-existent or no evidence.
Level 1	Limited, mostly theoretical efforts approach change in the scope of embracing higher degrees of connectivity and/or digitalization in the organization.
Level 2	Benefits and opportunities of the Industry 4.0 wave are identified in some areas or projects, or even recognized at organizational level. However, no structure approach is set, and efforts, if any, are marked by great variability. Lack of expertise to drive efforts.
Level 3	Best practices are identified, but methods, tools and approaches are still variable. Leadership and management have an active role in sponsoring change initiatives but are largely dependent on experts or external stakeholders. Initial benchmarking efforts.
Level 4	Organizations standards for change management projects and initiatives in the scope of connecting and digitalizing the organization are defined. Formal training is established and promoted in line with the deployment of tools and technology. Broad organizational alignment.
Level 5	The organization excels in driving change initiatives and projects, and the same is visible in the scope of Industry 4.0. Change initiatives are aligned with the organizational goals, and data and feedback are gathered to improve tools, training and workforce capabilities.



Agile Strategic planning

Leadership Unity (5)

(Doz and Konosen, 2008; Lewis, Antonopoulos, and Smith, 2014).

The ability to change will be highly impacted by the agreement of those making decision. If the Leadership cannot agree on what path to take, how to react to a sudden event, and to generally make bold decision fast. Strategic decision in an agile organization cannot be delaying by personal or departmental insecurities, or organizational politics. Speed and convergent, homogeneous thinking between the top leadership are essential – concepts that can easily be influenced by the cultural context and strategical goals.

Measures and evidence: Perceptions over change on top leadership; convergence in thinking at top leadership level; Decision processes.

Methods and data sources: Process Analysis; Interviews, Questionnaires.

Table 121 - Description of the maturity levels for the Organizational Agility critical success factor “Balance of project management methods”.

Leadership Unity	
Level 0	Non-existent or no evidence.
Level 1	Leadership unity is not actively promoted, and is negatively influenced by organizational silos, leading to delayed action taking in face of disagreements and organizations politics.
Level 2	There is an initial plan for managing leadership alignment, through efforts focused on top level, teamwork and silo reduction, and focus on organizational goals. Efforts are still done in a reactive way.
Level 3	Organization takes efforts to tear down organizational silos at top level and promoting a broader organizational view to the top management level team. Departmental goals are still rigid and do not adapt to allow easier alignment between leaders.
Level 4	Strong management unity and alignment, with the organization actively measures and considers the resource availability and impact that a decision might have, being flexible in departmental goals to low strategic organizational objectives to be pursued.
Level 5	The organization actively was able to promote high level of leadership unity and plan the future to keep of improve these levels. Leadership and management development programs support intra-organizational rotation to develop in the future leaders a broader organizational view; departmental goals and measures are followed and balanced in order to better understand how to improve the decision process and reduce trade-off between local and organizational goals.

Fact-based decision making (1) (2)

(Vesset and McDonough, 2009; Alberts, 2011)

Fact-based decision making is essential in a world where fast decision making and strategy planning are essential not only to gain competitive advantage but even to survive. Making decision on poorly reliable data can lead to severe mistake that will cost money and resources, but most importantly the scope of the speed of strategy development, deployment and alignment, will cost time. Organizations need to focus on the quality and reliability of the information it collects, having an orientation towards facts and making decisions at the appropriate moment and guaranteeing the best impact of information on decision-making.

Measures and evidence: Information systems; Decision Makings Processes; Information Quality Metrics and Methods.

Methods and data sources: Analysis of Documentation (covering processes, metrics definition and revision and methodologies); Interviews, Questionnaires.

Table 122 - Description of the maturity levels for the Organizational Agility critical success factor “Fact-based decision making”.

Fact-based decision making	
Level 0	Non-existent or no evidence.
Level 1	Behaviors are focused on attaining results and solving problem; If existent, processes for identifying reliable data sources and promoting a fact-based decision making are unpredictable and unstable, highly isolated and infrequent.
Level 2	An idea of fact-based decision making starts to transpire into the discourse, but its practical application is still limited. Processes are characterized by a project approach, and there are limited resources and capabilities for its implementation.
Level 3	There is some level of formalization around information quality and fact-based decision processes, measures and resources. Managers and leaders are increasingly involved and help set the direction. Initial level of benchmarking (mostly internal or within business group).
Level 4	The use of factual data and the quality of information are well-defined and measured. Processes are controlled qualitatively, through statistical or other quantitatively measures. Organization-wide integration and commitment.
Level 5	The organization has achieved a high level of maturity and commitment with identification, treatment and use of factual data in decision making process. It is committed to find improvement opportunities in order to responded to adversities from environment regarding counter-information or poorly verified data.

Product succession planning (1)

(Gehani, 1995; Bottani, 2010; Conforto, Salum, Amaral, Sila and Almeida, 2014)

Product succession planning is an essential feature for agile organizations. A single product may have a good market standing, with a large share and advantage over the competition, but that is not enough to ensure long term success. Organizations that rely on one product and do not plan its succession or promote innovation risk losing all ground as new solutions reach the market and become competitors.

Measures and evidence: Product succession planning, Number of new products launched; Number of versions of each product; Evolution of the product portfolio.

Methods and data sources: Interviews and corporate documents analysis (reports, charters, posters, handouts, internal newspapers/magazines, *etc*): text analysis: word frequency and patterns recognition; Questionnaires; Analysis of archival and historical records.

Table 123 - Description of the maturity levels for the Organizational Agility critical success factor "Product succession planning".

Product succession planning	
Level 0	Non-existent or no evidence.
Level 1	The organization develops new products mostly in a reactive manner, responding mainly to demands from its customers, and taking no competitive advantage of its product development capabilities.
Level 2	Product succession planning, where existent, is characterized by a project approach, with deep influence of stakeholders: product succession is mostly customer driven.
Level 3	The organization has defined the core aspect of its products and thus worked on its product succession planning. However, the influence of customers is still strong and may cause significant changes and plan deviations.
Level 4	Product succession planning processes and their results are controlled with basis on market results, such as sales, orders, quality and customer satisfaction. Higher integration of related processes; continued use of industry benchmarking.
Level 5	Product succession planning processes and results are continuously revised, with focus on improvement. Results lead to measures that are integrated across the organization and aligned with corporate goals. Industry independent benchmarking use in the scope of promoting continuous improvement.



Change Management

Strategic Sensitivity (3)

(Doz and Konosen, 2008; Brown, 2002; Thomas, Whitman, and Viswesvaran, 2010)

The anticipation and planning for changes, or "Strategic Sensitivity", will impact the ability of an organization to be agile at multiple levels, from manufacturing or technology to Human Resource Management. Organizations need to keep up with the current available industrial technologies and methods in order to identify change trends and quickly react, or, if possible, to be proactive in managing them and leading the change. At the same time, companies would be on the lookout for future market needs, HR skills, and changes in labor laws, regulations or demographics. Identifying, anticipating and planning for these changes will allow a much quicker response and give them strategic higher ground.

Measures and evidence: Perceptions over change; Use of tools, processes and methods for prioritization.

Methods and data sources: Analysis of Documentation (covering processes, metrics definition and revision and methodologies); Interviews and corporate documents analysis (reports, charters, posters, handouts, internal newspapers/magazines, *etc*): text analysis: word frequency and patterns recognition; Questionnaires; Analysis of archival and historical records.

Table 124 - Description of the maturity levels for the Organizational Agility critical success factor "Strategic Sensitivity".

Strategic Sensitivity - Anticipate and plan for changes	
Level 0	Non-existent or no evidence.
Level 1	Little or no change management is applied, as the organization does not have the resources or capabilities to identify and anticipate change.
Level 2	Elements of change management are applied in isolated projects, where the level of expertise allows anticipation and contingency planning to face change. At this project level, there is a large variation of change management practices exists between these projects.
Level 3	Standard methods, engagement and training systematics, and tools are available and used often in projects or the areas most exposed to change. At organizational level, response is still mostly reactive.
Level 4	Strategic sensitivity is sustained in metrics. Formal training is in place in areas with strategic activities more exposed to change. Broad organizational alignment, although some resistance and lack of understanding/training can be observed in some areas.
Level 5	The organization shows high levels of competency in anticipating and planning for change. Initiatives are aligned with the organizational goals. Data and feedback are gathered to improve tools, training and capabilities to improve change initiatives.

Effective initiation and prioritization of change (1)

(Dutton and Duncan, 1987; Safar, Defields, Fulop, Dowd, and Zavod, 2006; Baramichai, Zimmers Jr, and Marangos, 2007)

Change initiatives cannot be left only on paper after being designed and planned. Organizations must deploy them, effectively initiating change efforts and engaging the organization with them. At the same time, the number of change initiatives that an organization needs to deploy must be above its current resource capacity, or collide with other activates. In this sense, it is essential also to prioritize these efforts, considering the existing imitations, possible resistance from the workforce and the strategic needs, opportunities and trade-offs that come from these decisions. The same is valid in planning and managing agile projects, which will have similar prioritization challenges at a smaller scale.

Measures and evidence: Number of change initiative deployed; Priority planning and scheduling of change initiatives; Perceptions of Middle and line managers over initiation and prioritization of change efforts.

Methods and data sources: Analysis of Documentation (covering processes, metrics definition and revision and methodologies); Interviews; Questionnaires; Analysis of archival and historical records.

Table 125 - Description of the maturity levels for the Organizational Agility critical success factor "Effective initiation and prioritization of change efforts".

Effective initiation and prioritization of change efforts	
Level 0	Non-existent or no evidence.
Level 1	Change efforts are done in an unpredictable and unstable process. The processes for driving change efforts are poorly controlled and reactive, and when existent, isolated from the rest of the organization.
Level 2	Effective initiation and prioritization of change efforts is seen in controlled environments and group, such as project teams or certain, more independent and empowered business units. Process definition is mainly centered around experts and experienced people.
Level 3	Processes have begun to be seen at an organizational level, and defined through standards, procedures, tools and methods that were identified from best practices. Process success still relies on the inputs from the experts in teams and functional areas which have experience in initiating and planning change efforts.
Level 4	Processes for initiating and prioritizing change efforts are set and measured qualitatively and quantitatively, with defined metrics to calculate the impact and benefits of changes to process or products.
Level 5	The organization is able to effectively initiate and prioritize change efforts, being highly proactive in responding and aligning market needs and strategic goals. Process performance is continuously revised to continuously improve.

Resource fluidity (5)

(Shafer, Dyer, Kilty, Amos, and Ericksen, 2001; Power, Sohal, and Rahman, 2001; Doz and Kosonen, 2008)

An efficient management of resources is essential to allow organizations to be prepared and answer any changes in the market. Knowing its resource limitation is essential for organizations to be able to effectively plan and implement strategies and is crucial for a correct prioritization of change efforts. The allocation of resources in another essential aspect of their management: project teams' success and agile capabilities will be highly dependent on the availability and dedication of resources.

Measures and evidence: Resource management systems, Resource allocation processes, Integration of resource management and allocation processes, Perceptions over resource management; Projects regarding resource limitations and management.

Methods and data sources: Analysis of Documentation (covering systems, processes, metrics definition and revision and methodologies); Interviews; Questionnaires; Analysis of archival and historical records.

Table 126 - Description of the maturity levels for the Organizational Agility critical success factor "Resource fluidity".

Resource fluidity	
Level 1	Resource management is done in an <i>ad hoc</i> manner, being highly reactive, undocumented and based on poorly defined unpredictable processes.
Level 2	The organization has started to identify and measures capabilities and resource availability, actively initiating a management process. Response is still mainly reactive, and large limitations subside.
Level 3	Resource availability is defined and controlled, but limitation still impact performance. To overcome this, the organization starts to be proactive, predicting resource limitations and taking efforts to anticipate or address them.
Level 4	The organizations developed clear efforts to manage and overcome possible resources constraints and limitations, as human resources and talent are central to its strategy.
Level 5	Practices in the management of resources are considered mature and integrated, and the organization is able to plan, acquire or promote flexibility amongst its resources to avoid impacting its performance. Information and measures are used in the scope of continuous improvement.

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Information and Communication Strategy

Intensified communication (4), (5)

(Kotlarsky, Oshri, Kumar, and Hillegersberg, 2008; Almeida, Conforto, Silva, and Amaral, 2012)

Intensified communication will lead to further integration, helping different functional areas balance or merge objectives. By promoting a better, more intense communication, the number of conflicts is reduced and promote knowledge-sharing activities, promoting agility in development processes.

Measures and evidence: Communication processes; Perceptions over communication between departments and functional areas; organizational structure and rigidity; information sharing.

Methods and data sources: Questionnaires, Interviews; Analysis of communication processes; analysis of communication systems; analysis of organizational structure.

Table 127 - Description of the maturity levels for the Organizational Agility critical success factor "Intensified communication".

Intensified communication	
Level 1	Communication processes are rigid and create barriers to communication. Poor perceptions exist within the organization regarding communications processes.
Level 2	The organization has identified metrics and is taking efforts to promote process revision that allow to intensify the communication.

Level 3	Some definition in metrics and approaches has allowed the revision processes for promoting intensified communication. Different levels of reach are still found in some functional areas.
Level 4	Well defined but flexible communication processes allow to promote communication speed and agility, improving the amount and quality of information.
Level 5	The organization shows a high level of commitment at all level with improving and intensifying communication. Metrics are used not only to control and follow up communication processes performance, but also to revised them and look for further improvement.

Easy access to information (1)

(Bajgoric, 2000; Conforto, Salum, Amaral, Sila and Almeida, 2014)

Information is essential for timely, fact-based decisions. The amount of information is inversely proportional the uncertainty: the more information people have, the more the uncertainty around a new situation or the development of a new process or product. This information must be of easy access, allowing people in the organization to search and collect it rapidly and foster an agile response to new situation. Technology and information systems have a strong impact in making this access simples and easy.

Measures and evidence: Perceptions over easy access to information; Organizational communication infrastructure; availability and use of corporate communication means (reports, charters, posters, handouts, internal newspapers/magazines); availability and use of IT resources for communication and information.

Methods and data sources: Organizational Structure; Analysis of Documentation (covering processes, metrics definition and revision and methodologies); Interviews and corporate documents analysis (reports, charters, posters, handouts, internal newspapers/magazines, etc): text analysis: word frequency and patterns recognition; Questionnaires; Analysis of archival and historical records.

Table 128 - Description of the maturity levels for the Organizational Agility critical success factor "Intensified communication".

Easy access to information	
Level 1	Access to information faces severe structural, process and technological barriers, preventing a timely, fact-based decision-making and the promotion and sharing of agile strategies.
Level 2	Information availability is optimized or made easier in isolated cases, normally associated with core strategic projects.
Level 3	The organization starts to be proactive and has taken an effort to promote an easy access to information, creating processes and training workers to search and collect it rapidly in the scope of promoting timely, fact-based decisions.
Level 4	The organization has defined metrics to promote and assess the easiness of information access at different organizational levels.
Level 5	The organization has well-established process metrics and tools/technology to ensure the continuous promotion easy access to information, allowing people in the organization to search and collect it rapidly and foster an agile response to new situation. Technology and information systems have a strong impact in making this access simples and easy.

Open information sharing (4)

(Li, Lin, Wang, Yan, 2006; Olausson, and Berggren, 2010)

Information sharing helps to reduce uncertainty and to plan and prioritize change and agile-related activities. Information sharing strategy will be essential in managing these objectives, allowing departments to closely work together and to cut time and reduce organizational silos, thus cutting redundant tasks in daily activities and project. This can be done through the promotion of regular meetings where information is shared, activities are synchronized, and action plans are discussed.

Measures and evidence: Perceptions on information processes; Availability and use of information and communication systems and tools; Integration of external stakeholders in the communication processes.

Methods and data sources: Analysis of Documentation (covering internal and external processes, metrics definition and revision, and methodologies); Interviews and corporate documents analysis (reports, charters, posters, handouts, internal newspapers/magazines, etc.): text analysis: word frequency and patterns recognition; Questionnaires.

Table 129 - Description of the maturity levels for the Organizational Agility critical success factor "Intensified communication".

Open information sharing	
Level 1	Non-existent. There is no awareness of the importance of sharing information, perpetuating the existence of silos. No defined or planned efforts to train the workforce.
Level 2	Limited awareness of the benefits of promoting information sharing, especially at lower organizational levels. Silos and organizational structure limit information sharing between departments and sections. Limited information sharing may lead to redundant work.
Level 3	The organization takes efforts to promote awareness and change behaviors in terms of information sharing. High impacting training topics are identified and structured in order to promote awareness consistently. Strong involvement and support from top organizational levels leads to information campaigns to promote information sharing.
Level 4	Information sharing is recognized as an important effort by most of the organization. The organization has strong capabilities to measure the awareness around the importance of information sharing, and to identify problems related with lack of information sharing.
Level 5	Strong organizational focus on information sharing, being recognized by most of the organization as a competitive advantage. Well defined process, training and regular revision ensure high performance of information sharing.

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Appendix V - Assessment Results: Enablers and Critical Success Factors

In a research project that includes the collection and treatment of considerable amount of qualitative data and that relied heavily in a qualitative analysis, important insights can still be supported in the form of a quantitative assessment. Accordingly, the maturity levels defined in appendixes II, III, and IV are used to quantitatively assess, present and discuss the results. The assessment scores, based on the calculation described in Chapter 4, evaluates, for each organization, the existing level of maturity in the development of organization capabilities of Operational Excellence, Organizational Agility, and the development of a cultural orientation towards Excellence.

In this appendix, the assessments cores for each of each of the organizations studied, A to J.

