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Adaptation Mechanisms and Service Quality Dimensions in Dynamic and Turbulent Environments: Empirical Results

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Abstract. Organizations internally seek to develop adaptation and resilience processes or adaptation mechanisms to cope with drastic changes in the environment in order to survive. The changes in the environment affect the perception of product and service quality by the consumer, which are related to customer satisfaction. The purpose of this work is to identify the service quality dimensions that are nested within organizations and the mechanisms to adapt its processes to the turbulent environment. Twenty-four multiple case studies in the construction sector were developed through semi-structured interviews with customers and managers. The results suggest that there are new service quality dimensions; from the customers perspective such as: requirements management and process optimization, emotional intelligence, ergonomic analysis, permanent training of masons, extra activity, monitoring and others. The adaptation mechanisms that organizations use to guarantee service quality are integral training, saved budget, paradigm change, management system, teamwork, and others.

Keywords. Adaptation Mechanisms, Construction Sector, Service Quality Dimensions, Transdisciplinary, Turbulent environments.

Introduction and literature review

The dynamic and turbulent changes that occur in organizations and their environments are nowadays frequent. Organizations seek internally to develop adaptation and resilience processes or adaptation mechanisms in the face of context variables that change noticeably, to survive and achieve sustainability [1]. Therefore, it is important that organizations develop their actions in the face of dynamic and turbulent changes from a holistic point of view with the objective to integrate efforts from every department or area within the organization.

The Construction Sector (CS) has a complex structure by its nature, and at the same time it must face even more drastic changes in the environment with uncertainty, ambiguity and volatile information [2]–[4]. The International Standard Industrial Classification and the Central Product Classification [5], consider that the CS has two parts: first, construction that covers the physical outputs of construction activities (e.g., buildings or civil engineering works); and second, construction services that cover

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services provided in constructing these objects [5]. Construction is also a process of delivering physical outputs to clients through a temporary production system that consists of elements shared with other projects [6]. Therefore, the CS can offer goods and services at the same time [7]. Both dimensions are generally present in all construction projects and are dynamically and non-linearly related, which justifies why the CS can be considered and treated as a complex system [8, 9].

Service quality (SQ) is related to the satisfaction of clients in the short term. The purpose of SQ in an organization is to evaluate the satisfaction of consumers through the analysis of the gap between the expectations and the perceptions of the consumers in a specific time after receiving a service [9]–[11]. It is dependent on technical quality and functional quality, with an important component related to corporate image [12]. Technical quality tries to interpret what are the expectations, the functional quality tries to find the way in which the organization interprets the characteristics and translates them to technical specifications of work, and the corporate image deals with the perceptions of the consumers about the organization of the service that depends on: technical and functional quality, price, external communications, physical location, appearance of the site, and the competence and behaviour of service firms' employees [13]. SQ is the consequence not only of the performance of service, but also of the interaction between customer and firms [14]. SQ is an important determinant of customer satisfaction which in turn influences customers' loyalty [15]. Thus, SQ can be described as a multidimensional and dynamic concept.

Table 1 summarizes the traditional SQ dimensions referred in the literature [8, 9] that may affect SQ in the CS.

Table 1. Service Quality traditional dimensions: important aspects.

SQ Dimension	Most important aspects
Reliability	Total quality of work output Reputation and experience Delivery times
Responsiveness	Professionals' skills Worker's behaviour Technological tools Incident's resolution Work disruptions
Assurance	Competence Credibility Confidentiality
Empathy	Access Courtesy Communication Understanding the customer Interaction with customers
Tangibles	Technological tools

The traditional SQ dimensions can be described as:

- *Reliability,* as the ability to perform the service in a careful and reliable manner in a general consistency of performance and dependability (total quality of work output, relation with the physical progressive product quality and quality control, reputation and experience, relation with the image and prestige won through quality works done in the past and "know-how" of interaction with customers, delivery times, integrity, honesty, and ethics management in their processes).
- *Responsiveness*, willingness to help clients and provide fast service. It is related with time which is important to customers in the CS (professionals' skills,

workers behaviour as the dynamic ability to understand the customers' requirements and proactive attitude, technology tools in relation to incorporate virtual simulation of a construction project, 3D simulation, virtual reality, incidents resolution, work disruptions).

- *Assurance*, knowledge, and attentions shown by employees and their abilities to generate credibility and confidence. It is related to credibility, confidentiality, wisdom, and competence.
- *Empathy*, personalized attention with kindness and courtesy. It is related to understanding the customers' expectations and objectives; communication and permanent feedback in the project development (access, courtesy, communication, understanding the customer, interaction with customers).
- *Tangible's elements*, aspect of physical facilities, equipment, machines, tools, means of safety, the location of the project, personnel, and communication materials (technological tools, interaction between organizations and customers through technological applications).

