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“Total Quality Management in Greek Tech Companies: A
Comparative Analysis of Critical Success Factors Across
Large/Medium and Small Enterprises.”

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Patra, Greece, May 2024

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“Total Quality Management in Greek Tech Companies: A Comparative Analysis of Critical Success Factors Across Large/Medium and Small Enterprises.”

“Διοίκηση Ολικής Ποιότητας σε ελληνικές εταιρείες τεχνολογίας: Συγκριτική ανάλυση των κρίσιμων παραγόντων επιτυχίας σε μεγάλες/μεσαίες και μικρές επιχειρήσεις“.

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"to my family"
"I'd like to thank my supervisor, Mr. Chountalas, for all his encouragement, guidance, and patience throughout this dissertation."

Abstract

This study aims to determine if the 13 Critical Success Factors (CSFs) have an impact on Greek ISO-certified technology companies and the importance they demonstrate between the three company sizes, Large/Medium and Small, by ranking the CSFs.

A qualitative interview approach was used by interviewing a panel of 13 experts in quality management working in ISO certified technology companies in Greece.

The results showed that "Organizational Leadership and Management Commitment" is the most important CSF overall, in Large and Small enterprises and ranked 6th in Medium-sized enterprises. For Medium-sized enterprises, the most important CSF is "Customer-Centric Approaches". For all of them, the "Risk management and Compliance" factor is of fundamental importance. "Strategic planning and policy" and "Human Resource Development" also ranked highly.

The novelty of this study is to identify the CSFs of Total Quality Management by interviewing experts and ranking their preferences, overall and comparable between Large/Medium and Small companies as Greek ISO certified technology companies.

Keywords

TQM, Total Quality Management, CSF, Critical Success Factors, Greek tech companies

Περίληψη

Η παρούσα μελέτη έχει ως στόχο να προσδιορίσει εάν οι 13 κρίσιμοι παράγοντες επιτυχίας (ΚΠΣ) έχουν αντίκτυπο στις ελληνικές εταιρείες τεχνολογίας που έχουν πιστοποιηθεί με ISO και τη σημασία που επιδεικνύουν μεταξύ των τριών μεγεθών εταιρειών, Μεγάλων/Μεσαίων και Μικρών, κατατάσσοντας τους ΚΠΣ.

Χρησιμοποιήθηκε μια ποιοτική προσέγγιση συνέντευξης με τη λήψη συνεντεύξεων από μια ομάδα 13 εμπειρογνομόνων σε θέματα διαχείρισης ποιότητας που εργάζονται σε πιστοποιημένες με ISO τεχνολογικές εταιρείες στην Ελλάδα.

Τα αποτελέσματα έδειξαν ότι η «Οργανωσιακή Ηγεσία και Δέσμευση της Διοίκησης» είναι το πιο σημαντικό ΚΠΣ συνολικά, στις Μεγάλες και Μικρές επιχειρήσεις και κατατάσσεται στην 6η θέση στις Μεσαίες επιχειρήσεις. Για τις Μεσαίες επιχειρήσεις, το πιο σημαντικό ΚΠΣ είναι οι «Πελατοκεντρικές προσεγγίσεις». Για όλες αυτές, ο παράγοντας «Διαχείριση κινδύνων και συμμόρφωση» είναι θεμελιώδους σημασίας. Ο «Στρατηγικός σχεδιασμός και πολιτική» και η «Ανάπτυξη ανθρώπινου δυναμικού» κατατάσσονται επίσης σε υψηλή θέση.

Η καινοτομία αυτής της μελέτης είναι ο προσδιορισμός των ΚΠΣ της Διοίκησης Ολικής Ποιότητας μέσω συνεντεύξεων με εμπειρογνώμονες και η κατάταξη των προτιμήσεών τους, συνολικά και συγκριτικά μεταξύ Μεγάλων/Μεσαίων και Μικρών επιχειρήσεων ως ελληνικές πιστοποιημένες με ISO τεχνολογικές επιχειρήσεις.