Table 130 - **Organization A - Organizational Capability Assessment - Operational Excellence.**

Enablers	Critical Success factors	Score	Assessment	Score
Leadership and Management Commitment	Sustainability of excellence	4	Strong leadership commitment to operational excellence, evident in the discourse and official communication of the organization. Emphasis on the internal development of leaders helps to share this vision to the management level, but silos barriers, and resource limitations limit this alignment the top levels of the organization.	3.33
	Leadership development	3		
	Silo reduction	3		
Workforce Engagement	Suggestions and ideas programs	4	The workforce, especially at associate level, has limited engagement in the initiatives to promote and develop operations excellence. The potential for engagement is poorly explored, and the motivation of the associates is not actively promoted. There are a few channels and initiatives to encourage further engagement of the workforce, but with reduced outcomes and little trust from the associates.	3.00
	Managing the potential for engagement	2		
	Motivation, reward and recognition	3		
Learning Organization	Training Plan	3	Several aspects of a learning organization are seen at the leadership and management levels, but are limited within the associates' group. At this level, any evidence of learning and development beyond the training plan is unstructured and informal.	3.25
	Mentoring and Coaching	3		
	Recruitment & succession	3		
	Talent management (mgmt.)	4		
Workforce needs and expectations	Satisfaction over benefits	3	Budget limitations impact the ability to promote a broader set of benefits. Health and safety are a concern, with poor scores in a series of indicators. Several actions have been in place to improve awareness and results, but yet with limited impact. Teamwork is strongly promoted by managers and leaders, but its practice is assessed poorly by the workforce.	3.00
	Health, Safety & Hygiene	3		
	Teamwork	3		
Value Chain	Supply chain integration	4	The organization promotes a close value chain and strong integration with its stakeholders. It involves stakeholders in the process design, being highly focused on the creation of value. Customer relationship management efforts are distributed by functional area, but lack integration between them.	3.75
	Focus on value creation	4		
	Customer relationship mgmt.	3		
	Stakeholders involvement in process design	4		
Product and Market Development	Design for manufacturing	3	The activities of the organization are closely tied to the markets accessible through its stakeholders. It has started to develop efforts to enter new markets, but still at an initial level of commitment and proficiency. New areas/products show some focus on design for usability and the promotion of cross functional integration, but with limited influence in the practices of the organization as a whole.	3.00
	Stakeholder participation in product design	3		
	Cross functional integration	3		
	Market development	3		
Quality Systems	Quality assurance and error proofing	4	Strong use of quality tools and methods, with some degree of integration, especially within departments/section boundaries. Quality management is promoted at higher levels, but is deploy inconsistently across the organization. Emphasis on preventive maintenance, leading to a more effective control of processes and a reduction of maintenance downtime.	3.67
	Maintenance Engineering	4		
	Quality Management	3		
Mgmt., control and optimization	Process Revision	4	Standardized approach to process revision, with defined protocols, cycles and goals, and regular use across the organization. Integrated with the principles of lean management, helping to identify and eliminate wasteful and redundant tasks. In contrast, there is little quantitative measurement and control of processes. Challenges in managing capacity due to resource limitations.	3.50
	Lean Management	4		
	Process control and optimization	3		
	Scheduling and capacity management	3		
Process assessment & data validity	Data Reliability and Fact Driven Decision	3	Lack of quantitative management affects the ability of the organization to make improvement decisions in several process. However, it has well established systematics to promote qualitative self-assessment, taking also good advantage of networking and benchmarking opportunities.	4.00
	Benchmarking	5		
	Self-assessment	4		
Strategy Alignment	Process orientation	3	The focus on Organizations Excellence is insulated at the top organizational levels. Process orientation and alignment with the strategy start to fade already at middle management level, as the associates start to focus more on local activities and lack an integrated organizational perspective on quality or excellence.	3.00
	Focus on organizational excellence	3		
	Organizational strategy alignment	3		
Strategy Development	Strategic objectives definition	4	A multi-year strategic plan helps the organization set its long-term strategic goals, although an annual revision is promoted. Systems thinking and the focus on Operational Excellence are constrained to the leadership and top management levels, or to a few departments and sections.	3.33
	Strategy development	4		
	Systems thinking	2		
Strategy planning and deployment	Deployment action plan	3	The annual strategic revision helps to establish an action plan for strategy deployment. Strong commitment to strategy deployment observed at leadership and top management levels. Resource limitations and poor strategic alignment difficult the ability to plan for contingencies and to allocate resources.	2.67
	Contingency planning	2		
	Resource allocation	3		
Org. Com. Organizational Communication	Strategy communication	4	Strategy communication is strongly promoted at top levels, making use of the several available channels. Top down communication processes are well established, but processes to support communication in the inverse direction need development.	3.50
	Communication processes	3		
Assessment score – operational excellence				3.31

Table 131 - **Organization A** - Organizational Capability Assessment – Organizational Culture (orientation to Excellence).

Enablers	Critical Success factors	Score	Assessment	Score
Principles	Values and beliefs	3	The mission and vision the organization focus above all on promoting environmental sustainability. Connection between values, beliefs and norms and operational excellence is mostly seen in the leadership and top layers of the managers' group.	2.67
	Norms	3		
	Vision and mission	2		
Practices	Use of quality tools	4	Quality tools are used throughout the organization, but different levels of engagement and commitment are seen, namely between operational sections and organizational levels. There are some initiatives focused on the definition and sharing of the organizational culture, but differences subsist regarding the understanding of the culture and the way associates (self-)relate to it.	3.25
	Engagement with excellence	3		
	Commitment to excellence	3		
	Commitment to organizational culture	3		
Behaviors	Role of leaders	5	There are clear differences in the behaviors of different groups. Leaders and top management show a stronger orientation towards operational excellence, but this orientation starts to fade at middle management and is low at the associate level. Behaviors are highly irregular, and in certain groups cannot be predicted. Because of this reality, all remaining factors are affected. Duration is variable, being repeatable in certain cases, but unstructured in others. Intensity has expanded from individual to local level, but the scope is still limited to a few areas.	3.14
	Role of managers	3		
	Role of associates	3		
	Frequency	2		
	Duration	3		
	Intensity	3		
	Scope	3		
Artifacts and Creations	Built environment	3	The culture is present in many aspects of the daily life. Most structures and artifacts observed showed a clear connection with the organization's principles. The presence of excellence is variable. It is observable in some of these artifacts an in the official communication, but does not influence the stories and symbols of the organization.	3.33
	Internal communication and media	4		
	Stories, symbols and heroes	3		
Assessment Score – organizational culture orientation				3.10

Table 132 - **Organization A** - Organizational Capability Assessment – Organizational Agility.

Enablers	Critical Success factors	Score	Assessment	Score
Orientation and Work Environment	Agile mindset	2	Agility is yet insufficiently present in the organization, with little evidence of an agile mindset or work environment. Awareness on the importance of organizational agility is seen mostly at leadership level or in a few, isolated projects. Collaborative work exists, but silos and barriers are a challenge.	2.25
	Agile-style work environment	2		
	Collaborative work	3		
	Adequate reward for agile use	2		
Agile Resources and Capabilities	Development of new capabilities	2	The development of new capabilities is limited to a few areas and remains isolated from the rest of the organization. This means that any developed agile-related talent and knowledge stays local and is restricted from other areas. The lack of evidence of job rotation systems, together with the existing barriers and limitations to collaborative work, further expose this problem.	1.75
	Talent to support agility	2		
	Knowledge management	2		
	Job rotation systems	1		
Process and Project Team	Team dedication	3	The organization has been involved in a series of different projects, with these experiences providing enough know-how for managing team resource characteristics (dedication, experience) and autonomy. This diversity of projects has also prompted the multidisciplinary of the teams.	3.25
	Autonomy and empowerment	3		
	Integration/ cross-functionality	4		
	Team experience	3		
Organizational structure	Promoting horizontal structure	2	The organization structure is rigid, and the decision-making process is centered around the top management and leadership levels. Despite evidence of groups or units that were given more autonomy and decision-making power over their activities, examples are always observed within a project scope.	2.33
	Decentralized decision-making	2		
	Interdepartmental collaboration	3		
Manufacturing (development) flexibility	Automation	3	There is clear evidence of a pursuit of further automation in production processes. The major focus on processes is related to quality, but the current level of development leads speed, flexibility and reconfiguration to be considered as secondary goals.	2.33
	Speed	2		
	Flexibility and reconfiguration	2		
Process flexibility	Process concurrency	3	Clear evidence of the focus on quality and continuous improvement of processes. Internal teams were created to promote the continuous revision and enhancement of processes. However, these efforts differed in approach, reach, and engagement of the workforce at different levels.	3.00
	Process integration	3		
	Frequent revision cycles	3		
New Product and Process Development	Newness	3	Despite an increase in newness and complexity, innovation on products or processes still falls within the traditional scope of the organization. A major opportunity for improvement is to promote a better integration of agile project management methods, so far isolated to a few areas of the organization.	2.33
	Complexity	3		
	Balance of project management methods	1		
Technology and Information Systems	Use of technology	2	The use of high-end technology and the focus on connectivity and digitalization sees a huge potential for improvement. Leadership shows some proactivity in embracing new technologies, but needs to better plan and deploy them on its processes, both administrative and operational. Virtual networks are promoted.	2.33
	Virtual enterprise	3		
	Readiness for connectivity and digitalization	2		
Agile strategic planning	Leadership unity	4	Strong leadership unity, aware of the importance of promoting agility in changing markets. Emphasis on facts, but incomplete information sources and indicators impact decision-making and product succession plans.	3.33
	Fact-based decision making	3		
	Product succession planning	3		
Change Management	Strategic sensitivity	2	Despite the awareness and orientation of top leadership towards the need to change and adapt to the markets, the deployment of such strategic sensitivity and the effective prioritization of change efforts are challenges. Resource fluidity is limited due to availability and budget constraints.	2.00
	Effective prioritization of change	2		
	Resource fluidity	2		
Agile information & communication strategy	Intensified communication	3	While the organization is efficient in communication its strategic and operational goals to external stakeholders, internally there seems to be some difficulties in passing information between departments or organizational levels.	3.00
	Easy access to information	3		
	Open information sharing	3		
Assessment Score – organizational agility				2.54

Table 133 - **Organization B - Organizational Capability Assessment - Operational Excellence.**

Enablers	Critical Success factors	Score	Assessment	Score
Leadership and Management Commitment	Sustainability of excellence	5	Leadership sees the focus operational excellence as part of the cultural matrix of the organization. Evidence of efforts to identify, train and develop the people that have a fitting profile to hold leadership positions, with several examples among current managers. Silos are actively tackled by promoting a close leadership team, although local tensions may be visible between the associates in different departments.	4.67
	Leadership development	5		
	Silo reduction	4		
Workforce Engagement	Suggestions and ideas programs	5	The organization has very well-structured programs to promote the engagement of the workforce. Although the vast majority of workers trusts and participates in these programs, there are some concerns amongst the associates regarding the real impact of these programs. In the same sense, the management of motivation and the use of reward and recognition should be reviewed, as there is evidence of a growing disengagement that should be addressed.	4.33
	Managing the potential for engagement	4		
	Motivation, reward and recognition	4		
Learning Organization	Training Plan	4	Training plans are well defined, and each role will have a matching plan according to its functions. There is a coaching period for all new associates, supporting new recruitments as they join the organization. Often, replacing an associate is a long and demands extra support from the teams. Absenteeism and sick leaves have limited the participation in training activities. Retaining talent is often an issue.	3.75
	Mentoring and Coaching	4		
	Recruitment & succession	4		
	Talent management (mgmt.)	3		
Workforce needs and expectations	Satisfaction over benefits	3	Workforce needs and expectations are measured consistently. Most associates have the perception that benefits have been decreasing in the past few years, and feel especially penalized due to the increasingly complexity that impacts the workload and teamwork. Very well developed and deployed health, safety & hygiene systems.	3.33
	Health, Safety & Hygiene	4		
	Teamwork	3		
Value Chain	Supply chain integration	5	The company has a clear focus on value creation, aiming at developing innovative products that provide the best driving experience. Stakeholders are integrated in process design, both for operations (strong supply chain integration) and production. Customer Relationship management is supported by multi-functional teams with people from different areas, but could be better integrated.	4.5
	Focus on value creation	5		
	Customer relationship mgmt.	4		
	Stakeholders involvement in process design	4		
Product and Market Development	Design for manufacturing	4	Strong promotion in design for manufacturing, with the integration of customers and suppliers in the design and development of parts and products. Cross-functional teams support these development activities. Centralized, but well developed and managed practices for market development.	4
	Stakeholder participation in product design	5		
	Cross functional integration	4		
	Market development	4		
Quality Systems	Quality assurance and error proofing	4	Quality is embedded in the organization, showing high maturity levels in the use of quality methods, tools and maintenance. <i>Org. B</i> is concerned with ensuring maximum quality in its products and services, and Quality Management is the philosophy driving most of the organization efforts of the organizations.	4.33
	Maintenance Engineering	4		
	Quality Management	5		
Mgmt., control and optimization	Process Revision	4	The organization has well-developed process control and optimization systematics, adapting the principles and practices of continuous improvement and excellence to its reality and requirements. The revision of processes is common in the organization, with a well-established method and several initiatives to promote it. The organization has been able to maintain good level of capacity management, although some limitations in calculating capacity and following the production schedule are being observed with increased regularity.	4.5
	Lean Management	5		
	Process control and optimization	5		
	Scheduling and capacity management	4		
Process assessment & data validity	Data Reliability and Fact Driven Decision	4	Data driven decision are made at higher levels, with a system for collecting data being well implemented. Process assessment is an important source of data. Self-assessment practices are well established and based on internal audits and the use of recognized external frameworks. Benchmarking activities are increasingly common.	3.67
	Benchmarking	3		
	Self-assessment	4		
Strategy Alignment	Process orientation	5	The repeated engagement in quality and excellence programs, crowned by international recognition, provides strong sense and meaning to these efforts, helping an already highly quality motivated and oriented organization to recognize the benefits of excellence. In this scope, process orientation is evident, and there is strong strategical alignment across the organization, even without direct engagement.	5.00
	Focus on organizational excellence	5		
	Organizational strategy alignment	5		
Strategy Development	Strategic objectives definition	4	Strategic targets at organizational level are based on a series of measures, although part of it is influenced by the external metrics and objectives of the multinational group. Internally, there are efforts to balance the strategic goals at organizational level with those at local level. Systems thinking observed mostly at higher levels.	4.00
	Strategy development	5		
	Systems thinking	3		
Strategy planning and deployment	Deployment action plan	5	Policy deployment is deployed step-by-step throughout the organization, with clear follow up metrics and integration of sectional, departmental and organizational goals. Growth in production is having a strong impact in the organization, affecting contingency planning and resource allocation.	4.33
	Contingency planning	4		
	Resource allocation	4		
Org. Com. Organizational Communication	Strategy communication	3	The organization has well-established processes to communicate the strategy. However, perceptions among associates are low. Questionnaire results showed they understand and are committed to the strategy, but feel that it is not communicated well enough, and feel distant from the strategy making process.	3.50
	Communication processes	4		
Assessment score – operational excellence				4.17

Table 134 - **Organization B** - Organizational Capability Assessment – Organizational Culture (orientation to Excellence).

Enablers	Critical Success factors	Score	Assessment	Score
Principles	Values and beliefs	4	Associates feel excellence as one of the strongest aspects of their culture. Even when not directly involved in certain excellence initiatives, they still feel responsible for helping to achieve the excellence goals of the organization. Values, beliefs and norms transpire this concern with quality and promote behaviors that help ensure it.	4.33
	Norms	4		
	Vision and mission	5		
Practices	Use of quality tools	5	The focus on superior performance and high-quality products drives the practices of the workforce, and supports operational excellence. A number of associates recognize that they did not directly participate in certain excellence initiatives, but show further interest in participating in them.	4.50
	Engagement with excellence	4		
	Commitment to excellence	4		
	Commitment to organizational culture	5		
Behaviors	Role of leaders	5	Quality and operational excellence truly are part of the organizational culture, and behaviors and beliefs regarding quality are strong amongst the workforce. Most associate feel that excellence is made every day in their daily tasks. Leaders are fully involved in motivating people and making quality and excellence a continuous part of the culture. Managers are involved in the promotion of excellence, but are increasingly forced to focus on more local levels challenges that are a result of the growing complexity and innovation in products and operations.	4.29
	Role of managers	3		
	Role of associates	4		
	Frequency	5		
	Duration	5		
	Intensity	4		
	Scope	4		
Artifacts and Creations	Built environment	4	Many of the stories and symbols have a relation with quality and performance excellence, and "heroes" are normally highly quality oriented - anyone that is able to take performance to the next level is recognized within the culture. Excellence is an indissociably part of the organization, influenced by the values shared by its founder.	4.33
	Internal communication and media	4		
	Stories, symbols and heroes	5		
Assessment Score – organizational culture orientation				4.36

Table 135 - **Organization B** - Organizational Capability Assessment – Organizational Agility.

Enablers	Critical Success factors	Score	Assessment	Score
Orientation and Work Environment	Agile mindset	4	The ongoing transformation required supporting a more agile mindset. Collaborative work is promoted by the organization, but sees low perceptions amongst the workforce, often a result of tensions between goals at local level. Reward for the use of agile is still limited.	3.25
	Agile-style work environment	3		
	Collaborative work	3		
	Adequate reward for agile use	3		
Agile Resources and Capabilities	Development of new capabilities	3	Evidence of efforts to build new competencies, but mostly focused on technical areas. Partnership with universities and knowledge centers helps in this development. Knowledge management is essential for the organization as it transforms from a production site into a development center. Job rotation is frequent, both through structured rotation programs or internal mobility.	3.5
	Talent to support agility	4		
	Knowledge management	3		
	Job rotation systems	4		
Process and Project Team	Team dedication	4	Cross-functional project teams are a common reality at the organization, boosting experience and dedication. Depending on the complexity of the project, its strategic importance and the number of partners involved, different levels of autonomy and empowerment of the teams are observed.	4.00
	Autonomy and empowerment	3		
	Integration/ cross-functionality	4		
	Team experience	5		
Organizational structure	Promoting horizontal structure	2	Very centralized decision-making, with several decisions going through a long approval process. Even though managers agree on the strategy and frequently work together, at the associate level and in the daily work life there are clashes between departmental goals.	2.33
	Decentralized decision-making	2		
	Interdepartmental collaboration	3		
Manufacturing (development) flexibility	Automation	5	The organization has invested in promoting high levels of automation. It is taking efforts to better integrate and improve its production systems in order to allow increased speed, flexibility and reconfiguration.	4.33
	Speed	4		
	Flexibility and reconfiguration	4		
Process flexibility	Process concurrency	4	Processes integration is actively managed and improved by the organization. Nevertheless, there is room for further proactivity in seeking improvements regarding process concurrency and the frequency of process revision cycles.	4.33
	Process integration	5		
	Frequent revision cycles	4		
New Product and Process Development	Newness	4	Reinforced product development and innovation activities led to the need for capabilities to deal with complexity and newness. The organization resorted both to internal development and the acquisition of talent. Use of agile project management methods is under development.	3.67
	Complexity	4		
	Balance of project management methods	3		
Technology and Information Systems	Use of technology	3	Technology is well deployed across different departments and sections, but there are different tools being used in different areas. The penetration of technology in the organization is high, but not all workers have access or knowledge to use it.	3.00
	Virtual enterprise	2		
	Readiness for connectivity and digitalization	4		
Agile strategic planning	Leadership unity	4	The strategy is developed with basis on clear indicators, highlighting the importance of data reliability and facts. <i>Org. B</i> is increasingly oriented towards adaptability and innovation, both in future products and processes.	4.00
	Fact-based decision making	4		
	Product succession planning	4		
Change Management	Strategic sensitivity	5	<i>Org. B</i> promotes regular events to assess the strategy and the achievement of its strategic goals, involving managers and leaders from different departments. These events include the prioritization of change efforts and the development of initiatives to promote fluidity and balancing of resources. Resource limitations start to become evident.	4.00
	Effective prioritization of change	4		
	Resource fluidity	3		
Agile information & communication strategy	Intensified communication	4	Despite the established procedures for strategy communication, associates feel distant from the decision centers, and argue that wider access to information is necessary. Recent emphasis on the improvement of communication channels and processes, results are not yet observable.	3.67
	Easy access to information	4		
	Open information sharing	3		
Assessment Score – organizational agility				3.64

Table 136 - **Organization C - Organizational Capability Assessment - Operational Excellence.**