Traditional dimensions represent an important approach that aims to improve the quality of the organizations within the CS. SQ dimensions influence the decision-making process, the improvement of plans and the formulation and implementation of strategy. SQ dimensions help to improve the organization competitiveness and the adaptation to the market [12, 13]. However, new SQ dimensions can be identified in the literature. Table 2 summarizes new SQ dimensions referred in the literature [8] that may affect the SQ in the CS.

Table 2. Service Quality new dimensions: important aspects.

SQ new dimension	Most important aspects
Quality Aesthetic	Aesthetic (construction) Technical (construction)
Design	Flexibility Adaptability
Care in work execution	Social responsibility
Innovation	Sustainability Social responsibility

The new SQ dimensions referred in the literature can be described as:

- *Quality aesthetic*, it is related to aesthetic and technical workmanship in the project execution.
- *Design*, it is related with construction design, completion processes, technologies, organization, and assembly (flexibility and adaptability before, during and after execution of the project) and versatility with a conceptual strategic model of the construction.
- *Care in execution of work*, it is related with the preventive actions of the organizations to avoid accidents and incidents during the work process.
- *Innovation*, it is related to offering a construction services which imply technological solutions to social, environment and economic sustainability needs; organizations within the CS show to customers the responsibility to optimise resources through sustainable innovation processes (sustainability, social responsibility). Some service innovation processes.

Drastic changes around the world have led many organizations to reinvent their actions in the provision of products and services. Some of the organizations that have

adapted to the changing environment have been able to stay in the market and generated competitive advantage, while others have closed their production and gone bankrupt. To analyse this situation, we use the term VUCA, which is the acronym standing for Volatility, Uncertainty, Complexity and Ambiguity. It represents the actual and normal situation of this century where the environment is in a state at the edge of chaos or in a certain deterministic state of the chaos around the world [4]. According to Darwin's Origin of Species, it is not the most intellectual of the species that survives; it is not the strongest that survives; but the species that survives is the one that is best able to adapt and adjust to the changing environment in which it finds itself. Adaptation Mechanisms (AM) are understood as plans or strategies that could help organizations develop their adaptable capacity, and to generate an internal change to improve quality requirements and to provide service and product quality [17]. The adaptation process is generated to improve dynamic capabilities of work team.

The adaptation process is influenced by many factors which have different natures and origins. These factors can intersect several knowledge domains due to their inherently different conceptual and empirical affiliations. In order to better understand the adaptation phenomena in a complex and turbulent context related to SQ, a multidisciplinary and interdisciplinary perspective may be needed. In this work, several disciplinary areas from engineering, and other fields, are applied to take account of the diversity of factors that affect the object under study, which are particularly visible and evident in the diversity of the service quality dimensions and adaptation mechanisms that are addressed in the study. The main disciplinary approach is related to quality management, but other areas are also integrated to provide a broader and more comprehensive understanding, such as the area of quality engineering, and other related to industrial engineering such as innovation management, but also organizational studies and systems and complexity theory, not to mention technical dimensions. In this particular paper we focus on only some of these areas, but the underpinning research involves all the mentioned fields.

The purpose of this work is to identify AM organizations of the CS use under turbulent environment to adapt SQ dimensions as a result on environmental changes. To do that some empirical results that represent two perspectives; customers, and managers, are presented and discussed.

1. Methodology

The methodology adopted was based on exploratory multiple-cases studies. Exploratory study because the authors wanted to discover how organizations of the CS develop AM in a dynamic and turbulent environment oriented to guarantee SQ. Also, a descriptive study was carried out to identify new SQ dimensions for the CS involving customers and managers. Multiple-case studies involved customers and managers. The snowball technique (is used commonly when it is difficult to identify members of the desired population) within the category of volunteer sampling in the non-probability sampling technique [18] was adopted to select 24 respondents (12 customers and 12 managers). The main participants are the managers of the organizations and the customers of the CS in Cuenca city, Ecuador.

The research method used in this work has seven phases.

1. Develop the instruments (questionnaires for managers and customers).

2. Spanish translation process.
3. Instrument validation process.
4. Interview's execution process.
5. Interview transcription process.
6. Systematization and analysis of information.
7. Analysed results writing.

The instruments were developed to identify dimensions associated with new SQ dimensions and to identify the AM that organizations use to guarantee SQ in a dynamic and turbulent environment. The semi-structured interview instrument had three sections: (i) general information of the interviewee, (ii) questions to understand the customer and manager experience in a project within the CS and their perception about SQ dimensions and AM, and (iii) questions to validate SQ dimensions.

After the Spanish translation process was made, a validation process with three customers and three managers within the CS was performed. Semi-structured interviews were based on developed questionnaires.