Table of Contents

Abstract	v
Περίληψη.....	vi
List of Abbreviations & Acronyms	ix
1. Introduction	1
1.1 Importance of the Topic	1
1.2 Objectives of the study	2
1.3 Contribution to the field	2
1.4 Methodology used	2
1.5 Structure	3
2. Literature Review	4
2.1 Organizational Leadership and Management Commitment	4
2.1.1 Leadership / Top Management Support	4
2.1.2 Change management culture / Organization trust / Managerial innovation	5
2.1.3 Employee commitment / External support.....	5
2.2 Strategic Planning and Policy	6
2.2.1 Process Management / Strategic quality planning/policy	6
2.2.2 Information and Analysis / Vision / Strategic Advantage	7
2.2.3 Evidence-based Decision-making / Design Thinking / Problem Solving.....	8
2.3 Customer-Centric Approaches	8
2.3.1 Customer Satisfaction	8
2.3.2 Customer Focus.....	9
2.4 Human Resource Development.....	10
2.4.1 Teamwork / Human Resources Management (HRM).....	10
2.4.2 Employee Training, involvement, and empowerment	10
2.4.3 Motivation / Reward system / Selective hiring process	11
2.5 Process Optimization and Innovation	12
2.5.1 Continuous Improvement / Process Innovation / Quality Assurance (QA).....	12
2.5.2 Benchmarking / Service Design / Adaptability and Agility / Funds.....	13
2.6 Quality Control and Assurance	14
2.6.1 Quality Control / Quality Culture	14
2.6.2 QM tools & techniques / Statistical process control	14
2.6.3 Automation / Appraisal System / Feedback.....	14
2.7 Integration of Technology and Data Management.....	15
2.7.1 Automated document control and data collection.....	15
2.7.2 Technology Utilization.....	15
2.8 Stakeholder Engagement and Value Creation.....	15
2.8.1 Collaboration and quality relationship among stakeholders	15
2.8.2 Communication / Promotion	16
2.9 Sustainability and Social Responsibility	16
2.9.1 Sustainable development and Corporate sustainability.....	16
2.10 Performance Management and Evaluation	17
2.10.1 Performance Monitoring / Evaluation.....	17
2.10.2 Effective project management / Reliable data collection / Employee satisfaction.....	17

2.11 Product Development and Management	17
2.12 Risk Management and Compliance	18
2.13 Infrastructure and Support System	18
3. Methodology	20
3.1 Introduction	20
3.2 Data collection and sample characterization	20
3.3 Data Analysis	22
4. Results	23
4.1 Introduction	23
4.2 Demographic Characteristics of Sample	23
4.3 Interviews	23
4.3.1 1st Organizational Leadership and Management Commitment.....	23
4.3.2 2nd Strategic Planning and Policy	25
4.3.3 3rd Customer-Centric Approaches.....	27
4.3.4 4th Human Resource Development	30
4.3.5 5th Process Optimization and Innovation	33
4.3.6 6th Quality Control and Assurance	35
4.3.7 7th Integration of Technology and Data Management	37
4.3.8 8th Stakeholder Engagement and Value Creation	39
4.3.9 9th Sustainability and Social Responsibility.....	41
4.3.10 10th Performance Management and Evaluation	43
4.3.11 11th Product Development and Management	45
4.3.12 12th Risk Management and Compliance	47
4.3.13 13th Infrastructure and Support Systems	49
4.4 Ranking	
5. Conclusions	53
5.1 Introduction	53
5.2 Discussion	53
5.2.1 Comparative analysis for overall companies	53
5.2.2 Comparative Analysis between Large/Medium and Small Enterprises.....	53
5.3 Contribution, Limitations, and Further Research.....	56
Bibliography.....	57

List of Abbreviations & Acronyms

TQM	Total Quality Management
CSFs	Critical Success Factors
QM	Quality Management
QA	Quality Assurance

1. Introduction

1.1 Importance of the topic

The importance of the study focuses on its ability to provide information on the effectiveness of the Critical Success Factors (CSFs) of Total Quality Management (TQM) in the Greek technological sector. It offers an opportunity to understand how Greek technology companies implement those CSFs.

TQM is an overall management philosophy designed to ensure continuous improvement of product and process quality to achieve customer satisfaction. In simpler terms, it involves integrating quality into products and processes at all levels of the company business operations thus elevating quality to the responsibility and obligation of all company managers (Ahire, et al., 1995). TQM's history exists from the quality gurus like Deming and Juran, the Japanese adaptation and broadening of quality control (QC) principles, to current models like the Malcolm Baldrige National Quality Award (MBNQA) and the European Quality Award (EQA) (Boaden, 1997).

Defining TQM is a matter that has been argued about by quality management researchers throughout the years, leading to a wide range of definitions. Yet even today, there is no consensus on any of these terms (Sila & Ebrahimpour, 2003). Most current TQM literature is based on the quality management principles and philosophies of quality gurus like:

"Quality is free - TQM the theory of zero defects", (Crosby, 1979)

"14 Points for Management", (Deming, 1986)

"Continuous improvement can help increase quality while reducing costs", (Feigenbaum, 1991)

"Quality Planning, Control and Improvement", (Juran, 1989)

Over the years, several studies have highlighted the importance of TQM. Ahire, et al.'s (1996) paper suggests that TQM firms tend to outperform non-TQM firms. A study by Pambreni, et al. (2019) showed that TQM components, i.e. customer focus, continuous improvement, strategically based and total employee involvement, exert a meaningful and beneficial influence on organizational performance. Yu, et al.'s (2020) results implied that TQM's performance benefits increases if a business adopts a forward-looking strategy ("inner factor") and if a business grows with respect to product lifecycle ("outer factor"). Therefore, in order to obtain the full benefits of TQM, managers ought to introduce TQM before their competitors. The research by Saragih, et al. (2020) on the intervening influence of TQM on the link between supply chain operations competence and performance is empirically supported. According to Permana (2021) findings, TQM, regarded as broadly applied approach to control the quality of products and services, has been adopted in numerous companies worldwide and has been effective in enhancing the competitiveness, business growth and sustainability of organizations as well as raising the motivation of employees. The findings of Ali (2024) suggested that TQM studies have received substantial interest in advanced economies and should focus more on newly industrializing and developing economies. The outcome of Mohsin, et al.'s (2024) study shows that TQM policies influence positively the environmental and economic sustainability of the business.