Enablers	Critical Success factors	Score	Assessment	Score
Leadership and Management Commitment	Sustainability of excellence	3	Excellence is seen as a need, and the organization is still mostly reactive. The quick scaling up experienced by the organization meant most leaders and specialists were brought from outside. Silos and barriers between departments exist, and the organizations has started to measure, track and intervene to eliminate them.	3.67
	Leadership development	4		
	Silo reduction	4		
Workforce Engagement	Suggestions and ideas programs	4	There are number of structured programs and initiatives to promote the engagement of the workforce. However, there is limited evidence of efforts from top management to better understand and manage the motivation and interest of the workforce to take part in these initiatives. Associates are motivated to deepen their engagement, but highlight the need to create a better engagement and reward systems.	3.33
	Managing the potential for engagement	3		
	Motivation, reward and recognition	3		
Learning Organization	Training Plan	4	Strong promotion of organizational learning. New associates go through an onboarding training period, and all roles have a customized training plan. Tools and systems in place to promote knowledge transmission, coaching and mentoring. Efforts to manage talent focus not only on retention but also on the recruitment of potential talent from educational partners, such as schools and universities.	4.00
	Mentoring and Coaching	4		
	Recruitment & succession	4		
	Talent management (mgmt.)	4		
Workforce needs and expectations	Satisfaction over benefits	5	Associates show high levels of satisfaction regarding benefits. There is a clear effort from the organization in promoting a work-life balance. Perceptions and satisfaction in regards to dimensions such as health, safety and hygiene are also positively assessed, and are well integrated in the scope of systems management.	4.33
	Health, Safety & Hygiene	4		
	Teamwork	4		
Value Chain	Supply chain integration	5	The focus on the value and supply chains is one of the core competencies of the organization. Product distribution, support services and customer communication and feedback management are deployed through a channel managed by key partners, in which the organization invests considerable efforts - include training and knowledge sharing, but with no involvement in process design efforts. New channels to foster competitiveness and innovation and to reach new markets have been tried recently.	3.75
	Focus on value creation	4		
	Customer relationship mgmt.	4		
	Stakeholders involvement in process design	2		
Product and Market Development	Design for usability	5	The use of agile development methods has a huge impact in this enabler. The organization has adopted them in an effort to reduce product development lead times and rework, being able to include customer feedback along the process and developing a product the is closer to its requirements and usability needs. Integration between product development teams and commercial areas sees challenges.	4.00
	Stakeholder participation in product design	4		
	Cross functional integration	3		
	Market development	4		
Quality Systems	Quality assurance and error proofing	4	Quality assurance is essential at product development level, and metrics are defined and followed up. Efforts to promote preventive maintenance focused on improving performance and reduce downtimes, costs, and energy usage. Lack of an integrated Quality Management approach that used consistently in all departments.	4.00
	Maintenance Engineering	5		
	Quality Management	3		
Mgmt., control and optimization	Process Revision	3	Process improvement and revision is one of the aspects where the organization seems to have further room for improvement. Processes are defined, and the organization has integrated its quality management systems. However, there is limited evidence of any structured efforts to take the organization beyond this stage. Optimization and lean management initiatives are seldom used, and limited to a few departments, seeing different levels of commitment across the organization.	3.00
	Lean Management	3		
	Process control and optimization	3		
	Scheduling and capacity management	3		
Process assessment & data validity	Data Reliability and Fact Driven Decision	4	Well-defined approaches in ensuring data quality and decisions based on reliable information. Self-assessment is used to ensure that processes are error free, but there are limited efforts focusing on process improvement, the definition of process revision cycles, or the deepening and broadening of benchmarking activities.	3.67
	Benchmarking	3		
	Self-assessment	4		
Strategy Alignment	Process orientation	3	Strategy alignment is done through a set of different approaches focused on promoting the orientation of the workforce towards ideas considered central to the organization. However, there is limited promotion of process orientation and focus on operational excellence in the organization, and perceptions still differ in different sections and departments.	3.00
	Focus on organizational excellence	3		
	Organizational strategy alignment	3		
Strategy Development	Strategic objectives definition	4	Strategy development process is well defined and the plan considers and balances organizational goals with departmental and sectional goals. Strategic plans are defined for three years but reviewed annually, improving the sensibility to changes in the market.	4.00
	Strategy development	4		
	Systems thinking	4		
Strategy planning and deployment	Deployment action plan	4	Strategy deployment focus on the establishment of a plan that allows the organization to meet the proposed results, including the identification of critical tasks and the management and balance of resources. Most strategic process include the creation of a contingency plan in order to overcome unexpected changes and deviations from the defined strategy, limiting the impact that those modifications may have.	4.00
	Contingency planning	4		
	Resource allocation	4		
Org. Com. Organizational Communication	Strategy communication	3	Strategy communication processes are well-defined, reaching the different departments and sections. Some confusion regarding some new strategies, namely in regards to the relationship with customers and the channels to be promoted. Strategy is sometimes subject to different understandings according to the local perspectives.	3.5
	Communication processes	4		
Assessment score – operational excellence				3.73

Table 137 - **Organization C - Organizational Capability Assessment – Organizational Culture (orientation to Excellence).**

Enablers	Critical Success factors	Score	Assessment	Score
Principles	Values and beliefs	3	Although there is a strong focus in maintaining high levels of quality in products and services, this focus influences mostly the working norms, and is not as strong as other aspects in inspiring the values, the mission, and the vision of the organization.	3.33
	Norms	4		
	Vision and mission	3		
Practices	Use of quality tools	4	The use of quality tools is well-developed, but observed mostly in technical areas. There is a strong commitment to the development of the organizational culture, but with an inconsistent focus on operational excellence. The organization seems to be satisfied with the current <i>status quo</i> and does not actively look to expand the current level of commitment.	3.50
	Engagement with excellence	3		
	Commitment to excellence	3		
	Commitment to organizational culture	4		
Behaviors	Role of leaders	3	Behaviors regarding excellence are variable, both across different areas of the organization, and in regards to their recurrence and frequency of use. Operational excellence sees limited practical guidance from leaders, while managers and associates have mostly a task-oriented focus. Nevertheless, behaviors can be further improved across the organization, as the workforce shows strong motivation to participate in improvement initiatives.	3.00
	Role of managers	3		
	Role of associates	3		
	Frequency	3		
	Duration	3		
	Intensity	3		
	Scope	3		
Artifacts and Creations	Built environment	4	The built environment and internal media and communication channels are regarded as premium vehicles to transmit the values and beliefs of the organization. Stories and symbols revolve around the organization's history and the experience of its leaders, but show limited alignment with excellence.	3.67
	Internal communication and media	4		
	Stories, symbols and heroes	3		
Assessment Score – organizational culture orientation				3.38

Table 138 - **Organization C** - Organizational Capability Assessment – Organizational Agility.

Enablers	Critical Success factors	Score	Assessment	Score
Orientation and Work Environment	Agile mindset	4	Agility is an active part of the organization, and is present in the mindset, work environment and use of collaborative work. Although agile practices drive most of the development efforts, some areas still are disengaged, and reward and recognition for agile use is poorly explored.	3.75
	Agile-style work environment	4		
	Collaborative work	4		
	Adequate reward for agile use	3		
Agile Resources and Capabilities	Development of new capabilities	4	The management of human resources in the scope of agile project management is mature, and the organization starts to take efforts to develop organizational agility capabilities. However, these efforts are not clearly integrated and are often isolated from the rest of the organization. HR centralizes most activities, including recruitment efforts, talent management, and training.	3.75
	Talent to support agility	4		
	Knowledge management	4		
	Job rotation systems	3		
Process and Project Team	Team dedication	4	Project teams focused on developing new process or products are highly efficient, pro-active, and autonomous. Despite some evidence of silos, these teams often interconnect the technical and commercial areas. Team experience is well balanced, and expertise is a key metric in team formation.	4.25
	Autonomy and empowerment	4		
	Integration/ cross-functionality	4		
	Team experience	5		
Organizational structure	Promoting horizontal structure	3	Flexible organizational structure. Challenges include the bureaucracy and the complexity of processes that derive from organization's growth, resulting in the need to manage different products, services and markets. Interdepartmental collaboration is increasingly promoted to counter the siloed structure.	3.33
	Decentralized decision-making	3		
	Interdepartmental collaboration	4		
Manufacturing (development) flexibility	Automation	4	Use of agile methodologies and the investment of technology allows the promotion of fast, reliable and flexible development processes, with a high degree of automation.	4.00
	Speed	4		
	Flexibility and reconfiguration	4		
Process flexibility	Process concurrency	3	Process integration is promoted, especially in a perspective of delivering products to market. However, process concurrency is limited, and revision cycles are established but infrequent. Often limited to technical areas.	3.33
	Process integration	4		
	Frequent revision cycles	3		
New Product and Process Development	Newness	4	High proficiency in managing newness and complexity within development teams, but limitations are observed in the rest of the organization. The use of agile methods in project management is rare outside development team, and there is poor balance and integration with other methods.	3.33
	Complexity	3		
	Balance of project management methods	3		
Technology and Information Systems	Use of technology	5	The use of technology is widespread across the organization, with associates leveraging their knowledge to help <i>Org. C</i> be more efficient and improve its performance. This active use of technology is however still at an initial phase in recognizing and developing opportunities related to industry 4.0.	4.33
	Virtual enterprise	5		
	Readiness for connectivity and digitalization	3		
Agile strategic planning	Leadership unity	4	The organization has developed agile capabilities in relation to its strategic planning processes, with strong leadership unity and an active development of new products. Decisions are based on data gathered next to customers and prioritized in terms of the perceived added value to the market.	4.00
	Fact-based decision making	4		
	Product succession planning	4		
Change Management	Strategic sensitivity	4	The organization is strategically sensitive and able to effectively prioritize change efforts, with support of efficient resource management. Nevertheless, these efforts are mostly seen in scope of the development of new products or updates to its current product portfolio, and could be expanded to other areas.	4.00
	Effective prioritization of change	4		
	Resource fluidity	4		
Agile information & communication strategy	Intensified communication	3	Intensifying the communication around the new strategies, simplifying and making access to information easier, and promote further information sharing are opportunities for the organization to improve strategy recognition. Different perceptions on the strategy are seen still across the organization.	3.00
	Easy access to information	3		
	Open information sharing	3		
Assessment Score – organizational agility				3.73

Table 139 - **Organization D - Organizational Capability Assessment - Operational Excellence.**

Enablers	Critical Success factors	Score	Assessment	Score
Leadership and Management Commitment	Sustainability of excellence	4	Evidence of enduring commitment to quality and operational excellence, mainly driven by the different regulations and requirements of the markets where the organization operates, and a focus on performance and reducing cost. Efforts to maintain a quality-minded leadership have not been able to avoid functional silos.	3.67
	Leadership development	4		
	Silo reduction	3		
Workforce Engagement	Suggestions and ideas programs	4	The organization promotes several different programs and initiatives through which associates may engage and participate: suggestions programs, technical challenges and competitions open to the organization and its partners. Nevertheless, a considerable part of the workforce shows limited engagement and motivation levels, and poor perceptions on the existing systems for reward and recognition.	3.33
	Managing the potential for engagement	3		
	Motivation, reward and recognition	3		
Learning Organization	Training Plan	4	Training plans focus above all on the development of the operational and technical skills of the workforce, promoting a series of trainings in strategically important ideas related to quality, operational excellence, the value chain, the regulatory environment, and safety. The organization has been increasingly proactive in terms of recruitment and succession plan, as well as in talent management, taking the most form its close relationship with schools and universities to bring and retain the best.	3.75
	Mentoring and Coaching	4		
	Recruitment & succession	3		
	Talent management (mgmt.)	4		
Workforce needs and expectations	Satisfaction over benefits	4	Workforce expectations are supported on a series of benefits, which include the promotion of a work-life balance and personal development. Although health, safety, and hygiene systems are certified and integrated, there is room to promote further engagement of the workforce, using their deep and local process knowledge to mitigate risks. Low perceptions on the ability of the organization to promote teamwork.	3.67
	Health, Safety & Hygiene	4		
	Teamwork	3		
Value Chain	Supply chain integration	4	While there is a strong focus on value creation, and in managing customer expectations, integration and involvement with suppliers and service providers is limited, with most decision made internally. Customer relationship management are distributed by functional area, but integrated in order to provide the fastest and most complete response.	3.75
	Focus on value creation	4		
	Customer relationship mgmt.	4		
	Stakeholders involvement in process design	3		
Product and Market Development	Design for manufacturing	4	Growing focus on expanding markets, with efforts to meet regulations in different regions of the globe. Strong influence of the customers in product design, and growing innovation brings new stakeholders to the process. Product development efforts promote cross functional integration, but there are barriers and lack of communication between different departments, even when having related goals.	3.75
	Stakeholder participation in product design	4		
	Cross functional integration	3		
	Market development	4		
Quality Systems	Quality assurance and error proofing	4	Systems and tools are in place to eliminate errors and ensure the quality and safety of the products. There is a strong focus on Quality Management, with strong involvement of the workforce. Preventive maintenance is not yet at a level that eliminates breakdowns, with a considerable amount of reactive interventions.	3.67
	Maintenance Engineering	3		
	Quality Management	4		
Mgmt., control and optimization	Process Revision	3	Process revision is established but shows limitations in terms of frequency. Lean and six-sigma activities are well implemented and integration is actively pursued but incomplete, and there are considerable capacity limitations. Processes are continuously tracked, but improvement initiatives are still limited and there is not enough evidence of their impact to support further commitment.	3.50
	Lean Management	4		
	Process control and optimization	4		
	Scheduling and capacity management	3		
Process assessment & data validity	Data Reliability and Fact Driven Decision	4	The organization has well-defined metrics and measures, with several indicators to feed data-based decisions. Benchmarking is promoted with some regularity, but limited to a few organizational areas and activities. Self- assessment is more actively used, but sometimes with different approaches across the organization.	3.67
	Benchmarking	3		
	Self-assessment	4		
Strategy Alignment	Process orientation	4	The organization shows strong strategy alignment, even when its actual deployment is limited in some areas. Process orientation is strong but driven to ensure product quality and safety, and maintain low production costs. Focus on organizational excellence is seen at the leadership and management levels but has a somewhat limited deployment next to the workforce.	4.00
	Focus on organizational excellence	4		
	Organizational strategy alignment	4		
Strategy Development	Strategic objectives definition	4	The strategy making process is based on the identification of clear technical metrics to feed its strategic objectives, but seeks also to align with the existing culture and the mindset of the workforce. The definition of strategic objectives promotes the participation of different functional areas and departments, but there are still challenges due to existing silos and clashes between department-level goals.	3.67
	Strategy development	4		
	Systems thinking	3		
Strategy planning and deployment	Deployment action plan	3	Strategy deployment and contingency planning are not as mature as the development processes, but are well established. The major challenge refers to the allocation of resources, as the existing silos allow redundant and parallel tasks and efforts, promoting waste of resource and severely limiting the potential of new strategies.	3.33
	Contingency planning	3		
	Resource allocation	4		
Org. Com. Organizational Communication	Strategy communication	3	Processes for communicating strategies are established and stabilized, but there is no evidence that it is measured and managed. Part of the workforce feels distant from the strategy decision centers, impacting the associate's involvement and understanding regarding new strategies or actions outside the traditional alignment of the organization.	3.00
	Communication processes	3		
Assessment score – operational excellence				3.60

Table 140 - **Organization D** - Organizational Capability Assessment - Organizational Culture (orientation to Excellence).

Enablers	Critical Success factors	Score	Assessment	Score
Principles	Values and beliefs	4	Due to the highly regulated, quality-driven market that <i>Org. D</i> operates in, it has developed a strong mindset towards quality and excellence. Challenges include creating an integrated, organization-wide approach to quality.	4.00
	Norms	4		
	Vision and mission	4		
Practices	Use of quality tools	4	The use of quality tools, methods and frameworks is well-developed in the organization. The commitment to the organizational culture is promoted and managed in a more structured way than the commitment towards quality and excellence.	3.50
	Engagement with excellence	3		
	Commitment to excellence	3		
	Commitment to organizational culture	4		
Behaviors	Role of leaders	4	Behaviors related to quality are tied to the organizational hierarchy. Leaders are highly involved and drive the efforts, with the support of managers mainly seen in the operationalization of these efforts to their teams. Associates are involved sporadically, but focus mostly in their tasks. Most initiatives have passed beyond the project approach, and start to be repeatable, but there is limited intensity in the commitment of the workforce, with many regarding operational excellence efforts as falling within the scope of other functional areas.	3.14
	Role of managers	3		
	Role of associates	2		
	Frequency	4		
	Duration	3		
	Intensity	3		
Artifacts and Creations	Built environment	3	Despite the general orientation towards quality and operational excellence that exists in the organization, it is not transmitted with clarity by the built environment or the internal media. In the same way, it has limited influence in the stories, and in the definition of the heroes and symbols of the organization.	3.50
	Internal communication and media	3		
	Stories, symbols and heroes	3		
			Assessment Score – organizational culture orientation	3.41

Table 141 - **Organization D** - Organizational Capability Assessment – Organizational Agility.

Enablers	Critical Success factors	Score	Assessment	Score
Orientation and Work Environment	Agile mindset	2	Interest and awareness on agility is only starting to transpire, especially in the scope of using technology and connectivity (industry 4.0) to speed and optimize process, and digitalize much of the bureaucratic and manual work that is related with operations in a highly regulated industry.	2.75
	Agile-style work environment	2		
	Collaborative work	3		
	Adequate reward for agile use	4		
Agile Resources and Capabilities	Development of new capabilities	4	The organization is efficient in developing new competencies, and uses a variety of partnerships in order to develop and improve processes, products and strategies. Partnerships with universities and organizational learning efforts help identify, develop and sustain knowledge. Activities and roles demanding a high level of specialization constrain job rotation.	3.00
	Talent to support agility	4		
	Knowledge management	2		
	Job rotation systems	2		
Process and Project Team	Team dedication	4	Project teams are formed with focus on resource balance and managing the available knowledge and expertise in the organization. Nevertheless, external stakeholders are occasionally brought in to help with development process. Limited autonomy and challenges in promoting integration/cross functionality.	3.25
	Autonomy and empowerment	3		
	Integration/ cross-functionality	2		
	Team experience	4		
Organizational structure	Promoting horizontal structure	2	The organizational structure is rigid and highly vertical. Strong influence of top management in decision-making processes, especially when decisions require highly technical know-how or are expected to have a strong strategic impact.	2.33
	Decentralized decision-making	3		
	Interdepartmental collaboration	2		
Manufacturing (development) flexibility	Automation	3	Manufacturing flexibility is limited, due to constraints such as space, machinery, and industry regulations. <i>Org. D</i> has taken several steps to make its manufacturing processes more flexible, investing in automation and focusing on reconfiguration, modularity and new machinery.	3.00
	Speed	3		
	Flexibility and reconfiguration	3		
Process flexibility	Process concurrency	3	Further process flexibility is constrained by the lack of metrics to support and manage a continuous improvement perspective, and due to infrequent revision cycles. Some integration is observed, despite barriers between departments.	3.33
	Process integration	4		
	Frequent revision cycles	3		
New Product and Process Development	Newness	5	Focus on innovation supports the approach to newness and complexity, and the organization takes advantage from the know-how of its associates and the partnership with universities and research centers. Traditional approach to project management, with limited integration or balance of methods.	4.00
	Complexity	4		
	Balance of project management methods	3		
Technology and Information Systems	Use of technology	2	Use of technology is limited and sets as one of the greatest opportunities for an immediate improvement on organizational agility, supporting process speed while maintaining the focus on product quality and safety. Very limited use of virtual networks.	1.67
	Virtual enterprise	1		
	Readiness for connectivity and digitalization	2		
Agile strategic planning	Leadership unity	4	Strong leadership unity was observed the organization. Strategic and product portfolio decisions are taken with a clear focus on data and are supported by market needs and requirements or new research or innovation opportunities.	4.00
	Fact-based decision making	4		
	Product succession planning	4		
Change Management	Strategic sensitivity	4	Strategic sensitivity has allowed the organization to understand and adapt to new trends, challenges, and opportunities in the market. Challenges to the operationalization of such strategies are related to resource limitations, rigid process and regulatory concerns.	3.33
	Effective prioritization of change	3		
	Resource fluidity	3		
Agile information & communication strategy	Intensified communication	3	Work instructions and standards allow associates to access information, but there are limitations on how decisions and strategies are shared with the organization. Intensified communication between departments and levels needs to be further developed to help overcome these challenges.	3.00
	Easy access to information	4		
	Open information sharing	2		
Assessment Score – organizational agility				3.06

Table 142 - **Organization E - Organizational Capability Assessment - Operational Excellence.**