A detailed transcript of interviews was made to analyse the qualitative information from the customers and the managers, through qualitative analysis techniques. Every question was analysed with detail to obtain information in relation to the research objectives. Later, an English translation process was made. An integration of concepts was made and is presented in the Results section.

Many of the managers interviewed have participated in the public sector. Other present an important interaction with organizations within the CS in remodelling construction processes, housing construction, real state, departments, and others.

2. Results

In this section the results are presented based on customers and managers' perspectives.

2.1. Customers interviews results

Traditional and new SQ dimensions were considered relevant by customers of the CS. In this case, "care in execution of work" represented the most important dimension, followed by "responsiveness", "tangibles elements", "quality aesthetic" and "reliability". Customers identified additional SQ dimensions not referred in the literature, that seem to be relevant the CS.

The new SQ dimensions that emerged from the customers interviews were:

- *Requirements' management and processes' optimization* in the interaction between customers and organizations; it depends on whether it is in the public or private sector; however, it is necessary to reduce the activities which do not generate value and fulfil customer's requirements.
- *Emotional intelligence* in the construction manager to generate customers' satisfaction; skills to manage and solve problems.
- *Ergonomics analysis* in the design process of a construction work to adapt the installation to the people.
- *Permanent training* of the bricklayers to generate dynamic capabilities, experience, and professionalism.

- *Bonus item,* consists of giving an attractive attribute, functionality or upgrade to customers and generate more satisfaction through an unbudgeted offer.

2.2. Managers interviews results

The most important traditional and new SQ dimensions identified in the literature from the managers' perspective are: "reliability", "responsiveness", "empathy", "assurance", "design", "care in execution of work", and "tangibles elements".

The new SQ dimensions that emerged from the managers' interviews were:

- *Planning to reduce waste,* is a cultural process to incorporate within the organizations in the CS; also, to generate preventive processes to avoid resources' waste.
- *Project monitoring* is important to incorporate a monitoring process to understand every step in the project.
- *Deeper socialization of technical aspects*, it is important to inform customers about the construction process and technical aspects must be more explained.

Managers' perspective on the relevant internal stabilization strategies or AM to sustain the construction process were analysed. On the one hand, changes in construction are not recommended because they generate more costs (budget), delays in delivery and possible future problems if the changes are at the structural level. On the other hand, other cases indicate change could be made and it would generate customer satisfaction, despite increasing costs to be assumed by the customer.

The AM that help to generate an internal change within the organizations of the CS are induced based on managers' perceptions. The AM are:

- *Integral training*, is related with the employees need to know the new technology, trends, methodologies, and strategies to respond to an exigent market.
- *Saved budget*, consists of saving some money to respond to a complex environment and maintain financial liquidity.
- *Paradigm change*, is related with developing an internal process to change the actual paradigm and find other ways to work.
- *Management system improvement*, is oriented to organize the processes, documents, evidence and clarify the decision making process.
- *Teamwork empowerment*, is related with employee's empowerment.
- *Permanent feedback*, involving customers and collaborators through effective meetings.
- *Versatile construction project*, is the orientation to improve the adaptation of the construction with different technologies.
- *Innovation*, is key to generate new ideas, new approaches in critical situations with an integral solution.
- *Service approach*, to generate a service culture in the employees.
- *Formal approbation*, to guarantee through signed documents the adaptation of the work.

3. Discussion

3.1. Different perceptions on SQ dimensions from customers and managers

The traditional and new SQ dimensions described in the literature are confirmed among customers and managers. However, customers present new SQ dimensions and some of them are shared between customers and managers.

The new SQ dimensions identified from customers' and managers' perspectives are presented in Table 3. The SQ dimensions were establish through a deep analysis from open and close questions of the data collection instrument.

The customers' perspectives are different from the managers' perspectives. The managers' focus is on technical aspects while the customers refer soft and emotional aspects related with the construction project.

Table 3. SQ dimensions by customers and managers perspective.

From Customers perspective	From Managers perspective
Requirements' management and processes' optimization	Planning to reduce waste
Emotional intelligence	Project monitoring
Ergonomics analysis	Deeper socialization of technical aspects
Permanent training	
Bonus item	

The understanding of drivers of customers' satisfaction, through the analysis of SQ dimensions [19] could help organizations to adapt their structure and processes to manage through turbulent and dynamic environments [20]. Increase in customer satisfaction can lead to future purchase intention and ultimately to market share increase [19]. Therefore, a holistic, flexible, and adaptable attitude from managers and respective organisational processes, including the communication between customers and organizations, seem to be relevant to face changing customer's requirements and expectations, because SQ is influenced by environmental changes.