In contrast, there is no proof that TQM policies influence the social sustainability of the business in a positive way.

Critical Success Factors (CSFs) concern, for each business, the limited areas in where outcomes, viewed sufficiently, would provide the successful competitive performance for the organization to thrive (Leidecker & Bruno, 1984). They are the variables, consist of techniques and tools, that provide the most value to customers and that best differentiate competitors in a given industry.

By comparing the CSFs between Large/Medium and Small firms, the study offers a comparative analysis, which reveals whether the importance of CSFs differs according to the size of the firm. Large/Medium and Small firms face challenges due to differences in resources, organizational structure, business culture, and market dynamics.

A focus on Greek Technology companies ensures that the study addresses the distinctive context, challenges, and opportunities present within this industry in Greece. This tailored analysis enhances the relevance and applicability of the study findings to the local business environment. The analysis of the CSFs of TQM in Greek Technology companies is of significant importance for entrepreneurs, researchers, and customers.

1.2 Objectives of the study

This thesis aims to identify practical implications, inform and provide information on the effectiveness of CSFs in Greek technology companies, and potentially influence policy decisions and business support initiatives related to Quality Management (QM).

Furthermore, the study aims to provide information on the practice of CSFs in the Greek technology sector, allowing stakeholders to use the information and design supporting policies, and initiatives that promote a culture of quality and continuous improvement.

The objective of the comparative analysis of CSFs between Large/Medium and Small enterprises is to provide information on the scalability and adaptability of enterprises.

1.3 Contribution to the field

This study will be of interest to academics and practitioners involved in TQM, offering insights specific to the Greek context. Moreover, it will provide the basis for further research at the international level.

It will help management to identify areas for improvement in their strategies to enhance their performance and competitiveness in the market. Understanding CSFs improves organizational efficiency and customer satisfaction.

The focus on Greek technology companies ensures that the study addresses the particular challenges of this sector.

The study is particularly pertinent for technology companies because they operate in a dynamic and rapidly changing environment.

1.4 Methodology used

The methodology employed in this study encompasses the following key steps:

First, data sources were consulted in order to extract information pertaining to CSFs associated with the implementation of TQM in Greek technology companies.

Secondly, a systematic analysis of the collected data enabled the identification and compilation of a list of CSFs derived from the TQM implementation literature.

Third, a list of Greek technology firms that have been certified with the ISO 9001 standard was compiled. The distinction of companies according to their size based on the Greek standards, article 2 of Law 4308/2014, are classified as:

Class of business	Average Number of employees
Very Small Business	10 employees
Small Business	50 employees
Medium Business	250 employees
Large Business	+ 250 employees

In this study, due to the fact that we will focus on Greek Technology Companies, certified with ISO 9001, in order to facilitate the approach, the distinction of the companies has been made as follows:

Class of business	Average Number of employees
Small Business	9-28 employees
Medium Business	50-90 employees
Large Business	143-+900 employees

Fourth, communication was established with the quality experts of each company, and an interview was conducted. The interview consisted of questions pertaining to the 13 CSFs, their relative importance, a comparison between large, medium, and small companies, and a prioritization of the CSFs.

1.5 Structure

This dissertation is structured into five chapters: Introduction, Literature Review, Methodology, Results, and Conclusions.

The first chapter provides an overview of the subject's importance and objectives, a brief description of the methodology employed, and the contribution of the study to the field.

The second chapter presents a comprehensive literature review on the analysis of the 13 CSFs.

The third chapter outlines the methodology to be employed and the constraints that will be observed.

The fourth chapter presents a synthesis of the collected information and performs the relevant analysis.

In the fifth chapter, the conclusions of the previous analysis are discussed.

2. Literature Review

We have identified 13 CSFs from a review of the relevant literature across a range of industries. These will form the basis of our research into the Greek tech industry. In this chapter, we will analyze these CSFs in the context of existing literature.

2.1 Organizational Leadership and Management Commitment

2.1.1 Leadership / Top Management Support

Leadership is seen as the ability to establish trust and consolidate people's support to achieve the business's goals (Alawag, et al., 2023; Ali & Johl, 2022). The responsibilities of leadership and top management support are to raise awareness in the workforce of the company's vision and policy on quality (Akanmu, et al., 2023), and to build cohesion between divisions to deliver superior performance (Albloushi, et al., 2023). Top management support is therefore essential in setting the tempo for any transformation (Samanta, et al., 2023).

The literature on TQM promotes leadership as a key factor in adopting TQM (Abbas & Kumari, 2021; Alawag, et al., 2023; Ali AlShehail, et al., 2022; Ali & Johl, 2022; Budayan & Okudan, 2022). However, according to Abbas & Kumari (2021), leadership indicates an insignificant impact on Knowledge Management.