Enablers	Critical Success factors	Score	Assessment	Score
Leadership and Management Commitment	Sustainability of excellence	3	The focus on Quality and Excellence still sees many aspects of a project approach, although it has started to stabilize and see long term planning. Limited internal development of leaders, but people with leadership skills are starting to be identified. Silos are yet a challenge, both vertically and horizontally.	2.67
	Leadership development	2		
	Silo reduction	3		
Workforce Engagement	Suggestions and ideas programs	2	Suggestions programs are poorly established and not defined, and there is no evidence of the organization taking clear efforts to structurally manage and promote the engagement of the workforce. The organization has however been very efficiently in recognizing and rewarding the workforce for their efforts, whether in the scope of strategic projects and initiatives or their daily tasks.	2.67
	Managing the potential for engagement	2		
	Motivation, reward and recognition	4		
Learning Organization	Training Plan	3	Training plans, as well as mentoring and coaching are well defined in certain areas, but lack organizational-wide reach. Clear efforts to identify, develop and manage talent have been taken, and some successful results are seen. However, the organization faces clear challenges in managing its workforce, with difficulties in consistently defining the profile and characteristics of the people that is wishes to bring on board.	3.00
	Mentoring and Coaching	3		
	Recruitment & succession	2		
	Talent management (mgmt.)	4		
Workforce needs and expectations	Satisfaction over benefits	3	Workforce needs and expectations are met in a reactive way, and the associates' group considers that their benefits systems are being slowly developed. Health, safety and environmental are defined but developed only to the point of meeting minimum industry standards. Teamwork is regarded positively, initiatives for promoting team and collaborative work have been tested and deployed across the organization.	3.33
	Health, Safety & Hygiene	3		
	Teamwork	4		
Value Chain	Supply chain integration	3	Integration along the supply chain is well defined, with close cooperation with the stakeholders and an active focus on customer relationship management. However, they have little participation in the design of processes. On the other hand, this has increased the focus on value creation, and <i>Organization D</i> was able to identify practices and measures to keep value creation at the core of its activities.	3.00
	Focus on value creation	4		
	Customer relationship mgmt.	3		
	Stakeholders involvement in process design	2		
Product and Market Development	Design for manufacturing	3	Being an area that the organizations has recently taken in, after several years outsourced, the development of products has seen strong emphasis, and although well-established. still shows to be in a learning curve. A similar situation is observed regarding market development and the promotion of cross functional integration. By bringing the development in-house, the organization has sharply reduced the participation of the suppliers in the product development process.	3.00
	Stakeholder participation in product design	3		
	Cross functional integration	3		
	Market development	3		
Quality Systems	Quality assurance and error proofing	3	Recently defined quality management system, but with limited management and improvement efforts established. Efforts to promote Quality Management have been initiated when the development process was brought in, but show little integration with other management sectors or activities beyond the technical areas. Limited maintenance needs lead to low focus on measuring and improvements efforts.	3.00
	Maintenance Engineering	3		
	Quality Management	3		
Mgmt., control and optimization	Process Revision	3	Most processes are being controlled and managed, but their revision seems more connected to their recent definition than to well-established process review practices. The use of lean management is visible in different areas of the organization, but still has a limited presence overall. Capacity is not an issue.	3.00
	Lean Management	3		
	Process control and optimization	3		
	Scheduling and capacity management	3		
Process assessment & data validity	Data Reliability and Fact Driven Decision	4	Focus on the validity of data is strong, especially as the new strategy is mostly led by engineers and technical experts. While reliable data and fact driven decision-making processes are upheld by the organization, the use of information does not seem to focus on process revision. Self-assessment and benchmarking activities start to be promoted.	2.67
	Benchmarking	2		
	Self-assessment	2		
Strategy Alignment	Process orientation	2	There is a stable level of alignment with the organizational strategy, but the number of changes in the past few years has had an impact next to the workforce, and some pockets of resistance are observed. There is lack of a process orientation, and consequently of a focus on organizational excellence.	2.00
	Focus on organizational excellence	2		
	Organizational strategy alignment	2		
Strategy Development	Strategic objectives definition	3	While systems thinking is growing and is defined within mindset driving the ongoing organizational transformation, it is still mostly seen at leadership and management levels, and in the technical areas. Nevertheless, it has noticeable influence on the definition of strategic objectives. The organization defined its strategy formulation process, and has been actively trying to reduce the impact of recent strategic shifts.	3.00
	Strategy development	3		
	Systems thinking	3		
Strategy planning and deployment	Deployment action plan	4	Strategic deployment of has been well defined and improved, attaining successful results despite some resistance. Resource allocation is seen as a vital component in the efficient deployment of strategies. Contingency plans are established, but have not been actively tested nor have been actively managed.	3.67
	Contingency planning	3		
	Resource allocation	4		
Org. Com. Organizational Communication	Strategy communication	3	Communication processes are defined, but some people feel distant to the strategic making process, and insufficiently informed about the current strategic efforts.	3.00
	Communication processes	3		
Assessment score – operational excellence				2.92

Table 143 - **Organization E** - Organizational Capability Assessment – Organizational Culture (orientation to Excellence).

Enablers	Critical Success factors	Score	Assessment	Score
Principles	Values and beliefs	3	The principles of the organization have recently started to have increased connection to product quality, mostly obviously through norms. Some influence of Quality and OpEx in the values, beliefs, and mission and vision of the organization.	3.00
	Norms	3		
	Vision and mission	3		
Practices	Use of quality tools	2	While the mindset of workers towards quality has been growing, truth is that the actual use of quality tools and methods is still limited. People recognize excellence in processes as important for the performance, but the tools and frameworks are fairly limited to a few departments. Recent changes in the strategy had a strong impact in the culture, with highly variable levels of commitment to the existing culture.	2.25
	Engagement with excellence	2		
	Commitment to excellence	3		
	Commitment to organizational culture	2		
Behaviors	Role of leaders	4	Leaders are the most focused on excellence, while managers are mainly oriented to helping associates meet the expected results. Apart from that, associates' behaviors are limited, in line with the observed levels of workforce engagement. Although the focus on excellence is recent, with most approaches still at an initial phase of development, the frequency and intensity of behaviors are increasing. The focus on Quality and Excellence are transversal to the value chain, but internally their scope is still limited to some areas of the organization (typically, the most technical).	2.86
	Role of managers	3		
	Role of associates	2		
	Frequency	3		
	Duration	2		
	Intensity	3		
Artifacts and Creations	Built environment	3	Quality and excellence do not transpire in the artifacts and creations of the organization, not having a significant role in influencing the decoration, built environment, or written and oral communication of the organization.	2.67
	Internal communication and media	3		
	Stories, symbols and heroes	2		
			Assessment Score – organizational culture orientation	2.69

Table 144 - **Organization E - Organizational Capability Assessment – Organizational Agility.**

Enablers	Critical Success factors	Score	Assessment	Score
Orientation and Work Environment	Agile mindset	4	There were clear efforts to promote an agile mindset, both in terms of the evolution of the built environment and in the creation of a supportive environment, promoting and reward the use of agile and innovation methods. Collaborative work has achieved a stable level of maturity.	3.50
	Agile-style work environment	4		
	Collaborative work	3		
	Adequate reward for agile use	3		
Agile Resources and Capabilities	Development of new capabilities	3	The organization was able to do an efficient identification of human resources to support key roles for deploying agile methods and strategies. Similar effort was taken to ensure knowledge management, namely ensuring training and knowledge transference. Job rotation has been promoted in the scope of the transformation efforts, but is seen negatively by a number of employees.	3.25
	Talent to support agility	3		
	Knowledge management	4		
	Job rotation systems	3		
Process and Project Team	Team dedication	3	Teams formation metrics include indicators as dedication, areas of expertise and experience. Integration and cross functionality are sought, but not observed between all groups. Autonomy and empowerment of teams are fostered but decisions are often dependent on central approval.	3.50
	Autonomy and empowerment	3		
	Integration/ cross-functionality	4		
	Team experience	4		
Organizational structure	Promoting horizontal structure	3	Some approaches to make decision making processes faster and more decentralized, but still at an early stage of implementation. Interdepartmental collaboration work has seen a similar development, and helped to promote a more horizontal organization.	3.00
	Decentralized decision-making	3		
	Interdepartmental collaboration	3		
Manufacturing (development) flexibility	Automation	3	Speed is the main focus behind the development of process flexibility. Automation is defined but not yet in practice in most areas. Further flexibility and reconfiguration see limitation due to the lack of process orientation.	3.33
	Speed	4		
	Flexibility and reconfiguration	3		
Process flexibility	Process concurrency	3	Process definition and integration are defined, and start to see more frequent efforts, but are still not the standard in all areas of the organization. Poor process revision systematics, mostly observed in isolated cases.	2.67
	Process integration	3		
	Frequent revision cycles	2		
New Product and Process Development	Newness	4	Since the beginning of the transformation, innovation capabilities have seen a clear development, boosting the capacity of the organization to deal with complexity and newness. After experimenting different project management methods, the organization was able to find a balance that better fits its needs.	4.00
	Complexity	4		
	Balance of project management methods	4		
Technology and Information Systems	Use of technology	4	With partners and stakeholders spread across the globe, there is a strong promotion of virtual networks. While the organization has promoted a strong use of technology there is room for further improving the commitment and investment in technology focused on connectivity and digitalization.	3.67
	Virtual enterprise	4		
	Readiness for connectivity and digitalization	3		
Agile strategic planning	Leadership unity	2	Agile strategic planning has been a focus of the organization, but there is still limited leadership unity, as some senior leaders are mistrustful of the transformation or its related strategies. Decisions are made with basis on data and facts. Product portfolio evolution is grounded on market/customer data.	3.33
	Fact-based decision making	4		
	Product succession planning	4		
Change Management	Strategic sensitivity	3	Change management efforts have been defined during the initial phase of the transformation, but haven't frequently been updated since. Strategic sensitivity and the prioritization of change efforts are limited by the lack of leadership unity. Resource fluidity has been promoted, but faced workforce resistance.	3.00
	Effective prioritization of change	3		
	Resource fluidity	3		
Agile information & communication strategy	Intensified communication	3	Communication is yet a challenge for the organization. Despite being able to transmit the new organizational focus, communication processes do not seem to be sufficiently developed. The language used in the Organization has been increasingly technical since the transformation, a problem that limits the understanding and engagement of people with different backgrounds.	3.00
	Easy access to information	3		
	Open information sharing	3		
Assessment Score – organizational agility				3.30

Table 145 - **Organization F - Organizational Capability Assessment - Operational Excellence.**

Enablers	Critical Success factors	Score	Assessment	Score
Leadership and Management Commitment	Sustainability of excellence	5	Leadership and management are strongly engaged in promoting Excellence. As part of this commitment, it has actively identified and developed individuals that showed potential for leadership positions. Silos exist, most frequently due to poor communication and lack of integration between different teams.	4.00
	Leadership development	4		
	Silo reduction	3		
Workforce Engagement	Suggestions and ideas programs	4	Workforce engagement is promoted, but most associates see the efforts on continuous improvement and Operational Excellence as top-down approaches. There are a number of ideas and suggestions programs available, but there are no processes to share them across organization. Because of that, associates feel they are left with the burden of the extra work without recognition or benefits. The management of the potential for engagement is seen at top levels, but nowhere else.	3.33
	Managing the potential for engagement	3		
	Motivation, reward and recognition	3		
Learning Organization	Training Plan	3	Talent management and recruiting and succession plan are the most pressing challenges of the organization. With increasing direct competition in the same metropolitan area, Organization F has consistently been losing associates and potential hires to its competitors, having been so far been unable to stop the drainage. Training plans are well-established and there are good efforts supporting talent management. However, mentoring and coaching, being deeply impacted by the availability of co-workers and other resource limitations, have been impacted.	3.00
	Mentoring and Coaching	2		
	Recruitment & succession	3		
	Talent management (mgmt.)	4		
Workforce needs and expectations	Satisfaction over benefits	3	Satisfaction over benefits is poorly assessed by the workforce. Teamwork is frequently observed, having a series of systems to promote it and being positively perceived. The associates feel the impacts of the high levels of employee turnover, but work as a team to overcome them. Regulations concerning Health, Safety & Hygiene have high standards that are strictly upheld.	3.67
	Health, Safety & Hygiene	4		
	Teamwork	4		
Value Chain	Supply chain integration	3	Supply chain integration is somewhat limited, although some efforts have been developed recently to improve the value and information streams. The involvement of stakeholders in the design of processes is high, and although mostly driven by regulatory and customer requirements. Nevertheless, there are some efforts to involve stakeholders in process design and improvement activities that go beyond the enforcement of standards, and to better connect and communicate with customers. The organization has also explored new opportunities to provide value and grow.	3.75
	Focus on value creation	4		
	Customer relationship mgmt.	4		
	Stakeholders involvement in process design	4		
Product and Market Development	Design for manufacturing	2	Mostly activities of the organization serve a small number of clients and organizations. There is some cross-functional integration, but stakeholder participation in the development processes is limited. The exploration of new markets opportunities is undergoing; projects include focusing not only in operations but also services for its industry, such as consulting and training services.	3.00
	Stakeholder participation in product design	3		
	Cross functional integration	4		
	Market development	3		
Quality Systems	Quality assurance and error proofing	4	Quality Systems have been well-developed and are actively managed, and the organization is driven both by a strong internal focus on Quality Management, and external pressure to ensure error-free operations. Proactive maintenance efforts.	4.00
	Maintenance Engineering	4		
	Quality Management	4		
Mgmt., control and optimization	Process Revision	4	In parallel with Quality systems, the organization has also promoted a clear focus on process management and optimization, deploying different initiatives and methods to promote the revision and improvement of its processes and operations. The focus started to be driven by Quality, grew to include Lean Management and is increasingly aligned with Operational Excellence. Activities focused on the management, control and optimization of processes face limitations due to resources constrains.	3.75
	Lean Management	4		
	Process control and optimization	4		
	Scheduling and capacity management	3		
Process assessment & data validity	Data Reliability and Fact Driven Decision	3	Emphasis on the importance of use data in the scope of decision-making, but poor methods and systems for data collection. Benchmarking is used, but done essentially in terms of process and operations management and improvement. Self-assessment practices are defined, but its frequency should be expanded.	3.00
	Benchmarking	3		
	Self-assessment	3		
Strategy Alignment	Process orientation	4	There is a strong process orientation going beyond the simple scope of process control (required by industry regulations), and focusing on their quantitative management and improvement. However, the focus on organizational excellence is still limited and under development, with challenges including the creation of a stronger organizational alignment.	3.33
	Focus on organizational excellence	3		
	Organizational strategy alignment	3		
Strategy Development	Strategic objectives definition	4	The definition of strategic objectives and the guiding strategic activities is based on clear metrics and followed upon by the senior leadership team. Sometimes there are problems deriving from the lack of systems thinking, with some strategies impacting or clashing with local level goals and activities.	3.67
	Strategy development	4		
	Systems thinking	3		
Strategy planning and deployment	Deployment action plan	4	The strategy deployment plan is well-defined, and despite limitations, the organization has been able to do an efficient resource allocation. However, the variability and volatility in its resources, with high levels of employee turnover, creates unexpected situations that the organization has not been able to plan for.	3.67
	Contingency planning	3		
	Resource allocation	4		
Org. Com. Organizational Communication	Strategy communication	3	Existing processes and channels have shown not to be enough to ensure efficient and effective communication. structured a series of improvement initiatives and defined new means of communication, but these efforts are recent and have not yet showed results.	3.00
	Communication processes	3		
Assessment score – operational excellence				3.47

Table 146 - **Organization F - Organizational Capability Assessment – Organizational Culture (orientation to Excellence).**

Enablers	Critical Success factors	Score	Assessment	Score
Principles	Values and beliefs	3	Alignment with the principles of Excellence is strong at the leadership and management levels. It is variable amongst the associates, but there is an active resistance in some groups, which believe their norms and values do not fit the alignment promoted by the rest of the organization. The mission and vision fade outside the top organizational levels.	3.00
	Norms	3		
	Vision and mission	3		
Practices	Use of quality tools	4	The use of quality methods and tools at middle management and associate levels is strong. However, this leads to a task-oriented focus that can be reductive when aiming to pursue a level of Operational Excellence. The organization is trying to expand this commitment through actions that foster a sense of associate ownership towards the improvement initiatives, and helping managers to foster engagement and put more emphasis on organization-wide excellence. Limited focus on the organizational culture and in its development.	3.25
	Engagement with excellence	3		
	Commitment to excellence	4		
	Commitment to organizational culture	2		
Behaviors	Role of leaders	4	The organization has, so far, been unable to promote a similar level of alignment and a culture oriented to excellence across its ranks. Accordingly, behaviors vary across the different groups. Leadership shows the strongest level of alignment. Managers and associates are more task-oriented, but have been increasingly involved in organizational efforts. Behaviors are frequent and actively promoted, but the duration and intensity of the behaviors, as well as their scope across the organization, are yet under development.	3.29
	Role of managers	3		
	Role of associates	3		
	Frequency	4		
	Duration	3		
	Intensity	3		
	Scope	3		
Artifacts and Creations	Built environment	3	Operational excellence strongly defines the profile of heroes and the history of the organization. Internal media is highly focused on Operational Excellence, but has low engagement of the workforce. Efforts have been made to bring some OpEx elements to the built environment, which remains nevertheless largely neutral.	3.67
	Internal communication and media	4		
	Stories, symbols and heroes	4		
			Assessment Score – organizational culture orientation	3.30

Table 147 - **Organization F - Organizational Capability Assessment – Organizational Agility.**

Enablers	Critical Success factors	Score	Assessment	Score
Orientation and Work Environment	Agile mindset	1	Agile mindset is almost inexistent in the organization. The existing focus is driven by top management, and although some projects to promote better collaborative work are in place, there are no practical efforts to make the organization more agile.	1.25
	Agile-style work environment	1		
	Collaborative work	2		
	Adequate reward for agile use	1		
Agile Resources and Capabilities	Development of new capabilities	2	There are very limited resources to support agility, both in terms of technical knowledge and the practical deployment of tools and methods. There are some examples, mostly at project levels, that can be expanded with a reinforced focus on flexibility, but any focus on organizational agility is still at a very initial stage of development.	2.50
	Talent to support agility	3		
	Knowledge management	2		
	Job rotation systems	3		
Process and Project Team	Team dedication	3	Active efforts are in place to ensure that teams have the necessary resources, both in terms of the number of members, their roles, and experience. Cross-functional integration is promoted, there is some level autonomy and empowerment. However, the current levels of employee turnover and consequent resources limitations constrain the ability of the organization to manage these factors.	3.50
	Autonomy and empowerment	3		
	Integration/ cross-functionality	4		
	Team experience	4		
Organizational structure	Promoting horizontal structure	3	The structure is under review to allow the creation of a more horizontal organization, where ideas and decision-making can be made faster and more independently. Top management sponsors and promotes a good level of departmental collaboration, but also holds much of the decision power.	3.33
	Decentralized decision-making	3		
	Interdepartmental collaboration	4		
Manufacturing (development) flexibility	Automation	3	The focus on lean management and continuous improvement that is promoted by leadership and management allowed several processes to be improved in terms of flexibility, and the organization starts to develop plans to reduce both the time and the resources necessary to operate. There are some efforts to increase speed and automation, but operations are still heavily dependent on manual work.	3.00
	Speed	3		
	Flexibility and reconfiguration	3		
Process flexibility	Process concurrency	3	Process flexibility has also been positively impacted by the focus on continuous improvement, with concrete examples of process concurrency and integration, and defined revision cycles. Resource volatility demands constant training of new associates and slow the expansion of the focus on flexibility.	3.00
	Process integration	3		
	Frequent revision cycles	3		
New Product and Process Development	Newness	2	Well-developed capabilities to deal with complexity, with the organization actively dealing with the large number of factors that can impact its processes. The heavy regulated context has an impact on newness, and there is limited engagement with disruptive solutions and initiatives. Very limited engagement with any project management approaches beyond the traditional methods.	2.67
	Complexity	4		
	Balance of project management methods	2		
Technology and Information Systems	Use of technology	2	The use of technology in the organization is fit to its operational needs, but there is almost no evidence of the use of that technology to become more agile. Some efforts to deploy and integrate tools are being designed and explored, but in a very initial, project-based approach.	1.33
	Virtual enterprise	1		
	Readiness for connectivity and digitalization	1		
Agile strategic planning	Leadership unity	4	The leadership shows a strong unity, which ultimately helps it to make quick decisions, based on relevant information and in line with the defined strategic framework. No evidence of product/service succession planning.	2.67
	Fact-based decision making	3		
	Product succession planning	1		
Change Management	Strategic sensitivity	3	The leadership actively pursues change management, and is focused on developing the organization's sensitivity to the markets, being able to better understand and anticipate changes. Actions were taken to prioritize change efforts and in improving resource fluidity, but human resource limitations pose a challenge.	3.00
	Effective prioritization of change	3		
	Resource fluidity	3		
Agile information & communication strategy	Intensified communication	3	The organization has recently started to invest in intensifying its communication, sharing strategies and solutions faster between groups. To do that, it has focused on promoting a more open and easier access to information.	3.00
	Easy access to information	3		
	Open information sharing	3		
Assessment Score – organizational agility				2.66