Managers emphasize on building constructions that are useful, that are friendly to the environment, that have a sustainability approach, that have a purpose and that the subsequent maintenance is the least frequent possible [21]. Results suggest that managers could plan to provide a bonus activity and frequent training of collaborators to generate greater customer satisfaction [22].

3.2. Adaptation mechanisms to guarantee a Service Quality

Table 4 and Table 5 show the articulation between the AM identified and the new SQ dimensions presented in the Results section. The relation was established through a deep analysis of the interviews and the systematization and analysis of information from customers and managers.

Requirements' management and processes' optimization seems to be the focus of all the AM, since this has a direct impact on cost and customer perception of SQ. Requirements management are necessary to deal with customer's VUCA requirements during project execution.

AM to deal with SQ dimensions relevant to customers are difficult to establish because "the customer is right", however he may not have knowledge about technical aspects to allow a clear and complete definition of requirements which may lead to

customer unsatisfaction when the project is delivered. Thus, requirements' management and processes' optimization in the CS is a difficult task that may be subject of further research to focus on the adaptation of the business model for an organization considering the uncertainty, the dynamic requirements, and the complexity of the construction project. Results suggest that training, parading change, and innovation are AM referred by managers that impact all the SQ dimensions referred by customers.

Table 4. Adaptation Mechanisms and SQ dimension from customers' perspective.

	SQ Dimensions from Customers' perspective				
Adaptation Mechanisms	Requirements' management and processes' optimization	Emotional intelligence	Ergonomics analysis	Permanent training	Bonus item
Integral training	✓	✓	✓	✓	✓
Saved budget	✓				✓
Paradigm change	✓	✓	✓	✓	✓
Management system	✓		✓		✓
Teamwork	✓	✓		✓	
Permanent feedback	✓				✓
Versatile construction project	✓		✓		
Innovation	✓	✓	✓	✓	✓
Service approach	✓	✓		✓	✓
Formal approbation	✓		✓		✓

Table 5. Adaptation Mechanisms and SQ dimension from managers' perspective.

	SQ Dimensions from Managers' perspective		
Adaptation Mechanisms	Planning	Follow up	Deeper socialization of technical aspects
Integral training	✓	✓	✓
Saved budget	✓	✓	✓
Paradigm change	✓	✓	✓
Management system	✓	✓	
Teamwork		✓	
Permanent feedback	✓	✓	✓
Versatile construction project	✓		✓
Innovation		✓	
Service approach	✓		✓
Formal approbation	✓		

Managers consider the importance of AM because it helps to improve SQ dimensions. The AM that have influence on all the SQ dimensions according to managers perspective, are improving job skills and paradigm change. Innovation is a SQ dimension and an AM at the same time. This is due to the dual nature of the concept of innovation, which can be understood as a process but also as an outcome of the process. Changing the firm's internal process related to innovation management may be considered a mechanism that responds to the needs of the market in terms of the provision of new products or services that increase costumers' perception of quality.

Diverse and different criteria were analysed from the managers' perspective about the AM which help to improve SQ. Some factors, such as integrity in the execution of

the work, a good requirements management, a developed work team, experience, adaptability, proactive action, project customization, all are key to resolve particular problems [23].

Customers identified strategies and/or AM through experiences with firms within the CS. The reaction of customers depends on their expectations. Managers, on the other hand established AM to have effective negotiation processes. Collecting both points of view was helpful to understand the motivations behind the responses. A more thorough comparison and analysis of the two perspective is out of the scope of this paper due, in part, to space limitations.

4. Conclusions

According to the interviews results, CS is a complex sector and satisfying customers' expectations represents a great challenge [24]. Each construction project has a variety of variables to considerer, such as: its nature (simple or complex), the intervention sector (public and/or private), and the customer (one person, many peoples and/or an institution) [25]. An eclectic research approach was followed through the application of a mix of concepts to better take into account the diversity of the nature of the factors that affect the phenomena.

From this exploratory study, new SQ dimensions were identified. They may suggest a new research path for a more thorough study. The SQ dimensions from customers' and managers' perspectives are different in the CS confirming previous research [11]. Managers express SQ dimensions related with technical aspects while customers highlight emotional aspects. Thus, there is an important gap between these two perspectives which can be a path for future research [11], [17].

The understanding of drivers of customer satisfaction, which may be related to new dimensions, is the key element of SQ [19], and SQ culture developed in organizations could help to adapt their structure and processes to respond to changing and turbulent environments [20]. It is important to consider customer satisfaction to increase the market of customers and the future behavioural intention [19] and the features of the dynamic environment and their influence in the SQ [19].

An opportunity for an in-depth study in relation to these empirical results is to develop an organizational resilience process oriented to face the dynamic and turbulent environments with AM to guarantee the SQ [1].

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