The implementation and practice of TQM are guided by enablers, which are leadership and top management support, and insufficient barriers (Ali & Johl, 2022). The features of leadership and top management support are innovative insight, network intelligence, adaptability, digital intelligence, clear procedures, recruiting qualified staff, and acquiring up-to-date tools and equipment (Antony, et al., 2022; Elibal & Özceylan, 2022; Samanta, et al., 2023), strategic targets, and metrics for TQM and shares them with employees, providing ongoing engagement through funding, training, and verification of results (Nguyen, et al., 2023).

In the context of TQM, as formulated in ISO 9001, leadership aims to create and maintain conditions for the achievement of the organization's quality objectives (Elibal & Özceylan, 2022). Effective leadership supports the development of organizational design, decision-making, and control of operations, having a beneficial effect on financial performance and customer satisfaction (Hassan & Jaaron, 2021; Verma, et al., 2022). Moreover, according to Do, et al. (2021), support from top management (human category) contributes to enhancing the quality of the company, and balancing interests between the business and stakeholders.

Engagement in TQM requires sustained commitment from leadership and top management support (Alawag, et al., 2023; Albloushi, et al., 2023; Ali & Johl, 2022; Budayan & Okudan, 2022; Nguyen, et al., 2023). To fulfill the goals of TQM, influential leaders need to foster cooperation over competition, shared communication and better understanding among all stakeholders towards achieving the organizations' goals, leading

to the implementation of the Quality Transition starting with the digital transition and then continuing with the digital environment (Akanmu, et al., 2023; Antony, et al., 2022).

Under TQM, managers use accurate and up-to-date data to assess results to fairly promote employees (Elibal & Özceylan, 2022), so Leadership must take into account the skills of all stakeholders to have a meaningful impact on wider stakeholders such as customers and suppliers (Abbas & Kumari, 2021). Also, establish an appropriate climate for efficient interaction at every stage of the organization (Samanta, et al., 2023). According to Arifin, et al. (2022), some of the principles that must be implemented in TQM are fact-based management, organizational system, and respect for everyone.

Poor leadership is a barrier to TQM implementation. Reasons for this may include inappropriate strategic approaches to quality, lack of leadership development, absence of control systems to enable TQM programs and insufficient employee involvement (Zhang, et al., 2021). Top management support must be directed towards the long-term performance of the business. Competitiveness to reach short-term objectives may result in infighting, antagonistic attitudes, limited understanding, and recriminations when these objectives are not met (Budayan & Okudan, 2022). Nguyen, et al. (2023) considers top management support as one of the social factors. This factor refers to the evaluation of individuals in a firm's superiors who support quality improvement (Azam, et al., 2023; Budayan & Okudan, 2022).

2.1.2 Change management culture / Organization trust / Managerial innovation

The change management culture supports employees to become familiar with the use of the latest technology and working methods. It is important to define the tasks related to the implementation of the new approach. Change management culture is key to a company's success in implementing change, whether it is a process, or a system, or a whole new set of policies (Samanta, et al., 2023; Yadav, et al., 2021).

Organizational trust is the way the organization values the skills and abilities of its employees to manage operations and direct change in the organization. It also means that the organization's principles and policies are expressed at all levels of the hierarchy and that employees feel that their managers are impartial and open to being approached for help (Ali & Johl, 2022; Arunachalam & Palanichamy, 2017; Lim, et al., 2022).

Innovation capability consists of three sub-components: product innovation, process innovation, and management innovation (Hudnurkar, et al., 2023; Samson, 1991; Tsai, et al., 2001) with a structured approach implementing quality improvement activities (Yadav, et al., 2021).

2.1.3 Employee commitment / External support

Employee engagement has played an important role in creating a greater sense of personal involvement in organizational success. Training, willingness and ambition are all important functions in enhancing commitment to organizational performance (Cavallone & Palumbo, 2022).

Often, employees are so busy that they can't devote a significant amount of time to other projects, so they bring in outside experts to help with their extra skills. An additional factor is the fact that in some cases developing in-house expertise is not economically feasible and delivery times would increase (Barth & Koch, 2019; Yadav, et al., 2021).

2.2 Strategic Planning and Policy

2.2.1 Process Management / Strategic quality planning/policy

Continuous improvement is founded on process management practices that lead to the improvement and innovation of products, services, and processes (Alawag, et al., 2023; Ali AlShehail, et al., 2022; Kalra & Pant, 2013). TQM combines the ideas of systems management and continuous improvement, optimally applied in the context of a process management strategy (Alawag, et al., 2023; Ali & Johl, 2022). Process management stands out as a key factor in TQM, as it enhances the clarity of operations, contributing to the rationalization of procedures, increased performance, more effective deployment of resources, reduces the risk of man-made mistakes and production costs, as well as having the latest technology and equipment to serve customers more effectively and efficiently (Alawag, et al., 2023; Ali & Johl, 2022; Azam, et al., 2023; Budayan & Okudan, 2022). It is also a hard factor (Ali & Johl, 2022), it includes - Robust communication processes between stakeholders; and an intelligent system for planning, and monitoring progress. - System for analyzing and evaluating the project performance. - Ensuring updated communication with all project participants (Alawag, et al., 2023; Ali AlShehail, et al., 2022). Businesses must identify the root causes of poor communication. ISO 9001 improves the procedures, incorporating several standards to provide advice to organizations regarding how they should operate (Budayan & Okudan, 2022).