Table 148 - **Organization G - Organizational Capability Assessment - Operational Excellence.**

Enablers	Critical Success factors	Score	Assessment	Score
Leadership and Management Commitment	Sustainability of excellence	2	Focus on Operational Excellence is growing but the lack of a process orientation limits the sustainability of the initiatives deployed so far. As the organization grows, the need for this commitment becomes more obvious, namely with the formation of some siloed activities and functional areas.	2.67
	Leadership development	4		
	Silo reduction	2		
Workforce Engagement	Suggestions and ideas programs	3	The organization promotes the engagement and participation of its workforce, in line with its focus on talent and use of individual expertise. This is one of the areas where the organization shows more definition in its process, but there is still room for improvement, mainly in measuring and stabilizing procedures as the organization scales up. Leaders and managers actively explore the potential for engagement and encourage recognition the recognition of the workforce.	3.67
	Managing the potential for engagement	4		
	Motivation, reward and recognition	4		
Learning Organization	Training Plan	3	The organization is very active in its recruitment efforts, and even more so in the case of talent retention and acquisition. It sees talent as essential factor for success, and has defined strategies and procedures to identify and manage internal talent and knowledge. Emphasis on the individual development of the workforce, with well-defined training plans and mentoring and coaching activities.	3.5
	Mentoring and Coaching	3		
	Recruitment & succession	4		
	Talent management (mgmt.)	4		
Workforce needs and expectations	Satisfaction over benefits	4	The need to meet workforce needs and expectations is strategic for the organization, has retaining talent is seen as a critical success factor in the organization. Factors such as Health, Safety and Hygiene Systems and teamwork are part of this benefit system, but have room for further - and a more structured - development.	3.33
	Health, Safety & Hygiene	3		
	Teamwork	3		
Value Chain	Supply chain integration	4	There is an effort to keep short supply and value chain, promoting partnerships to keep both clients and suppliers in a close network. The organization has key clients to which it develops specific solutions and a strong focus on value creation. There is a common approach defined to promote integration and partnerships with these clients, but they are not used thoroughly, which had an important role in sharing practical know-how and helping to define processes and operations.	3.50
	Focus on value creation	3		
	Customer relationship mgmt.	3		
	Stakeholders involvement in process design	4		
Product and Market Development	Design for manufacturing	4	Product and market development are strongly aligned with the idea of value creation and the involvement of key stakeholders. Products are developed with the involvement of customers, and the organization puts a strong emphasis in, with their customers, explore new product functionalities (for users) and market opportunities. However, this is not defined enough to be replicated as the organization grows.	3.50
	Stakeholder participation in product design	4		
	Cross functional integration	3		
	Market development	3		
Quality Systems	Quality assurance and error proofing	3	Quality systems are in place, but still with limited definition and integration between tools and methods. Even though, the use of agile methodologies is integrated and helps promote iteration with customers and quickly correct limitations or re-align with their requirements.	3.33
	Maintenance Engineering	3		
	Quality Management	4		
Mgmt., control and optimization	Process Revision	2	Efforts to promote the management, control and follow up of processes are very limited and highly unstructured. Each case or efforts to define, improve or optimize a process is unique and all efforts follow a projects approach, meaning that the use of methods is highly unstructured and varied. Despite the efforts to define processes - including stakeholder participation - the limited use of metrics and process orientation constraints any process revision efforts.	2.00
	Lean Management	2		
	Process control and optimization	2		
	Scheduling and capacity management	2		
Process assessment & data validity	Data Reliability and Fact Driven Decision	3	Data reliability and fact driven decision are pursued, as the organization has clear focus on data-based decision. However, the lack of defined metrics may impact these goals. Benchmarking with other industries and clients has been important for the organization to improve and validate its processes. However, to fully take advantage of these efforts, self-assessment needs to be pursued in a more consistent way.	3.00
	Benchmarking	4		
	Self-assessment	2		
Strategy Alignment	Process orientation	2	The organization has reduced practical focus on excellence, with limited resources involved in its development. This aligns clearly with the lack of a process orientation, which is very limited in the organization. Processes and operations are approached in a project-like perspective, and there is little definition on promote their revision.	2.67
	Focus on organizational excellence	2		
	Organizational strategy alignment	4		
Strategy Development	Strategic objectives definition	3	Although there is a strong strategic alignment across the organization, the truth is that the processes to define the strategy and to develop it are still somewhat limited. The development of strategic objectives presents some definition, but the process is not actively managed or revised. Systems thinking is observed in the leadership areas.	3.00
	Strategy development	3		
	Systems thinking	3		
Strategy planning and deployment	Deployment action plan	2	Strategy deployment processes are poorly defined, and are deployed case by case in a project approach style. The variability in stagey deployment efforts limits the definition of a process for resource allocation and planning for contingencies.	2.00
	Contingency planning	2		
	Resource allocation	2		
Org. Com. Organizational Communication	Strategy communication	3	There are defined processes for communication, which are used mostly used by the leaders/founders to share strategies. Other processes see poor development and and do not foster bottom up communication.	2.50
	Communication processes	2		
Assessment score – operational excellence				2.97

Table 149 - **Organization G** - Organizational Capability Assessment – Organizational Culture (orientation to Excellence).

Enablers	Critical Success factors	Score	Assessment	Score
Principles	Values and beliefs	3	There is a clear focus on quality and an effort to ensure an excellent level of service, but the organization did not expand the ideas of Quality and Excellence into every aspect of its culture. The mission and vision of the organization are clearly understood across the organization, but the influence of Quality and Excellence in them is limited.	3.00
	Norms	3		
	Vision and mission	3		
Practices	Use of quality tools	3	The use of quality tools is observable in place, mostly focused on technical aspects, but influencing most of the organization's activities. The commitment to excellence, although growing and becoming clearer, is dependent on initiatives that are not yet fully established. The commitment to Organizational Culture sees better development - in great part due to the leadership team, and with the close presence of the founders helps to sustain the cultural commitment.	2.75
	Engagement with excellence	2		
	Commitment to excellence	3		
	Commitment to organizational culture	3		
Behaviors	Role of leaders	4	Excellence oriented behaviors are driven by the leaders, with some support for their development being done by managers. Associates are still distant from an excellence-oriented behavior, and are mostly concerned with quality at a local level. In general, behaviors towards quality are still limited - in part, a result of the newness of broader concern to quality, as shown by the small duration of these efforts. The frequency is undoubtedly growing, as quality becomes more and more a key strategic topic for the organization. Intensity and scope are, however, still inadequate.	2.57
	Role of managers	3		
	Role of associates	2		
	Frequency	3		
	Duration	2		
	Intensity	2		
Artifacts and Creations	Built environment	3	<i>Organization G's</i> offices are located in startup incubators or shared (co-working) office spaces, which are decorated in a sober way. The personalized decoration is still limited, but the organization takes a clear effort to create an environment that facilitates the communication of its cultural and strategic message. Stories and heroes revolve around the experience of two founders and the achievements of the organization.	2.67
	Internal communication and media	3		
	Stories, symbols and heroes	2		
Assessment Score – organizational culture orientation				2.75

Table 150 - **Organization G** - Organizational Capability Assessment – Organizational Agility.

Enablers	Critical Success factors	Score	Assessment	Score
Orientation and Work Environment	Agile mindset	4	There is a clear effort to make agility a central concept in the organization, which is promoted to together with the use of tools, and allows to create a mindset for agility. The work environment is designed to be very open and project a barrier-free structure and to promote a collaborative work. As the organization grows, and as it now has offices in two different cities, this work environment and mindset is further reinforced both by looking for offices in shared spaces/incubators and by the use of tools to allow efficient and has remote communication. The use agility is not particularly rewarded.	3.75
	Agile-style work environment	4		
	Collaborative work	4		
	Adequate reward for agile use	3		
Agile Resources and Capabilities	Development of new capabilities	3	While talent is key for the organization, the development of capabilities in-house is still limited. Training is available for key skills linked with technical capabilities, but there is little evidence considering other parts and roles in the organization. Well-structured efforts to identify and use the knowledge available in the organization, and in acquiring both talent and knowledge form the market. Due to the limited size of the organization, job rotation is very limited.	3
	Talent to support agility	3		
	Knowledge management	4		
	Job rotation systems	2		
Process and Project Team	Team dedication	4	Project teams are seen as central to success, and are built on talent, autonomy and, with a focus on balancing experience with technical skills of its members. The limited availability of resources means that there are some limitations in terms of experience.	3.75
	Autonomy and empowerment	4		
	Integration/ cross-functionality	4		
	Team experience	3		
Organizational structure	Promoting horizontal structure	4	The organization takes clear efforts to promote a horizontal structure and allow decentralized decision making for most processes. Strategic processes and products still need to go through the approval of the leadership, but as the organization grows, more power is given to the teams to make decisions. Interdepartmental collaboration is strong and well established, but benefit from the organization's size and may be difficult to scale.	3.67
	Decentralized decision-making	3		
	Interdepartmental collaboration	4		
Manufacturing (development) flexibility	Automation	3	Development is still very dependent on the requirements of the customers, which impairs a continuous focus in one single development process and its development and optimization. <i>Organization G</i> has standardized most of its approaches, but measurement and control activities are still limited.	3.00
	Speed	3		
	Flexibility and reconfiguration	3		
Process flexibility	Process concurrency	3	Process flexibility is impacted by the poor process definition and an overall lack of process orientation. Some practices are identified and deployed, or planned, but in general awareness on the importance of concurrency, integration and revision are limited.	3.00
	Process integration	3		
	Frequent revision cycles	3		
New Product and Process Development	Newness	4	The organization has a clear focus on innovation and technological disruption, aiming to shake the standards in the markets where it operates. New projects and processes that have a high degree of complexity and newness, which the organization is able to manage efficiently and in a well-structured way.	4.00
	Complexity	4		
	Balance of project management methods	4		
Technology and Information Systems	Use of technology	5	The organization operates mostly in the principles of a virtual organization, and works to develop a digital network of associates and partners that allows the organization to reach well beyond its physical limitations and make the best use of its technology. Connectivity and digitalization are the core of the organization's strategies and technological development.	4.67
	Virtual enterprise	4		
	Readiness for connectivity and digitalization	5		
Agile strategic planning	Leadership unity	4	Agile strategic planning is well developed as the organization clearly understands that it has to be ready to quickly shift and meet changing market demands. However, there is still a strong influence of single customer projects in the development of products.	3.67
	Fact-based decision making	4		
	Product succession planning	3		
Change Management	Strategic sensitivity	4	The organization invests strongly on change management, having explored and defined how to prioritize its change efforts and strategies. There is an effort to ensure the availability of resources to do that, but there are limitations due to the size and limited workforce size.	3.67
	Effective prioritization of change	4		
	Resource fluidity	3		
Agile information & communication strategy	Intensified communication	4	Open information sharing and intensified communication are seen across the organization and supported by well-defined systems. The access to information is not always easy, mainly due to the lack of a common process for the documenting the information.	3.67
	Easy access to information	3		
	Open information sharing	4		
			Assessment Score – organizational agility	3.62

Table 151 - **Organization H - Organizational Capability Assessment - Operational Excellence.**

Enablers	Critical Success factors	Score	Assessment	Score
Leadership and Management Commitment	Sustainability of excellence	3	Quality and excellence have been strategic concerns of the organization in recent years, but its sustained development is still limited. The organization focuses on talent as key success factor, with several leadership positions having been filled internally. Silos are uncommon and there were clear efforts to promote teamwork, participation, and engagement to actively avoid them as the organization grew.	3.67
	Leadership development	4		
	Silo reduction	4		
Workforce Engagement	Suggestions and ideas programs	3	The workforce has the ability to share and promote their ideas and suggestions, and the organization actively promotes, their discussion. However, there seems to be an untapped potential for improvement as these processes are not always fully structured, allowing ideas and suggestion to be registered and recorded for future reference. Reward and recognition are observed but practices are still poorly defined.	3.00
	Managing the potential for engagement	3		
	Motivation, reward and recognition	3		
Learning Organization	Training Plan	3	Most learning activities see high levels of development within the leadership team. However, outside this level there is still limited focus on individual development, training and coaching, and most activities are observed in the scope of the initial onboarding session with new associates. There is an effort to develop new skills and integrating them into the organization. Strong focus on talent management, with clear efforts to retain talent. In 9 years, the organization has never lost an associate.	3.00
	Mentoring and Coaching	2		
	Recruitment & succession	3		
	Talent management (mgmt.)	4		
Workforce needs and expectations	Satisfaction over benefits	4	Levels of satisfaction are high, and there is a clear effort to promote a positive work environment, and use it as a competitive advantage. Benefits are mainly focused on personal development and working hours flexibility. Limited understanding and development of health, safety, and hygiene systems. Teamwork is highly emphasized and supporting systems are well-developed and stable.	3.33
	Health, Safety & Hygiene	2		
	Teamwork	4		
Value Chain	Supply chain integration	3	Value-oriented supply chain, involving customers and stakeholders and with special emphasis on the development and design of products/services and processes. In its early days, the organization tended to acquire the skills necessary to its projects. However, as products and markets became better defined, sourcing certain services became more usual. As a result, supply chain developed to have a more holistic integration.	3.50
	Focus on value creation	4		
	Customer relationship mgmt.	4		
	Stakeholders involvement in process design	3		
Product and Market Development	Design for manufacturing	4	Due to the close presence of stakeholders in the definition of value chain development and products, there is a deep alignment with customers' needs and expectations. The organization has promoted a clear focus on cross-functional integration, which helps to develop and integrate the different requirements in an efficient way. Market development has seen some variability, with focus on multiple markets or sectors. More recently, the organization started to focus on certain areas, defined as strategic.	3.50
	Stakeholder participation in product design	4		
	Cross functional integration	3		
	Market development	3		
Quality Systems	Quality assurance and error proofing	3	Defined but initial use of quality assurance and error proofing tools. Ongoing efforts to promote proactive maintenance and reduce reactive maintenance and customer complaints. In general, quality management systems are not fully developed, with limited understanding and the absence of an organization-wide commitment.	3.00
	Maintenance Engineering	3		
	Quality Management	3		
Mgmt., control and optimization	Process Revision	3	Process revision is limited beyond the organization's core activities and operations. The only area where the organization shows an active process management is the scheduling and management of its resources and capacity, as the organization needs to ensure, in the face of a somewhat limited workforce, that the necessary skills are available and balanced between teams. Very limited use of lean management.	3.00
	Lean Management	2		
	Process control and optimization	3		
	Scheduling and capacity management	4		
Process assessment & data validity	Data Reliability and Fact Driven Decision	3	While there is a great focus on data reliability and ensuring fact driven decisions, the organization has its structures for process assessment relatively underdeveloped. Self-assessment tools, despite standardized, are not fully explored across the organization. Benchmarking activities are limited, and done especially through customers.	2.67
	Benchmarking	3		
	Self-assessment	2		
Strategy Alignment	Process orientation	3	There is some development of a system thinking, helping to promote and sustain the process orientation. However, limited engagement and understanding at different organizational level limits the ability to take the strategic alignment with organizational excellence to another level.	2.67
	Focus on organizational excellence	2		
	Organizational strategy alignment	3		
Strategy Development	Strategic objectives definition	3	Strategy development has been traditionally influenced by customers and other stakeholders, but the organization starts to promote specialization in areas where it sees it competitive advantage or market potential. New strategies fit is thus ensured by the deepening of areas where the organization has developed the most capabilities and is a position of competitive advantage in the markets.	3.00
	Strategy development	3		
	Systems thinking	4		
Strategy planning and deployment	Deployment action plan	3	Strategy deployment is structured and has been tested and reviewed, focusing mostly on the existing tools to manage existing resources. Contingency planning is limited but defined. In key projects with critical stakeholders contingency planning follows a less structured approach to meet demands and balance any constraints.	3.00
	Contingency planning	2		
	Resource allocation	4		
Org. Com. Organizational Communication	Strategy communication	2	Strategy communication is limited and happening more frequently major strategic events or shifts. Communication processes and channels are defined but are not frequently used, and are not reflected upon, with no efforts to review and possibly revise them to promote a better understanding of the strategies and communication efficiency.	2.50
	Communication processes	3		
Assessment score – operational excellence				3.06

Table 152 - **Organization H** - Organizational Capability Assessment – Organizational Culture (orientation to Excellence).