Soft practices, such as strategic planning, are long-term factors and involve managerial issues that need to be integrated throughout the TQM strategy (Hassan & Jaaron, 2021). It is a fundamental practice, a key enabler of TQM (Abbas & Kumari, 2021; Ali AlShehail, et al., 2022; Verma, et al., 2022) and is the way management sets its objectives and allocates its assets to achieve them (Abbas & Kumari, 2021; Verma, et al., 2022) in the short or long term (Albloushi, et al., 2023; Azam, et al., 2023). It provides a methodology for quality managers by synchronizing their actions towards the adoption of TQM (Abbas & Kumari, 2021; Verma, et al., 2022) and supporting strategic decision making on innovation and sustainability (Ali AlShehail, et al., 2022). It is considered critical for introducing TQM and improving services and products when TQM and strategic planning are integrated into the organization's workflows (Albloushi, et al., 2023; Azam, et al., 2023; Verma, et al., 2022). Organizations evaluate and adapt their activities according to market needs, with monitoring strategies. Strategic planning has a profound effect on the production, collection, sharing and use of knowledge, enables organizations to produce knowledge and foster a culture of knowledge sharing (Abbas & Kumari, 2021). Strategic planning affects business performance in the areas of finance, customer satisfaction, innovation and competition (Abbas & Kumari, 2021; Hassan & Jaaron, 2021). In today's

competitive environment, implementing an effective market-based strategy the organization will lead rather than just compete (Abbas & Kumari, 2021). Leadership develops strategic planning to define the vision, mission, and business objectives of the organization (Abbas & Kumari, 2021; Albloushi, et al., 2023; Azam, et al., 2023; Verma, et al., 2022).

2.2.2 Information and Analysis / Vision / Strategic Advantage

Information and analysis are an enhancement for effective performance in the information and communication revolution (Akanmu, et al., 2023; Elibal & Özceylan, 2022). They describe a set of interactions between colleagues or managers to employees (Do, et al., 2021). The huge amount of data collected from multiple feeds must be processed with reliable intelligence, therefore, the company must have a specialized information strategy (Brah, et al., 2002) to be able to leverage this data, e.g. through big data analytics. The level of accuracy and clarity of decision-making depends mainly on access to and analysis of the information (Abbas & Kumari, 2021). Organizations can respond to changes in the environment quickly and decisively if they have an advanced information system capable of collecting and distributing data accurately (Abbas & Kumari, 2021; Akanmu, et al., 2023), thus firms perform and innovate successfully, increasing customer satisfaction (Abbas & Kumari, 2021; Alshourah, 2021) improving employee performance and profitability compared to firms with inadequate information management (Abbas & Kumari, 2021; Albloushi, et al., 2023; Azam, et al., 2023). Powell (1995) noted the existence of a link at the interface of information systems quality and sustainable performance. In contrast, (Sila & Ebrahimpour, 2005) stated that hard factors, such as information and analysis, do not have a meaningful correlation. According to Akanmu, et al. (2023), information and analysis are one of the effective key dimensions for improving quality performance (Prajogo & Sohal, 2003), which belongs to the soft practices of TQM implementation (Lim, et al., 2022). It involves the combination of software, hardware, processes, and people (Ahire, et al., 1996; Akanmu, et al., 2023; Kartha, 2004).

The literature on QM suggests dimensions classified as soft and hard. Soft practices have a positive effect on hard practices, indicating that leadership/top management should emphasize soft quality practices such as employee engagement and training, creating a shared vision (Ali & Johl, 2022; Lim, et al., 2022; Rahman & Bullock, 2005) quality across the workforce, etc. (Khan & Naeem, 2016). Vision, according to Lim, et al. (2022), is a factor that supports leadership. It creates a culture of quality for service innovation and organizational performance (Khan & Naeem, 2016; Rahman & Bullock, 2005). It addresses the motivations behind the various business excellence models, such as the Malcolm Baldrige National Quality Award (MBNQA), which promotes quality awareness, or the European Foundation for Quality Management (EFQM), which recognizes sustainable success, and guidelines on how to achieve it. Antony, et al. (2022) and Yadav, et al. (2021), for the deployment of Quality 4.0 technologies, point to vision as a CSF and must be defined by leadership. Tomorrow's Quality 4.0 vision must be linked to the present state of affairs (Antony, et al., 2022).

The Sony, et al. (2020) required some CSFs to implement quality, such as leveraging Quality 4.0 as a strategic advantage (Antony, et al., 2022). The findings of the work (Sadikoglu & Zehir, 2010) reveal that employees are a vital asset for an organization when it comes to innovating to introduce new products, services, or processes, enhancing efficiency and quality, reducing costs, and satisfying customers. As described by (Deming, 1982), the key focus of TQM is to build and maintain a competitive advantage by achieving maximum effectiveness. This efficiency is manifested by reducing costs and improving customer satisfaction (Deming, 1982).

2.2.3 Evidence-based Decision-making / Design Thinking / Problem Solving

According to QMP (2024), evidence-based decision making is among the principles that are commonly applied. Decisions should be based on timely and accurate data to achieve adequate results. Conducting research, and making easy use of data are among the key measures for evidence-based decision making (Elibal & Özceylan, 2022).

Design thinking is of great importance (Chiarini & Kumar, 2021; Samanta, et al., 2023) because it enables the management team to start thinking about issues from a different perspective and come up with the best possible way of solving the problem at hand, thus driving the business towards a higher level of operational performance (Samanta, et al., 2023).

Lim (2022) and Ali (2022) identify problem-solving as a critical factor in the practice of soft TQM. Typically, quality problem solving teams are established that include employees from different departments. By identifying and solving the root cause of a problem, similar errors can be avoided. Medium and large firms seem to have top management support for TQM in terms of solving problems in sustainability performance, compared to small firms. Perhaps the reason for this is that larger firms have means and resources that top management would be willing to provide for the functions of TQM. This allows larger organizations to have better performance compared to smaller organizations. Conversely, Nguyen (2023) argue that smaller companies have fewer employees, so problem-solving methods are easier to manage compared to larger companies.

2.3 Customer-Centric Approaches

2.3.1 Customer Satisfaction

Competition, unpredictable business markets and environmental issues are forcing firms to think beyond their traditional areas of expertise and develop practices that allow them to create competitive advantage and enhance their performance by satisfying customers and other stakeholders (Agyabeng-Mensah, et al., 2021). Companies improve their business performance by focusing on consumers' demands, assessing their attitudes towards goods or services, trying to build relationships with their customers, and determining their needs and expectations to improve their satisfaction because customer satisfaction depends on how they feel about a service or product (Alawag, et al., 2023). The correlation between quality products or services and improved profitability leads to

increased customer satisfaction (Elibal & Özceylan, 2022) as well as customized production, smart factories/operations/products, skilled employees and digital customer integration (Elibal & Özceylan, 2022).

Identifying the current and future needs of customers, communicating effectively (Alawag, et al., 2023) with them and evaluating and monitoring their satisfaction are key practices of ISO 9001 (Elibal & Özceylan, 2022). Customer satisfaction is a critical factor in the implementation of TQM (Alawag, et al., 2023) since the company is customer oriented because it will be impossible to have satisfaction without reasonable standards and regulations to minimize complaints (Alawag, et al., 2023). TQM is a people-centered management framework designed to continuously improve customer satisfaction with a realistic level of effort (Arifin, et al., 2022). TQM enhances profits by creating customer satisfaction, resulting in customer retention (Agyabeng-Mensah, et al., 2021; Alshourah, 2021).

2.3.2 Customer Focus

Customer focus as a soft factor (Ali & Johl, 2022; Hassan & Jaaron, 2021; Lim, et al., 2022) for effective implementation of Quality in organizations (Ali AlShehail, et al., 2022; Elibal & Özceylan, 2022) influences the performance of Quality (Alshourah, 2021). As mentioned, TQM is a customer-centric practice (Budayan & Okudan, 2022). The awareness of the need to put the customer at the center of all decisions (Alshourah, 2021) and to meet their needs is business success. The presence of alternatives lead to increased rivalry between firms. The primary objective of focusing on customers should be to enhance their value by satisfying their current and upcoming needs (Abbas & Kumari, 2021; Budayan & Okudan, 2022). Organizations need to understand not only their external customers (those who buy the end product for use) but also their internal customers (employees, stakeholders, partners, etc.) (Budayan & Okudan, 2022).

Positive impact on operational performance comes from TQM practices such as customer focus (Faeq, et al., 2021; Hassan & Jaaron, 2021). Especially Small and Medium Enterprises (SMEs), which contribute significantly to a country's economic growth, need to adopt customer-focused quality practices to be sustainable (Niyi Anifowose, et al., 2022) thus leading to lower prices, higher quality, increased customer satisfaction and reduced consumption of energy and resources resulting in profitability (Agyabeng-Mensah, et al., 2021). Customer engagement during the production phase, as well as the prediction of market demand, are benefits in the context of customer centricity (Ali & Johl, 2022; Elibal & Özceylan, 2022) refer to the customer life cycle as having three phases: pre-purchase, actual phase and post-purchase phase. In the first phase the company analyses the customers' needs. In the second, partners and predictive analysis help the buyer to buy the optimal product/service at the ideal price. In the third, manufacturers realize the importance of Quality development to benchmark the performance of the product/service (Ali & Johl, 2022).

The customer focus in knowledge management processes (knowledge creation, acquisition, sharing and application) has a positive impact. Customer-related knowledge

should be shared with colleagues, especially in cases of tasks that depend on previous work. Companies need to acquire customer knowledge to differentiate their products and gain competitive advantage (Chakraborty, et al., 2019). Providing accurate information to customers about products and services is a corporate responsibility and a right of customers (Abbas & Kumari, 2021; Hudnurkar, et al., 2023).