Enablers	Critical Success factors	Score	Assessment	Score
Principles	Values and beliefs	3	Although there is a good understanding of the importance of operational excellence in the design, development and delivery of products and services, truth is that this focus is not clear in the statements and language used to communicate the organization's espoused values, and even less in the mission and vision.	2.67
	Norms	3		
	Vision and mission	2		
Practices	Use of quality tools	4	While the use of quality tools is well established across the organization, to a point of solidifying as a practice, further efforts on performance and operational improvement are limited. Engagement with clear initiatives is limited, and the commitment fades in the middle and lower organizational levels. There is a gap between discourse and practices, and most obviously between the intentions and reflections at the leadership level and the remainder of the organization.	3.25
	Engagement with excellence	3		
	Commitment to excellence	3		
	Commitment to organizational culture	3		
Behaviors	Role of leaders	4	Behaviors are repeatable and different according to the organizational area where they are observed. The scope is generally limited, with any efforts or intentions to expand the view on operational excellence being found at the leadership level. Managers provide some support, but are essential focused on helping associates do their jobs and ensure the level of quality and excellence in products and services.	2.86
	Role of managers	3		
	Role of associates	2		
	Frequency	3		
	Duration	3		
	Intensity	3		
	Scope	2		
Artifacts and Creations	Built environment	4	Artifacts and creations focus mostly on the promotion of the well-being and satisfaction of the workforce. Some focus on quality and operational excellence is seen as part of the stories and role models (symbols and heroes) of the organization, especially when recollected by managers and leaders.	3.00
	Internal communication and media	2		
	Stories, symbols and heroes	3		
			Assessment Score – organizational culture orientation	2.94

Table 153 - **Organization H - Organizational Capability Assessment – Organizational Agility.**

Enablers	Critical Success factors	Score	Assessment	Score
Orientation and Work Environment	Agile mindset	4	Agile strategies, tools, and systems are well deployed in the organization and balanced with collaborative and a fair level of use of agile methodologies. Nevertheless, there is limited promotion of rewards or incentives for the use of agile. Collaborative work, in line with the strong focus on teamwork, is a clear strength of the organization.	3.75
	Agile-style work environment	4		
	Collaborative work	4		
	Adequate reward for agile use	3		
Agile Resources and Capabilities	Development of new capabilities	3	Strong emphasis on individual talent. The organization has traditionally resorted to the market to acquire new talent and skills. There are efforts to develop skills and capabilities, but they limited and mostly related to the management of projects, resources, and teams. Job rotation is high and demands an active resource and capacity management.	3
	Talent to support agility	4		
	Knowledge management	3		
	Job rotation systems	4		
Process and Project Team	Team dedication	4	Most of the efforts that the organization has developed in terms of resource management were done in the scope of ensuring stable and balanced teams for the different projects. However, team experience is not always well-balanced - more due to the characteristics of the resources than limitations in planning. There is strong autonomy, and cross functionality is ensured.	3.75
	Autonomy and empowerment	4		
	Integration/ cross-functionality	4		
	Team experience	3		
Organizational structure	Promoting horizontal structure	4	There are clear efforts to maintain a horizontal organizational structure, with the leadership and managers being strongly dedicated to this objective. Inter departmental collaboration promotes the sharing of knowledge and skills. Decision making is decentralized mostly in smaller projects, while bigger and strategic projects are still dependent on the core leadership team.	3.67
	Decentralized decision-making	3		
	Interdepartmental collaboration	4		
Manufacturing (development) flexibility	Automation	4	The organization has invested in tools to ensure development flexibility, focusing strongly on automation and speed. Flexibility and reconfiguration of development processes occur with strong influence of customer feedback.	4.00
	Speed	4		
	Flexibility and reconfiguration	4		
Process flexibility	Process concurrency	3	From an organization perspective, the development of process and the promotion of their flexibility are less mature than what was observed in the scope of development project. Process concurrency and integration are defined but not actively managed; limited proactivity regarding revision cycles.	3.00
	Process integration	3		
	Frequent revision cycles	3		
New Product and Process Development	Newness	4	There has been a continuous effort to develop new and more complex products, building and expanding the existing experience. The organization works mostly with agile project management. Waterfall and other project management methods, when used by request of clients or partners, demand extra alignment and deployment efforts.	3.67
	Complexity	4		
	Balance of project management methods	3		
Technology and Information Systems	Use of technology	4	The organization is technology based and sees the use of technology as central to its strategy. Networks are established, and have a significant impact on the ability of the organization to learn from its clients and partners and develop better products. Industry 4.0 is recognized as both an organizational and market opportunity.	3.33
	Virtual enterprise	3		
	Readiness for connectivity and digitalization	3		
Agile strategic planning	Leadership unity	4	There is a clear leadership unity, with the organization being able to maintain a common top-level alignment even as the number of leadership and management positions grew. Product succession planning is done with basis on two principles: improving existing products and services, and developing new, sustainable market opportunities. Strong focus on facts	3.33
	Fact-based decision making	3		
	Product succession planning	3		
Change Management	Strategic sensitivity	3	The organization promotes strategic sensitivity, the effective prioritization of change efforts, and high resource fluidity. Although sometimes in a reactive or unstructured way, this allows fluid decision making. Organization H has good understanding of the disruptive markets where it operates, and plans for them.	3.33
	Effective prioritization of change	3		
	Resource fluidity	4		
Agile information & communication strategy	Intensified communication	4	Although the organization promotes and values an intensified and open communication, truth is that the access to it is not always well easy for the workforce to access it, mostly due to lack or processes and work instructions.	3.67
	Easy access to information	3		
	Open information sharing	4		
Assessment Score – organizational agility				3.55

Table 154 - **Organization I - Organizational Capability Assessment –Operational Excellence.**

Enablers	Critical Success factors	Score	Assessment	Score
Leadership and Management Commitment	Sustainability of excellence	2	Leadership and management are committed to Operational Excellence but the approaches are still very initial, with a project perspective being central to most processes and operation of the organization. Well established use of technology and virtual networks helps eliminate silos and disruption between teams and people.	2.33
	Leadership development	2		
	Silo reduction	3		
Workforce Engagement	Suggestions and ideas programs	2	The organization has channels for ideas or suggestions to be shared, but the follow up process is not defined. The organization takes efforts to engage its associates and promotes their participation, but reward and recognition systems are unstructured. Potential for engagement can be further explored.	2.33
	Managing the potential for engagement	3		
	Motivation, reward and recognition	2		
Learning Organization	Training Plan	1	No evidence of training plans being defined. The organization puts strong emphasis on recruitment, attracting talent to suppress it needs – a process that has been intensified and improved in times of quick growth. In the same sense, talent is seen as vital factor for success, and the organization has worked to establish approaches to manage and retain the talent acquired. Mentoring and coaching are strongly promoted by the leadership team, and the development of the workforces relies heavily on it.	3.00
	Mentoring and Coaching	4		
	Recruitment & succession	4		
	Talent management (mgmt.)	3		
Workforce needs and expectations	Satisfaction over benefits	2	Workforces needs and expectations are attended to a case-by-case approach, trying to meet the individual expectations of the still limited number of workforce members. Health, Safety & Hygiene are developed poorly but as expected for an organization relying mostly on a virtual network. Teamwork is promoted and supported in repeatable processes and the use of systems and collaborative working tools.	2.33
	Health, Safety & Hygiene	2		
	Teamwork	3		
Value Chain	Supply chain integration	2	Efforts to integrate partners in the value chain are ongoing, but are limited. There is little influence in the design of the value chain, - in fact, the design of most of the processes is centralized within the leadership team. There is however a strong emphasis in learning from the experience of customers and in learning from them how to provide increased value.	2.5
	Focus on value creation	3		
	Customer relationship mgmt.	3		
	Stakeholders involvement in process design	2		
Product and Market Development	Design for usability	4	Strong emphasis on design for usability, with several trials running before a product is launched. Cross functional integration of product development team is promoted, but stakeholders have a more active part and strong influence. Market development efforts see some collaboration of the stakeholders, but emphasis on the development of new market opportunities is not as strong as on the product.	3.50
	Stakeholder participation in product design	4		
	Cross functional integration	3		
	Market development	3		
Quality Systems	Quality assurance and error proofing	3	There are some established efforts to ensure quality in the during the product development process. In the same way, the organization has defined maintenance practices, ensuring the product and communication channels are active and working. Very limited organizational-wide perspectives on Quality Management.	2.67
	Maintenance Engineering	3		
	Quality Management	2		
Mgmt., control and optimization	Process Revision	2	Some efforts to use of the approaches and methods of a lean start up were promoted, and although not followed thoroughly, they inspire most of the approaches of the organization in designing and assessing their processes. Products are assessed with frequency, but the revision of development processes is underscored. Scheduling and capacity management see an inconsistent, project like approach.	2.50
	Lean Management	3		
	Process control and optimization	3		
	Scheduling and capacity management	2		
Process assessment & data validity	Data Reliability and Fact Driven Decision	4	With operations involving law and intellectual property, the organization takes very seriously the reliability of data and the need to make fact driven decision, and these questions have a visible impact in the design and development of processes. Benchmarking and self-assessment initiatives are limited and pursued loosely.	2.67
	Benchmarking	2		
	Self-assessment	2		
Strategy Alignment	Process orientation	3	Process orientation is well defined in terms of product and strategy development, but most processes are underdeveloped in comparison. There is a strong strategy alignment, actively promoted by the leadership team. Organizational Excellence is approached inconsistently and regarded as a distant goal.	3.00
	Focus on organizational excellence	2		
	Organizational strategy alignment	4		
Strategy Development	Strategic objectives definition	4	The strong emphasis on strategy development has led to processes and systems to identify strategic goals and develop and plan strategies accordingly. A google level of systems thinking is observed, but sustained in the close support of the leadership.	3.67
	Strategy development	4		
	Systems thinking	3		
Strategy planning and deployment	Deployment action plan	2	Contrary to the strategy development process, the deployment plan is not as well planned – although there is some definition in the resource allocation plan. Contingency planning is done mostly in a reactive way.	2.33
	Contingency planning	2		
	Resource allocation	3		
Org. Com. Organizational Communication	Strategy communication	2	Communication processes are under definition. At this point, they rely mostly on the tools and platform the organization uses to connect the different locations of its employees. Strategy communication processes are defined, but follow the same approach.	2.00
	Communication processes	2		
Assessment score – operational excellence				2.68

Table 155 - **Organization I** - Organizational Capability Assessment –Organizational Culture (orientation to Excellence).

Enablers	Critical Success factors	Score	Assessment	Score
Principles	Values and beliefs	2	The mission and the vision of the organization are well defined, and while they focus on the creation of value, there is no direct mention of Quality and Excellence. The same is valid for the values, and the norms seems to be the most exposed to the principles of Operational Excellence.	2.33
	Norms	3		
	Vision and mission	2		
Practices	Use of quality tools	3	The use of quality tools is frequent and well-established in product development processes, but limited in other areas. There are low levels of commitment regarding Excellence, and little evidence of examples of engagement in any Excellence-related initiatives. Strong promotion of the organizational culture and emphasis on the creation of an organizational-aligned commitment.	2.75
	Engagement with excellence	2		
	Commitment to excellence	2		
	Commitment to organizational culture	4		
Behaviors	Role of leaders	4	Behaviors towards quality are mainly driven by leaders and managers, with the associates focusing solely on task-related efforts. These behaviors are poorly structured and dependent on a small group of people, influencing the organization more via direct engagement and participation of the leader in the organization's activities than through the development of competencies of the associates.	2.57
	Role of managers	4		
	Role of associates	2		
	Frequency	2		
	Duration	2		
	Intensity	2		
	Scope	2		
Artifacts and Creations	Built environment	-	The organization operates mostly in the basis of virtual networks, having little artifacts and physical creations. Internal communication channels are structured and used to develop the culture, but there is no presence of Quality and Excellence beyond the scope of product development. Stories symbols and heroes are centered around the founders, but they do promote some focus on Excellence.	2.50
	Internal communication and media	2		
	Stories, symbols and heroes	3		
Assessment Score – organizational culture orientation				2.54

Table 156 - **Organization I** - Organizational Capability Assessment – Organizational Agility

Enablers	Critical Success factors	Score	Assessment	Score
Orientation and Work Environment	Agile mindset	4	There is a clear organizational mindset on agility, focused on the creation of a flexible, collaborative work environment (even if mostly virtual). There are no particular reward or recognition practices for the use of agile, but they are included in the organization's efforts to praise the efforts of its associates.	3.75
	Agile-style work environment	4		
	Collaborative work	4		
	Adequate reward for agile use	3		
Agile Resources and Capabilities	Development of new capabilities	3	There is limited internal development of capabilities, and the organization emphasizes the acquisition of talent at this stage of its life. Nevertheless, there are efforts to managed this talent, using existing knowledge and expertise to help the workforce learn. Job rotation may happen, but is unstructured and is the result of unexpected situations or project team needs.	3.00
	Talent to support agility	3		
	Knowledge management	4		
	Job rotation systems	2		
Process and Project Team	Team dedication	3	Not all teams are not fully dedicated, but there are efforts to define the needs of each project or process and balance them with the available resources, experience and skills. Integration and cross functionality are promoted in all circumstances.	3.25
	Autonomy and empowerment	3		
	Integration/ cross-functionality	4		
	Team experience	3		
Organizational structure	Promoting horizontal structure	4	There is a strong emphasis on the promotion of a horizontal, barrier less organization, where collaboration between different teams and locations can flow. However, decision making is still somewhat dependent on the leadership team.	3.67
	Decentralized decision-making	3		
	Interdepartmental collaboration	4		
Manufacturing (development) flexibility	Automation	4	Strong use of technology allowed the organization to define tools and systems to promote a good level of speed and automation. Flexibility and reconfiguration are high, but in part due to a lack of definition that limits the speed in development processes.	4.00
	Speed	4		
	Flexibility and reconfiguration	4		
Process flexibility	Process concurrency	4	Both the integration and the concurrency of processes are well-developed and managed. The organization works to balance the needs of each group with the availability of resources while ensuring process flexibility. Revision cycles are defined but often happening reactively.	3.67
	Process integration	4		
	Frequent revision cycles	3		
New Product and Process Development	Newness	4	The development of disruptive solutions is at the core of the organization's strategy, leading to a good level of maturity in the management of newness and complexity. The use of different project management methods is promoted, but their integration is still limited	3.67
	Complexity	4		
	Balance of project management methods	3		
Technology and Information Systems	Use of technology	5	Technology and Information systems are vital in the organization, not only as a working platform as a virtual enterprise and a network, but also in the use of tools, in the definition of products/services, and the pursuit of value and competitive advantage.	5.00
	Virtual enterprise	5		
	Readiness for connectivity and digitalization	5		
Agile strategic planning	Leadership unity	4	Strong leadership unity, favored by a small leadership team. Fact based decision making is essential in the definition strategies but also products/ services. The organization is currently in its first product generation	3.67
	Fact-based decision making	4		
	Product succession planning	3		
Change Management	Strategic sensitivity	4	There are active efforts to prioritize change efforts, with leadership and management showing strong strategic sensitivity. Resources fluidity is limited by availability.	3.67
	Effective prioritization of change	4		
	Resource fluidity	3		
Agile information & communication strategy	Intensified communication	4	The organization promotes an intensified communication, with an open and easy access to information. For that, it uses different platforms and systems. However, only a small number of topics are defined and have data available.	3.67
	Easy access to information	4		
	Open information sharing	3		
Assessment Score – organizational agility				3.73

Organization J

Table 157 - **Organization J - Organizational Capability Assessment - Operational Excellence (OpEx).**

Enablers	Critical Success factors	Score	Assessment	Score
Leadership and Management Commitment	Sustainability of excellence	2	There is some focus on leadership development, with the organization giving local leaders and managers the opportunity to grow and have decision power. However, this leads to lack of transparency and integration between offices. Initial level of commitment to Excellence.	2.33
	Leadership development	3		
	Silo reduction	2		
Workforce Engagement	Suggestions and ideas programs	2	Although the organization promotes the participation of its associates, but most efforts are done at local level and not in an integrated way across the organization. No defined systems to manage workforce ideas neither to promote the recognition of the associates.	2.33
	Managing the potential for engagement	3		
	Motivation, reward and recognition	2		
Learning Organization	Training Plan	2	The organization put strong emphasis on talent an in the development of organizational learning. However, this is mostly done through leader and peer mentoring and coaching, and training plans are poorly established. There is also a strong emphasis on recruiting people with the necessary talents and skills to fill in gaps in the organization. Active talent management to retain these skills.	3.5
	Mentoring and Coaching	4		
	Recruitment & succession	4		
	Talent management (mgmt.)	4		
Workforce needs and expectations	Satisfaction over benefits	2	Workforce needs and expectations are managed by each individual office, with only the broader HR plans being defined centrally. Health, Safety and Hygiene systems are defined and deployed across the organization, but although integrated, are not so well developed as the environmental management systems. Teamwork is strongly promoted, although is often unstructured.	2.67
	Health, Safety & Hygiene	3		
	Teamwork	3		
Value Chain	Supply chain integration	4	Value chain and product and market development are central for the development of the organization. Although the core product is well defined, the way and scenarios where it can be deployed vary, and the organization aims at balance its mission and vision of deploying boxes in developing or disaster areas with the creation of value for a wide number of customers. For those reasons, there is strong participation of customers and of stakeholders in designing the processes and operations for deployment and building of the boxes.	3.75
	Focus on value creation	4		
	Customer relationship mgmt.	3		
	Stakeholders involvement in process design	4		
Product and Market Development	Design for manufacturing	3		3.75
	Stakeholder participation in product design	4		
	Cross functional integration	4		
	Market development	4		
Quality Systems	Quality assurance and error proofing	4	The organization puts emphasis on its quality systems in order to ensure the performance and reliability of the product once delivered. Although this mean some emphasis in Quality Management, these efforts are related mostly with the technical characteristics of the products and its operations, focusing essential in quality assurance and maintenance.	3.67
	Maintenance Engineering	4		
	Quality Management	3		
Mgmt., control and optimization	Process Revision	2	Despite some efforts on designing efficient operations. In this scope, efforts for scheduling and managing capacity are amongst the best developed. There is limited focus on managing, controlling, and optimizing processes. Process revision is infrequent, and there are no recurring methods or philosophies to promote their active correction.	2.25
	Lean Management	2		
	Process control and optimization	2		
	Scheduling and capacity management	3		
Process assessment & data validity	Data Reliability and Fact Driven Decision	3	There are metrics to ensure data quality and they are connected with the focus of the leadership team to make fact-based decisions. Process assessment practices are limited and infrequent.	2.33
	Benchmarking	2		
	Self-assessment	2		
Strategy Alignment	Process orientation	2	There is a strategic alignment in the organization, but is more connected with the mission, vision and values of the founder than with a focus on organizational or operational excellence. Very limited process orientation.	2.00
	Focus on organizational excellence	2		
	Organizational strategy alignment	2		
Strategy Development	Strategic objectives definition	3	The strategic alignment of the organization is more obvious felt in the pursuit of the objectives of the organization. Strategy objectives and processes are defined with strong influence of the organization mission and values.	3.00
	Strategy development	3		
	Systems thinking	3		
Strategy planning and deployment	Deployment action plan	3	The deployment plan focuses mostly on ensuring the operational deployment and the planning for contingencies after it is done. Although they are structured, they have a limited reach and resource allocation is not always efficient.	2.67
	Contingency planning	3		
	Resource allocation	2		
Org. Com. Organizational Communication	Strategy communication	3	The strategy is actively communicated across the organization, although relying mostly on the person of the founder or top leaders. Communication processes are poorly developed.	2.50
	Communication processes	2		
Assessment score – operational excellence				2.81

Table 158 - **Organization J** - Organizational Capability Assessment –Organizational Culture (orientation to Excellence).