2.4 Human Resource Development

2.4.1 Teamwork / Human Resources Management (HRM)

Teamwork is one of the important factors in establishing TQM. It helps organizations to succeed (Alawag, et al., 2023) and according to Lim (2022) it is a mild practice of TQM. In his study Verma (2022), the results placed it among the three key strategic human resource management (SHRM) practices, although it ranked the lowest in the study of (Alawag, et al., 2023). The goal of team strategy is to involve everyone in the TQM process (Alawag, et al., 2023) so that individuals can continuously create and communicate their innovative ideas (Verma, et al., 2022) to fulfill and achieve the vision, goals and objectives of the company (Alawag, et al., 2023; Faeq, et al., 2022). The health of an organization depends on the cooperative performance of employees working as a team (Verma, et al., 2022). Teams are a vital part of all TQM initiatives, allowing business units to work together to meet customer requirements in a way that is not possible with individual work (Verma, et al., 2022). They are essential when the organization requires multiple levels of interaction to build trust among project team participants, resulting in long-term, mutually beneficial and sustainable working partnerships and enhancing a sense of ownership (Alawag, et al., 2023; Verma, et al., 2022).

The social-behavioral aspects of TQM, such as human resource management (Ali & Johl, 2022), are classified as soft attributes of TQM (Ali & Johl, 2022; Lim, et al., 2022). They include training, empowerment and employee involvement (Abbas & Kumari, 2021; Ahire, et al., 1996). Therefore, to effectively handle knowledge, firms must be skilled in human resource management (Abbas & Kumari, 2021). Employees represent vital assets (Abbas & Kumari, 2021) and are the main drivers of applied TQM initiatives. They influence the development of knowledge (Akanmu, et al., 2023), so HRM and knowledge are mutually reinforcing since knowledge is created by people (Abbas & Kumari, 2021). For financial success, employees should be motivated to participate in decision making and problem solving (Abbas & Kumari, 2021; Abdous, 2009; Yusuf, et al., 2007) and be aware of the present and future fiscal health of the organization (Akanmu, et al., 2023). Akanmu (2023) research, showed that human resource management contributes marginally to sustainable performance, but these findings are not consistent with previous studies (Talib, et al., 2013).

2.4.2 Employee training, involvement and empowerment

Employee training that reflects the organization's perception in improving organizational performance (Cavallone & Palumbo, 2022), i.e. maintaining a well-trained

workforce that can properly handle customer requests (Budayan & Okudan, 2022; Faeq, et al., 2022), are critical factors in the implementation of TQM (Ali AlShehail, et al., 2022; Alshourah, 2021). They support the creation of TQM mindset by empowering employees to enhance their contribution to value-added processes (Cavallone & Palumbo, 2022), expressing their views on improving processes, increasing their work ethics, having a better work life and gaining a higher position in the organization (Cavallone & Palumbo, 2022; Faeq, et al., 2022). Alshourah (2021) states that training contributes to quality performance. However, it is sometimes neglected (Budayan & Okudan, 2022). Learning and training play a vital role in building culture. Providing training opportunities is considered part of a company's ability to change the organizational climate (Budayan & Okudan, 2022). ISO 9001 alone is not enough (Budayan & Okudan, 2022). Industry 4.0 requires employees to receive specialized training in the new landscape. Therefore, organizations need to financially support and dedicate time to train their employees (Samanta, et al., 2023).

Encouraging employee participation in decision-making and in solving organizational tasks are soft TPM practices (Cavallone & Palumbo, 2022; Lim, et al., 2022). Participation in an organizational context involves empowering employees to shape decisions that affect problem solving in the organization (Cavallone & Palumbo, 2022). Employee involvement promotes the cultivation of organizational knowledge, which is the most important element in improving personal and team capacity to engage in the quality mindset. It is considered an important aspect of the TQM logic and can be seen as an internal marketing activity (Cavallone & Palumbo, 2022). Participation can have some negative consequences in the form of increased workload and work pressure. Such negative consequences may compromise the effectiveness of employee initiatives to establish a corporate culture, reducing the level of both individual and joint work (Cavallone & Palumbo, 2022).

Participation creates a culture of empowerment in which employees make organizational choices in collaboration with managers (Cavallone & Palumbo, 2022; Do, et al., 2021; Verma, et al., 2022). Employee empowerment is recognized as an advantage of TQM culture since 5 of Deming's 14 points are associated with empowerment (Verma, et al., 2022). Empowerment enables employees to develop, self-confidence, expertise and become more capable to face organizational challenges (Faeq, et al., 2022; Verma, et al., 2022). It is an indicator of employee satisfaction and satisfied employees will lead to engaged employees (Faeq, et al., 2022).

2.4.3 Motivation / Reward system / Selective hiring process

Motivation ensures that employees are aware and more willing to contribute to quality improvement. Consequently, a company's commitment to creating and executing motivation programs will increase its organizational excellence (Cavallone & Palumbo, 2022).