Enablers	Critical Success factors	Score	Assessment	Score
Principles	Values and beliefs	3	The vision and Mission of the organizations strongly influence the principles of the organization and the values and beliefs of the workforce.	2.67
	Norms	2		
	Vision and mission	3		
Practices	Use of quality tools	3	While the use of quality tools is a practice sin some area, namely in product development and deployment operations, there is little commitment or active engagement with operational Excellence. Strong commitment to organizational culture is seen, inspire by the leadership and by the mission of the organization, but may vary from office to office.	2.75
	Engagement with excellence	2		
	Commitment to excellence	2		
	Commitment to organizational culture	4		
Behaviors	Role of leaders	4	Leaders are more active in promoting the importance of value creation and performance, supported by managers. Associates are task oriented, and metrics and approaches differ between locations. Behaviors are limited in all their dimension, and are mostly in a development phase at this point.	2.57
	Role of managers	3		
	Role of associates	2		
	Frequency	2		
	Duration	2		
	Intensity	2		
Artifacts and Creations	Built environment	3	The organization has different offices, located in shared spaces and start up incubators. It promotes an open layout and decoration focused mostly on cultural principles. Internal media channels are limited and see poor engagement for cultural activities. Most stories and symbolism revolve around the founder and the organizations success.	2.67
	Internal communication and media	2		
	Stories, symbols and heroes	3		
			Assessment Score – organizational culture orientation	2.66

Table 159 - **Organization J - Organizational Capability Assessment –Organizational Agility.**

Enablers	Critical Success factors	Score	Assessment	Score
Orientation and Work Environment	Agile mindset	4	There is a clear agile mindset, supported in the work environment, with the promotion of collaborative work and personal relationships. Despite this focus, there is no special reward in place of the use of agile practices or methods.	3.75
	Agile-style work environment	4		
	Collaborative work	4		
	Adequate reward for agile use	3		
Agile Resources and Capabilities	Development of new capabilities	3	Although a strong emphasis is put on individual talent, the internal development of new capabilities is limited, and the organization resorts mostly to the market to acquire the skills it needs. Nevertheless, it has initiated a series of projects to expand the existing knowledge to benefit workforce development. No structured job rotation systems.	3.00
	Talent to support agility	4		
	Knowledge management	3		
	Job rotation systems	2		
Process and Project Team	Team dedication	3	The creation of team is not always well structured in terms of skills, and the necessary cross functionality leads to teaming rather than teamwork. Resources may be involved in different project teams. Autonomy and empowerment are still limited.	3.50
	Autonomy and empowerment	3		
	Integration/ cross-functionality	4		
	Team experience	4		
Organizational structure	Promoting horizontal structure	4	Despite efforts to create a horizontal structure, decision making is centralized within the leadership team. There are challenges in the collaborations between offices (and departments). Integration is limited and operations and communication are sometimes difficult to align between offices.	3.33
	Decentralized decision-making	3		
	Interdepartmental collaboration	3		
Manufacturing (development) flexibility	Automation	4	Development flexibility is promoted with a focus in speed, essentially promote through the automation of any activities that allow it. Flexibility and reconfiguration are an advantage, but thrive on the lack of process definition.	3.67
	Speed	4		
	Flexibility and reconfiguration	3		
Process flexibility	Process concurrency	4	Process concurrency is promoted, with different team working in parallel to solve strategic challenges. However, the subsequent integration of processes faces some constraints. Process revision is sporadic and often reactive.	3.00
	Process integration	3		
	Frequent revision cycles	2		
New Product and Process Development	Newness	4	Organization J deals with a high degree in newness, and above all complexity, in its operations and in the development of its product. It has learned and defined how to deal with these factors in its development processes. Different project management methods are used, with good levels of integration.	4.00
	Complexity	4		
	Balance of project management methods	4		
Technology and Information Systems	Use of technology	4	The use of technology is strongly promoted, especially to cope with the distribution of the organization around the globe. The organization has invested in the creation of virtual networks to support its global activities. Connectivity and digitalization are a focus of its products and operations.	4.00
	Virtual enterprise	4		
	Readiness for connectivity and digitalization	4		
Agile strategic planning	Leadership unity	4	Strong leadership unity, with a small and stable leadership team being very aligned. Data is an important factor in the decision of the organization, including in the planning of the next version or generation of products.	4.00
	Fact-based decision making	4		
	Product succession planning	4		
Change Management	Strategic sensitivity	4	There is high strategic sensitivity at the leadership level, especially in regard to identifying new market opportunities. The organization has been able to efficiently prioritize change efforts in order to take advantage of them. Limited resources and dispersion of the organization constrains resource fluidity.	3.67
	Effective prioritization of change	4		
	Resource fluidity	3		
Agile information & communication strategy	Intensified communication	4	Intensified communication is promoted through a series of different channels, although the dispersion of the organization across 3 continents places some challenges. The organization has defined approaches and platforms to foster open information sharing but needs to more actively promote and allow an easy access to information.	3.67
	Easy access to information	3		
	Open information sharing	4		
Assessment Score – organizational agility				3.60

Appendix VI: Data Collection and Research on Human Subjects

Furthermore, and in order to ensure the protection, anonymity, privacy and confidentiality of the participants in this study, these documents were submitted and reviewed by the Universities committees on responsible and ethical research. Together with a research action plan, they were submitted both to the Ethics Subcommittee for Social and Human Sciences (ESSHS) at the University of Minho (UM), and to the Institutional Research Board at the Massachusetts Institute of Technology, for revision by the Committee On the Use of Humans as Experimental Subjects (COUHES). In both cases, the requests were approved and waived from the need to take any further actions to ensure the protection of the research subjects. In the process to get the approval from the COUHES, a collaborative institutional training on Human Research for Social and Behavioral Research Investigators was completed. The documents submitted and the approval (or waiver from further review) granted by these committees are included in this appendix as follows and in their original forms:

- Questionnaire Outline (in English);
- Interview Outline (in English);
- Application to the Ethics Committee – University of Minho (in Portuguese);
- Approval of the Ethics Committee – University of Minho (in English);
- Consent Form – As submitted to the University of Minho and used in Portugal (in Portuguese);
- Application for approval to the use of Humans as experimental subjects (exempt status form) – Massachusetts Institute of Technology (in English);
- Approval and waiver of further *review by the Committee On the Use of Humans as Experimental Subjects* – Massachusetts Institute of Technology (in English);
- Consent Form - As submitted to the Massachusetts Institute of Technology and used in the USA (in English).

All documents are presented in their original form.

Questionnaire outline

Operational Excellence, Culture and Agility: key concepts to manage Technical Industries

Please answer by marking with an X or a circle the options that better transmit your opinion. In some questions, you will be able to write down a short answer if none of the provided options meets your opinion.

I – Social Climate

1. How long have you been working at [introduce organization's name]?

0-1 years	1-4	5-9	10-14	15-19	20+
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2. My organization shows an active concern with the well-being and safety of its workforce:

1 Completely Disagree	2	3	4	5 Completely Agree

3. My organization shows an active concern with the training and professional development of its workforce:

1 Completely Disagree	2	3	4	5 Completely Agree

4. My organization shows an active concern with quality, continuous improvement and operational excellence:

1 Completely Disagree	2	3	4	5 Completely Agree

5. I personally understand the importance of quality, continuous improvement and operational excellence for my organization:

1 Completely Disagree	2	3	4	5 Completely Agree

6. I feel like my organization has its processes oriented in a way that helps it achieve quality and performance excellence:

1 Completely Disagree	2	3	4	5 Completely Agree

7. I can see practical results of the engagement with quality, continuous improvement and operational excellence:

1 Completely Disagree	2	3	4	5 Completely Agree

8. In my daily tasks, I am concerned with promoting quality and identifying opportunities for continuous improvement:

1 Completely Disagree	2	3	4	5 Completely Agree

9. I see quality and continuous improvement as being parts of my daily job:

1 Completely Disagree	2	3	4	5 Completely Agree

10. I think that my organization can serve as an example of best practices within its industry:

1 Completely Disagree	2	3	4	5 Completely Agree

11. I share the values of my organization in regards to **[adapt to espoused and communicated organizational values]**:

1 Completely Disagree	2	3	4	5 Completely Agree

12. I am proud of working at **[organization's name]**:

1 Completely Disagree	2	3	4	5 Completely Agree

II – Employee engagement and participation in organizational improvement activities

13. Does the workforce at **[organization's name]** have the opportunity to submitted suggestion and ideas for innovation and improvement?

- i. Yes
- ii. No

14. Have you ever submitted such an idea or suggestion?

- ii. Yes
- ii. No

15. If yes, did you feel like it was given enough consideration and follow up?

- i. Yes, and it was implemented.
- ii. Yes, but it ended up not being implemented.
- iii. No.

16. In general, do you feel like these ideas and suggestion are consistently considered and implemented?

- iii. Yes ii. No

17. Who provide stronger support to these ideas and suggestion programs?

- i. My manager
- ii. The department's head.
- iii. Other departments or sections (which?)

- iv. Top Management.

III – Perceptions and understanding over quality and organizational excellence initiatives

18. Are you familiar and able to explain of the [introduce name of a first quality and organizational excellence initiative or approach used in the organization]?

- i. Yes ii. No

19. Are you familiar and able to explain of the [introduce name of a second quality and organizational excellence initiative or approach used in the organization]?

- i. Yes ii. No

20. Do you believe that these quality and organizational excellence initiatives help [organization's name] improve and achieve performance excellence?

- i. Yes ii. No

21. According to you understanding, these initiatives and approaches...

- a. ... are everyone's responsibility.
- b. ... fall under the responsibility of top management.
- c. ... all under the responsibility of a special department or section.
- d. ... have/ should have a special team that is dedicated to and responsible for them.

22. I have participated actively in such initiatives and approaches in the past.

- iv. Yes ii. No

23. I would be interested in participating such initiatives and approaches in the future.

- v. Yes ii. No

IV – Matrix of Cultural Perception

24. How do you associate the following words with the culture and daily work experience at [organization's name]?

Technology				
1	2	3	4	5
Innovation				
1	2	3	4	5
Quality				
1	2	3	4	5
Excellence				
1	2	3	4	5
Agility				
1	2	3	4	5
Adaptation				
1	2	3	4	5
Technology				
1	2	3	4	5
Success				
1	2	3	4	5
Change				
1	2	3	4	5
Teamwork				
1	2	3	4	5

Interview outline

The final form of each interview will have to be adapted to the participating person, as it needs to be prepared considering its role, expertise with excellence initiatives. In this sense, it will vary in length (time), depth (exploration of the opinions and perceptions), and degree of involvement.

Nevertheless, a general structure is followed. There are 4 main sections forming the structure the interview.

Each section is expected to last up to 5 minutes.

The general structure and typical questions in each category are as follows:

1. Individual perceptions on Quality, Operational Excellence and Organizational Agility.

“What is your perception on the way **[introduce organization’s name]** promotes and leads its Quality and Excellence initiatives?”

“Do you feel like **[introduce organization’s name]** is a quality-minded organization?”

“Do you think that your organizations pursuit of agility has brought operational benefits and performance results?”

2. Perceptions on the general workforce views on Quality, Operational Excellence and Organizational Agility.

“What do you think is the general perception within the workforce regarding Quality and Excellence initiatives?”

“Do you think that there are different perceptions and levels of understanding on quality and excellence and initiatives in different sections and departments?”

“Regarding the organizational culture, do you think it is unified around certain values and beliefs, or are there different cultures across the organization?”

3. Challenges for the organization’s future

“What do you see as the main challenges for the future of your organizations?”

“what changes do you think are more impactful in defining the future of **[introduce organization’s name]**?”

4. Story-telling

Story-telling by members of the workforce has an important impact in the understanding of an organizational culture. A short story may help the researcher identify and analyze many of the elements and the dynamics of a culture (Hansen and Kahnweiler, 1993) such as the “heroes” (those who are the main drivers of a particularly successful accomplishment) or the “rituals” (procedures that are repeated as they are seen as a recipe for success), for example (Hofstede *et al.*, 1997). A short story allows a better understanding of the organizational culture, and the depth of the inclusion of concepts such as Quality, Excellence and Agility in the cultural panorama.

Application to the Ethics Committee – University of Minho

Formulário de identificação e caracterização do projeto

Identificação do projeto

Título do projeto	"Operational Excellence, Culture and Agility: Key Concepts to Manage Technical Industries" ("Cultura, Excelência e Agilidade como factores chave de sucesso na gestão de empresas)		
Data prevista de início	Outubro 2017	Data prevista fim	Dezembro 2019

Investigador principal e filiação	André Mendes de Carvalho, Programa MIT Portugal, Universidade do Minho
Co-investigadores e filiação	Paulo Sampaio, Departamento de Produção e Sistemas, Universidade do Minho, Orientador Eric Rebentisch, Sociotechnical Systems Research Center, Massachusetts Institute of Technology, Co-orientador

Instituição proponente	Universidade do Minho
Instituição(ões) onde se realiza a investigação	Universidade do Minho Massachusetts Institute of Technology

Entidades financiadoras	Fundação para a Ciência e Tecnologia
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Questões relativas ao envolvimento de investigadores exteriores		
Estão envolvidos no projeto, colegas de outra (s) Escola(s)/Instituição(ões)?	<input checked="" type="radio"/> S	<input type="radio"/> N
Se sim, este pedido de parecer cobre o seu envolvimento?	<input type="radio"/> S	<input checked="" type="radio"/> N

<p>Qualificação dos investigadores</p> <p>André Mendes de Carvalho, investigador e aluno do Programa Doutoral "Leaders For Technical Industries" do Programa MIT Portugal/ Escola de Engenharia. Mestre em Engenharia e Gestão Industrial pela Universidade do Minho, em 2012.</p> <p>Paulo Alexandre da Costa Sampaio, Orientador, Professor Auxiliar do Departamento de Produção e Sistemas da Escola de Engenharia da Universidade do Minho, concluiu a licenciatura em Engenharia e Gestão Industrial na Universidade do Minho em Dezembro de 2002, tendo obtido o doutoramento em Engenharia de Produção e Sistemas, na mesma Universidade, em Dezembro de 2008. Em 2009, após conclusão do douramento, foi contratado como Professor Convidado Equiparado a Professor Auxiliar, tendo ocupado essa categoria até Novembro de 2011, altura em que passou a Professor Auxiliar.</p> <p>Eric Scott Rebentisch, Co-orientador, Eric Rebentisch, Ph.D., <i>Research Associate</i> no MIT - Massachusetts Institute of Technology. Doutorado em 'Gestão da Inovação Tecnológica' pela Sloan School of Managment do MIT. Mestre em 'Comportamento Organizacional' pela Universidade Brigham Young e Bacharel em Ciências de Engenharia Aeroespacial pela Universidade Politécnica do Estado da Califórnia - Pomona.</p>
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Caracterização do projeto e questões de carácter ético relativas à sua execução

<p>Introdução justificativa do projeto e sumário dos seus objetivos</p> <p>O objectivo deste projecto de investigação é compreender a relação entre os conceitos de Excelência Operacional, Cultura Organizacional e Agilidade Organizacional. Pretende-se perceber como é que as organizações mais maduras (aquelas que foram não só capazes de sobreviver, mas também de crescer perante sucessivas mudanças nos seus mercados com várias alterações técnicas, tecnológicas, sociais e políticas das ultimas décadas) adquiriram competências ao nível da Qualidade, da Excelência e da Melhoria Contínua, e mais importante, como sustentaram estas competências na sua Cultura Organizacional. Num mundo onde a mudança é simultaneamente um sinal dos tempos e um dos principais desafios que as organizações têm que enfrentar, este estudo ganha relevo pelo sector onde se desenvolve, o das indústrias técnicas e tecnológicas, mais expostas - e em ciclos mais curtos - a esta mudança. A teoria desenvolvida aponta como principal hipótese para o sucesso</p>

destas organizações o tratamento dos conceitos de Qualidade e Excelência como parte integrante do seu dia-a-dia, uma responsabilidade de todos e envolvendo todos, ao invés de os abordarem como simples tarefas ou estratégias momentânea. Fazer destes conceitos parte integrante do *mindset* de todos os colaboradores levaria uma absorção mais profunda, e transversal à organização, destes conceitos, dotando a organização a sua força de trabalho de uma capacidade de trabalhar sobre a cadeia de valor do produto no sentido de aumentar a satisfação do cliente, evitar falhas e resolvê-las eficiente e duradouramente quando ocorreram. Isto levaria, no longo termo, a que as organizações procurassem tornar-se mais flexíveis de forma a garantir a satisfação dos seus clientes, promovendo a Agilidade Organizacional enquanto paradigma industrial e de produção, e conseguindo a adaptabilidade que o mercado deseja.

Perante este cenário, e de forma a perceber realmente como se desenvolve em contexto real esta relação entre conceitos, é necessário não só estudar e validar as opções técnicas e estratégicas ao nível da Excelência Operacional, mas também identificar até que ponto e em que profundidade estes conceitos foram capazes de influenciar, orientar e fazer evoluir as formas de trabalhar e de pensar o trabalho, ou, por outras palavras, a Cultura Organizacional. Neste sentido torna-se essencial a recolha de dados junto dos colaboradores da empresa, desde a administração à produção e desenvolvimento. Para isso, escolheu-se uma abordagem por questionários e entrevistas, com as necessárias considerações em termos de ética e proteção dos participantes envolvidos.

Participantes

A população alvo desta investigação são o conjunto dos colaboradores de empresas altamente técnicas e tecnológicas. Nesse sentido, procuram-se estudar os comportamentos de pessoas empregadas em setores como o automóvel, aeronáutico, farmacêutico, software, entre outros, sendo o objetivo estudar 3 a 4 empresas com estas características, no total. Isso implica uma variabilidade não controlada em termos de características populacionais como idade, sexo, etnia, nível educacional e até língua materna, sendo o único fator a ter em conta que as populações sejam representativas da realidade de cada uma das organizações estudadas. O tamanho da amostra também será dependente destas organizações, sendo que se esperam estudar uma percentagem que seja suficiente para que a amostra seja representativa de cada uma das organizações em estudo. Não são esperados nem planeadas quaisquer interações com grupos de especial risco, ou que sejam especialmente vulneráveis.

Recrutamento e triagem

As áreas dentro de cada organização (departamentos ou secções) onde possíveis participantes serão selecionados serão discutidas e identificadas com a ajuda administração de cada empresa, tendo em conta os objetivos do estudo. Assim, pretende-se em cada organização participante acompanhar a cadeia de valor de um produto, tanto na sua vertente produtiva como de desenvolvimento, e obter uma percepção da cultura organizacional em relação ao foco na qualidade, excelência e criação de valor para o cliente.

Neste sentido, e tipicamente, as áreas de uma organização a estudar serão as de concepção e desenvolvimento do produto (engenharia), produção, controlo de Qualidade (Processos e Produto), administração e operações. Isto envolverá participantes com diferentes cargos, tarefas, idades e habilitações literárias. A selecção das pessoas a participar e a definição do número de participantes serão feitas com base na sua capacidade de representatividade da realidade da organização, em termos de número de colaboradores, cargos, tarefas e/ou anos de permanência na organização.

Dentro de cada secção ou departamento, e através de um acordo com a chefia dessa área, serão identificados os possíveis participantes, tendo por base os critérios de representatividade acima descritos, e um número similar de suplentes com iguais características. Estes suplentes serão chamados quando, por recusa ou impossibilidade temporária, os participantes inicialmente identificados não possam estar presentes. Mais uma vez, destaca-se o carácter voluntário da participação, e a privacidade e/ou confidencialidade dos dados recolhidos para uso e tratamento exclusivo dos investigadores.

Compensação e custos

Não haverá espaço para compensação financeira para a participação no estudo.

Procedimento

Uma vez identificados os possíveis participantes em cada área organizacional, e veiculada a sua aceitação inicial em participar (os mesmos poderão mudar de ideias e recusar responder, em privado com o investigador, e evitando o conhecimento da sua decisão por parte da chefia/organização), os mesmos serão convocados para sessões de preenchimento de questionários ou entrevistas. A recolha de dados será, quer no caso das sessões de preenchimento de questionários quer das entrevistas, realizada num local fechado e privado dentro das instalações da empresa, e apenas na presença do investigador. Em qualquer caso, os participantes serão informados do âmbito do projecto, do ato voluntário que constitui a sua participação, e dos seus direitos. Os questionários e as gravações áudio realizadas durante as entrevistas serão guardadas com acesso exclusivo para tratamento de dados por parte dos investigadores no âmbito único deste projeto, não sendo partilhadas com quaisquer partes terceiras.

Benefícios, Riscos e Desconforto

Qualquer possível desconforto identificado neste estudo prender-se-á essencialmente com o receio que os participantes poderão ter em comentar certos assuntos, nomeadamente referentes ao rumo e estratégia da empresa, ou em relação à liderança, chefias ou colegas. Estas situações poder-se-ão prender, por exemplo, com receio de represálias ou com a criação de um mau ambiente de trabalho. Este desconforto será, regra geral, mais exetável junto dos colaboradores manuais/operacionais, pelo que um maior cuidado deve ser tido juntos dos mesmos no sentido de os esclarecer.

Nesse sentido, algumas medidas serão tomadas no sentido de minimizar o risco ou desconforto dos participantes, sendo garantido que qualquer participação é feita num ambiente privado e controlado. Assim, será clarificado no início de cada sessão física de preenchimento dos questionários ou entrevista o carácter de anonimato e/ou a privacidade e o uso exclusivo dos dados recolhidos por parte do investigador. Este carácter e utilização serão também expresso por via escrita, onde se fará a garantia de consentimento informado não assinado (de forma a salvaguardar o anonimato e/ou a privacidade dos participantes). De forma a garantir que a participação é voluntária, serão também dadas, em cada caso e por escrito, as indicações a seguir caso não pretendem responder.

Confidencialidade

Um dos objetivos deste estudo é perceber uma série de elementos culturais existentes na força de trabalho de organizações que demonstram maturidade na implementação, gestão e integração de ferramentas da Qualidade e a capacidade de se adaptarem a alterações nos seus mercados. Assim, o estudo prende-se mais no grupo do que no indivíduo, excepção feita a cargos de administração e aos líderes/fundadores de uma empresa, por serem estes os mais influentes atores na criação e evolução da cultura de uma organização. Assim sendo, o preenchimento dos questionários será feito em total anonimato, assegurando-se que os questionários, se preenchidos fisicamente, são realizados em espaços fechados e apenas na presença do investigador. Em relação aos questionários preenchidos *on-line*, os mesmos serão enviados diretamente para os colaboradores que neles participem, sendo que os resultados individuais não terão qualquer possibilidade de rastreamento para a máquina (computador) ou respondente, e sendo o acesso aos resultados exclusivo aos investigadores.

No que toca às entrevistas estruturadas, com gravação áudio, a privacidade dos participantes será garantida primeiramente através do controlo do ambiente no local da entrevista, sendo a mesma feita num espaço fechado e insonorizado para o exterior. De forma a aumentar a privacidade dos respondentes, os ficheiros áudio gravados serão identificados por um código cujo sistema de descodificação apenas o investigador e os orientadores terão acesso.

Fruito da possível presença regular, ou mesmo contínua, do investigador nas instalações da empresa (devidamente autorizada pela administração) numa perspectiva etnográfica da compreensão cultural, situações poderão ocorrer em que o investigador fará recolha de dados em momentos e espaços públicos da organização. Nessas situações, caberá ao investigador zelar pelos seus interlocutores, negando-se a fazer perguntas que coloquem em riscos os participantes, podendo nomeadamente interromper a conversa e marcando uma entrevista privada caso surjam assuntos sensíveis mas suficientemente relevantes para a investigação.

Todos os dados recolhidos serão guardadas, em formato digital e com acesso exclusivo do investigador e dos seus orientadores, até 18 meses depois do término do doutoramento, apenas e só para salvaguardar quaisquer possíveis questões futuras referentes à qualidade e isenção da investigação. Perante tal situação, o acesso aos dados seria apenas dado a uma comissão de investigação científica independente, sendo em qualquer circunstância negado acesso a qualquer outra entidade. Após este período os dados serão destruídos.

Conflito de interesses

O investigador declara não existirem quaisquer conflitos de interesse.

Consentimento Informado

A investigação envolve apenas voluntários saudáveis?	<input checked="" type="radio"/> S	<input type="radio"/> N
A investigação envolve grupos vulneráveis: crianças, menores, idosos ou outras pessoas com incapacidade temporária ou permanente?	<input type="radio"/> S	<input checked="" type="radio"/> N
O pedido de parecer inclui a declaração de consentimento informado, livre e esclarecido?	<input checked="" type="radio"/> S	<input type="radio"/> N

Formato de consentimento informado:

Consentimento informado.

Consentimento informado não assinado.

Consentimento informado alterado.

Isenção de consentimento.

Documentação anexada

cópia dos questionários ou formulários de recolha de dados a utilizar, se aplicável;

modelo de consentimento informado e outro material informativo relevante;

e outro material informativo relevante

informação a que se refere o número 3 do artigo 4º das normas orientadoras da SECSH sobre o enquadramento, apoio e viabilidade do projeto facultada pelo responsável pela unidade/subunidade orgânica onde se vai desenvolver o projeto;

curriculum vitae resumido dos investigadores responsáveis.



Universidade do Minho

SECSH

Ethics Subcommittee for Social and Human Sciences

Project reference: SECSH 050/2017

Project Title: *Operational Excellence, Culture and Agility: Key Concepts to Manage Technical Industries*

Responsible investigator: André Mendes de Carvalho, MIT Portugal Program, University of Minho

Other investigators: Paulo Sampaio, Department of Production and Systems (DPS), School of Engineering, University of Minho; Eric Rebentisch, Sociotechnical Systems Research Center, Massachusetts Institute of Technology (Supervisors)

Acknowledgment Receipt and Approval

The Ethics Subcommittee for Social and Human Sciences (SECSH) acknowledges the receipt of the process regarding the project “Operational Excellence, Culture and Agility: Key Concepts to Manage Technical Industries”, with the reference SECSH 050/2017.

It is the Committee’s opinion that the project complies with national Law and international guidelines for research with human participants that regulate the investigation in Social and Human Sciences, and has granted FULL APPROVAL.

Braga, 04th December de 2017.

The President

Digitally signed by
PAULO MANUEL
PINTO PEREIRA
ALMEIDA MACHADO
Date: 2018.03.13
09:32:53 Z

Paulo Manuel Pinto Pereira Almeida Machado

Cultura, Excelência e Agilidade como factores chave de sucesso na gestão de empresas

André M. Carvalho

Universidade do Minho/ MIT Portugal Program

Informação aos participantes entrevistados e consentimento

O objectivo deste estudo é obter dados que permitam compreender a Cultura de Trabalho na Organização XPTO, nomeadamente no que toca à importância e peso de alguns factores estratégicos na vida diária e na forma de trabalhar da organização.

A participação neste questionário é facultativa e deve ser exercida de livre e espontânea vontade. Todas as respostas recolhidas serão tratadas de forma anónima e confidencial, sendo de uso exclusivo do investigador, e não serão divulgadas ou partilhadas para outros fins ou com outras partes.

Os dados serão gravados em formato áudio, identificados por um código a que apenas os investigadores têm acesso.

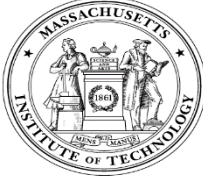
Código da entrevista: _____

Data : _____

Declaro ter lido as informações referentes à confidencialidade, privacidade e gestão/guarda dos dados recolhidos no âmbito deste estudo, e participar nele voluntariamente:

Sim

Application for approval to the use of Humans as experimental subjects (exempt status form) – Massachusetts Institute of Technology

	<p align="center">Massachusetts Institute of Technology Committee on the Use of Humans as Experimental Subjects</p>	<p align="center">Application # (assigned by COUHES)</p>	
		<p align="center">Date</p>	

APPLICATION FOR APPROVAL TO USE HUMANS AS EXPERIMENTAL SUBJECTS (EXEMPT STATUS FORM)

Please answer every question. Positive answers should be amplified with details. You must mark N/A where the question does not pertain to your application. Any incomplete application will be rejected and returned for completion.

I. BASIC INFORMATION

1. Title of Study	
Operational Excellence, Culture and Agility: key concepts to manage Technical Industries	
2. Investigator	
Name: André Mendes de Carvalho	Building and Room #:E18-430
Title: Ph.D Candidate (Visiting Student)	Email: andremc@mit.edu
Department: Sociotechnical Systems Research Center Institute for Data, Systems and Society	Phone: (617) 230-2602
3. Faculty Sponsor. <i>If the investigator does not have PI Status (faculty, SRS or PRS) then a faculty sponsor must be identified and sign below.</i>	
Name: Eric Rebentisch	Email: erebenti@mit.edu
Title: Research Associate	Phone: (617) 258-7773
Affiliation: Sociotechnical Systems Research Center	
4. Collaborating Institutions. <i>If you are collaborating with another institution(s) then you must obtain approval from that institution's institutional review board, and forward copies of the approval to COUHES).</i>	
University of Minho, Portugal	
5. Funding. <i>If the research is funded by an outside sponsor, the investigator's department head must sign this form. Please enclose one copy of the research proposal (draft is acceptable) with your application. Do not leave this section blank. If your project is not funded check No Funding.</i>	
A. Sponsored Project Funding:	
<input type="checkbox"/> Current Proposal	Proposal # _____
Sponsor _____	
Title _____	
<input type="checkbox"/> Current Award	Account # _____
Sponsor _____	
Title _____	

B. Institutional Funding:	
<input type="checkbox"/> Gift <input type="checkbox"/> Departmental Resources <input checked="" type="checkbox"/> Other (explain) <u>FCT - Foundation for Science and Technology (Portugal)</u> <input type="checkbox"/> No Funding	
6. Statement of Financial Interest	
<p>Does the investigator, study personnel involved in the study or their Family have a <u>financial interest</u> in a company or other organization participating in or providing drugs, devices, biological agents, investigational medical devices, or any other tangible material or financial sponsorship for the research?</p> <p><input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</p> <p>Does this study contemplate receiving/using any materials/data (data sets, confidential information) or making any purchases from or subawards to a company or other organizations in which you or a Family member hold a Financial Interest?</p> <p><input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</p> <p>If yes was checked for any of the questions above, then attach a Supplement for Disclosure of Financial Interest for each individual with an interest. <i>This supplement, together with detailed guidance on this subject and definitions of the highlighted terms, is available in the COUHES site under Policies & Procedures in the Financial Conflicts of Interest section.</i></p>	
7. Human Subjects Training. <i>All study personnel in research MUST take and pass a training course on human subjects research. MIT has a web-based course that can be accessed from the main menu of the COUHES web site. COUHES may accept proof of training from some other institutions. List the name, MIT or outside affiliation and emails of all study personnel and indicate if they have taken a human subjects training course.</i>	
<p>André Mendes de Carvalho, MIT, andremc@mit.edu. Training taken. Eric Rebentisch, MIT, erebenti@mit.edu. Training taken. Paulo Sampaio, University of Minho, paulosampaio@dps.uminho.pt. Sponsorship and approval of the Ethics Committee at the University of Minho (Portugal) to this project can be found enclosed.</p>	
8. Anticipated Dates of Research	
Start Date: 05/20/2018	Completion Date: 01/31/2019

II. STUDY INFORMATION

1. Purpose of Study. <i>Please provide a brief statement of the background, nature and reasons for the proposed study. Use non-technical language.</i>
<p>The goal of this research project is to study both the technical measures (tools and methods) and the cultural side (behaviors) of an organization, as we study the relationship between an organization's process quality & operational excellence, and the development of agile capabilities.</p> <p>During the last decades, the speed at which changes are unfolding and their level of disruption have substantially changed the global market. In times of change and innovation, adaptability is essential to fulfil customer expectations.</p> <p>Agility seeks to meet the rapid changing needs of the marketplace in real time response to customer demand. Excellence is about adding value for customers by understanding, anticipating and fulfilling needs. In face of such propositions, it would be logic to join both concepts and look for an integrated perspective linking the two. But due to the lack of empirical proof</p>

of such relationship, this approach has been rather limited. This project aims at closing that gap, developing new scientific knowledge but providing also new practical approaches for technical industries worldwide.

2. Study Protocol. *Please provide an outline of the proposed research. You should provide sufficient information for effective review by non-scientist members of COUHES. Define all abbreviations and use simple words. Unless justification is provided, this part of the application must not exceed 2 pages. Attaching sections of a grant application is **not** an acceptable substitute for the description requested here. Include copies of any questionnaire or standardized tests you plan to use. If your study involves interviews, submit an outline of the types of questions you will include. Your research outline should include a description of:*

A. Experimental procedures:

Interviews and Questionnaires

B. Study population, maximum number of subjects and age range:

Around 10 to 20% of the workforce in each partnering organization is expected to participate in the questionnaire. Participants are voluntary members of the workforce, of any age, and in any role. Maximum number of expedited subjects should be between 150 and 200. 3 to 4 organizations are expected to participate.

C. Subject Compensation: (describe all plans to pay subjects in cash or other forms of payment i.e. gift certificate).

No direct compensation is provided for the involvement of subjects. This project is done in the scope of helping develop and promote new paths for organizational improvement and change, and that is stated in the recruitments message, where voluntary participation is thanked beforehand. The results of the study will be provided to partner organizations in order to help them leverage their organizational capabilities. Only processed and analyzed data and results are sent. No interview transcripts are shared, protecting personal views or any other ideas shared in the interviews).

D. Method of recruitment

Primary method of recruitment is an email message sent by the Investigator (or responsible person at partner organization) to the entire organization.

E. Length of subject involvement:

10 minutes (questionnaires); 25 minutes (interviews).

F. Location of the research:

Industrial or Product Development sites in the Greater Boston Area.

G. Procedures for obtaining informed consent:

Informed Consent will be gathered from all participants in the questionnaire and interviews.

Consent Form for interviews and questionnaires attached.

Alteration of Informed Consent Request Form enclosed (the process of acquiring consent for the questionnaires does not require the signature of the subjects).

H. Describe procedures to ensure confidentiality and explain in detail how research data will be secured:

No personal data is collected in the questionnaires. Interviews are given a code in order to prevent identification of participants. Interviews will be store digitally, with no personal reference or information, up to 18 months after graduation (for scientific validation proposes).

3. HIPAA Privacy Rule. *If you are in any way working with individually identifiable health information for a research study that is sponsored by MIT Medical, an MIT Health Plan or another healthcare provider, then the Health Insurance Portability and Accountability Act ("HIPAA") likely applies to your study and you must comply with HIPAA in the conduct of your study. However, we expect that if you are applying for exempt status, you will only receive de-identified health information from participants in connection with your study. If you expect to receive identifiable health information from or about research participants in your study, you should complete the standard COUHES application form rather than this application form. You may consult with COUHES staff if you have questions about the exempt/non-exempt status of your proposed research study.*

Signature of Investigator _____

Date _____

Signature of Faculty Sponsor _____

Date _____

Signature of Department Head _____

Date _____

Print Full Name and Title

The electronic file should be sent as an attachment to an e-mail: couhes@mit.edu. In addition, two single sided hard copies (one with original signatures) should be sent to the COUHES office: Building E25-Room 143B.

Approval and waiver of further review by the Committee On the Use of Humans as Experimental Subjects (COUHES) – Massachusetts Institute of Technology

MIT Committee On the Use of Humans as
Experimental Subjects

MASSACHUSETTS INSTITUTE OF TECHNOLOGY
77 Massachusetts Avenue
Cambridge, Massachusetts 02139
Building E 25-143B
(617) 253-6787

To: Andre Mendes de Carvalho
From: Leigh Finn, Chair
COUHES
Date: 05/01/2018
Committee Action: Exemption Granted
Committee Action Date: 05/01/2018
COUHES Protocol #: 1804342950
Study Title: Operational Excellence, Culture and Agility: Key Concepts to Manage Technical Industries

The above-referenced protocol is considered exempt after review by the Committee on the Use of Humans as Experimental Subjects pursuant to Federal regulations, 45 CFR Part 46.101(b)(2) .

This part of the federal regulations requires that the information be recorded by investigators in such a manner that subjects cannot be identified, directly or through identifiers linked to the subjects. It is necessary that the information obtained not be such that if disclosed outside the research, it could reasonably place the subjects at risk of criminal or civil liability, or be damaging to the subjects' financial standing, employability, or reputation.

If the research involves collaboration with another institution, then the research cannot commence until COUHES receives written notification of approval from the collaborating institution's IRB.

Unless informed consent is waived by the IRB, use only the most recent, IRB approved and stamped copies of the consent form(s).

Adverse Events: Any serious or unexpected adverse event must be reported to COUHES within 48 hours. All other adverse events should be reported in writing within 10 working days.

Amendments: Any changes to the protocol, including changes in experimental design, equipment, personnel or funding, must be approved by COUHES before they can be initiated, except when necessary to eliminate apparent immediate hazards to the subject.

Human subjects training is required for all study personnel and must be updated every 3 years.

Consent Form - As submitted to the Massachusetts Institute of Technology and used in the USA.

CONSENT TO PARTICIPATE IN NON-BIOMEDICAL RESEARCH

Operational Excellence, Culture and Agility: key concepts to manage Technical Industries

You are asked to participate in a research study conducted by André Carvalho, PhD Candidate of the MIT Portugal Program. You were selected as a possible participant in this study as a workforce member of partner organization of this Research Project. You should read the information below, and ask questions about anything you do not understand, before deciding whether or not to participate.

▮ PARTICIPATION AND WITHDRAWAL

Your participation in this study is completely voluntary and you are free to choose whether to be in it or not. If you choose to be in this study, you may subsequently withdraw from it at any time without penalty or consequences of any kind. The investigator may withdraw you from this research if circumstances arise which warrant doing so.

▮ PURPOSE OF THE STUDY

The goal of this research project is to study both the technical measures (tools and methods) and the cultural side (behaviors) of an organization, as we study the relationship between an organization's process quality & operational excellence, and the development of agile capabilities.

During the last decades, the speed at which changes are unfolding and their level of disruption have substantially changed the global market. In times of change and innovation, adaptability is essential to fulfil customer expectations.

Agility seeks to meet the rapid changing needs of the marketplace in real time response to customer demand. Excellence is about adding value for customers by understanding, anticipating and fulfilling needs. In face of such propositions, it would be logic to join both concepts and look for an integrated perspective linking the two. But due to the lack of empirical proof of such relationship, this approach has been rather limited. This project aims at closing that gap, developing new scientific knowledge but providing also new practical approaches for technical industries worldwide.

▮ PROCEDURES

If you volunteer to participate in this study, we would ask you to do the following things:

- Participate in an anonymous questionnaire, expected to take about 10 minutes to complete, and/or,
- Participate in a confidential interview, typically with a duration of 10 to 25 minutes.

In both cases questions regard your experience as a member of your organization's workforce regarding the concepts of quality and organizational excellence, agility, and the general working context.

Questions are thought to address the relations between these concepts and understand workforce perceptions. You will be only asked to participate once in each of these procedures.

▮ **POTENTIAL RISKS AND DISCOMFORTS**

This research does not involve anything more than minimal risks. Personal views on the organizational context are gathered anonymously (in the case of questionnaires), or coded (for interviews) in order to reduce or even eliminate any potential risks and discomforts.

▮ **POTENTIAL BENEFITS**

The results of the study will be provided to partner organizations in order to help them leverage their organizational capabilities. No personal data or views will be shared, at any point, with the organization. Only final, analyzed results combining the entire data gathered in the organization will be provided.

▮ **PAYMENT FOR PARTICIPATION**

There is no payment or other direct compensation for the involvement of subjects

▮ **CONFIDENTIALITY**

Any information that is obtained in connection with this study and that can be identified with you will remain confidential and will be disclosed only with your permission or as required by law. In addition, your information may be reviewed by authorized MIT representatives to ensure compliance with MIT policies and procedures. No information will be released to any other party for any reason.

Audiotaped content will be used only under full consent and in the extent provided by that consent. Subject's right to review the tapes, and revoke previously given consent. Only the Investigator (André Mendes de Carvalho, andremc@mit.edu) will have access to them. Data will be used for educational purpose, and when they will be erased 18 months after graduation. All data will be stored digitally, but will be coded to avoid disclosure of further personal information.

▮ **IDENTIFICATION OF INVESTIGATORS**

If you have any questions or concerns about the research, please feel free to contact

André Mendes de Carvalho
andremc@mit.edu
(617)230-2602

Faculty Sponsor:
Eric S. Rebentisch
erebenti@mit.edu

▮ EMERGENCY CARE AND COMPENSATION FOR INJURY

If you feel you have suffered an injury, which may include emotional trauma, as a result of participating in this study, please contact the person in charge of the study as soon as possible.

In the event you suffer such an injury, M.I.T. may provide itself, or arrange for the provision of, emergency transport or medical treatment, including emergency treatment and follow-up care, as needed, or reimbursement for such medical services. M.I.T. does not provide any other form of compensation for injury. In any case, neither the offer to provide medical assistance, nor the actual provision of medical services shall be considered an admission of fault or acceptance of liability. Questions regarding this policy may be directed to MIT's Insurance Office, (617) 253-2823. Your insurance carrier may be billed for the cost of emergency transport or medical treatment, if such services are determined not to be directly related to your participation in this study.

▮ RIGHTS OF RESEARCH SUBJECTS

You are not waiving any legal claims, rights or remedies because of your participation in this research study. If you feel you have been treated unfairly, or you have questions regarding your rights as a research subject, you may contact the Chairman of the Committee on the Use of Humans as Experimental Subjects, M.I.T., Room E25-143B, 77 Massachusetts Ave, Cambridge, MA 02139, phone 1-617-253 6787.

**IF YOU AGREE AND VOLUNTARILY WISH TO PARTICIPATE, PLEASE PROCEED
IF YOU DO NOT WISH TO PARTICIPATE, PLEASE INFORM THE RESEARCHER AND HAND BACK THIS
DOCUMENT**