The reward system and TQM must be in harmony because they encourage participation, commitment and cross-functional cooperation. Therefore, rewards should

create power, incentives and financial benefits to sustain enthusiasm and implementation of TQM (Verma, et al., 2022).

Recruitment and selection is very important in achieving TQM. Staff with the right skills, knowledge, competencies and character aligned with the TQM mindset can be a driving factor for project success. Having trust and support in the workplace leads to greater engagement and productivity. Selective hiring helps organizations find new employees quickly (Verma, et al., 2022).

2.5 Process Optimization and Innovation

2.5.1 Continuous Improvement / Process Innovation / Quality Assurance (QA)

TQM refers to the continuous effort to meet customer requirements and expectations through continuous improvement at the least possible cost to those who work diligently and with dedication (Akanmu, et al., 2023). So the primary objective of TQM is to continuously improve organizational and operational processes to meet customer expectations, achieve competitive advantage (Alawag, et al., 2023) and good performance (Arifin, et al., 2022). It is a hard TQM method (Alawag, et al., 2023; Hassan & Jaaron, 2021; Lim, et al., 2022) and its introduction in the management of daily tasks is vital for employees who are committed to the success of the organization (Alawag, et al., 2023; Ali AlShehail, et al., 2022), so management should help with the implementation of continuous improvement to improve the business (Arifin, et al., 2022; Lim, et al., 2022). The adoption and implementation of TQM philosophy requires continuous training of all staff (Al-Zoubi, et al., 2023). Continuous improvement is the application of process management techniques to achieve continuous product, service, and innovation improvement (Alawag, et al., 2023) key prerequisites for sustainable performance (Akanmu, et al., 2023). It requires the involvement of all stakeholders as it enhances consumer relationships, creativity and business performance (Alawag, et al., 2023) and is also defined as a continuous effort to improve the production process and business operations (Do, et al., 2021). Continuous improvement is most effectively introduced using a strategy of process management (Alawag, et al., 2023), backed up and supported by measures such as top management support and an adequate information system (Akanmu, et al., 2023). The fundamentals of TQM implementation are to require continuous improvement for sustainability, hence determining TQM enablers necessary and socially responsible (Do, et al., 2021).

The use of TQM methods provides a favorable framework for innovation, establishing a competitive advantage over other global competitors (Do, et al., 2021). In the current world of business, nothing is more important or sophisticated than innovation and change management because changing expectations and for attracting new customers, companies are driven to innovate. An innovator will demonstrate readiness for change, creating new products or upgrading existing products (Kumar & Sharma, 2017). Management support, teamwork and communication are important for innovation and TQM (Hudnurkar, et al., 2023). In order to remain competitive in a constantly evolving marketplace, firms are forced to develop innovative products and new services (Hudnurkar,

et al., 2023). Creation and innovation promote high-quality services at an affordable cost (Basu & Bhola, 2016).

QA is a soft practice of TQM (Akanmu, et al., 2023; Lim, et al., 2022). The implementation of QA has a beneficial effect on sustainability that achieves quality outcomes (Akanmu, et al., 2023). QA through extensive inspection and clarification is divided into several sequential stages: planning, design, analysis, production, post-production and feedback (Abdous, 2009), also, prompts the formulation of ISO 9001 because it focuses on continuous process improvement for quality management and facilitates new product development (Akanmu, et al., 2023). The Intelligent QA Industry 4.0 of the TQM 4.0 model uses artificial intelligence software and machine learning to empower the industry system for predictive actions to eliminate system failures (Chiarini & Kumar, 2021), as well as big data analytics to collect timely data and convert it into friendly useful information (Sader, et al., 2022).

2.5.2 Benchmarking / Service Design / Adaptability and Agility / Funds

Benchmarking is a hard TQM practice (Lim, et al., 2022) that positively affects sustainability (Akanmu, et al., 2023), helping a firm to set goals in order to enhance efficiency by reporting the comparison of techniques performed by competitors and by the firm itself, thus giving it the opportunity to redefine the boundaries of quality (Akanmu, et al., 2023; Budayan & Okudan, 2022) and achieve competitive advantage (Ahire, et al., 1996). On the other hand, studies have shown that benchmarking has no effect on the implementation of TQM. However, using benchmarking as a strategy to continuously gain competitive advantage and identify the shortcomings that exist is important (Akanmu, et al., 2023).

Service design has a positive effect on organizational performance because it increases customer satisfaction, business profitability, and response time, before production and marketing (Akanmu, et al., 2023; Ali & Johl, 2022). TQM promotes service performance and Quality 4.0 empowers customers to be part of the product/service design process as proactive stakeholders (Ali & Johl, 2022).

The requirement for organizations is to be flexible and adaptable to new technologies, such as Industry 4.0, learning new processes, systems and technologies to differentiate themselves from their competitors. This extends to the entire range of the organization's personnel, whether they are senior managers or employees (Samanta, et al., 2023).

The availability of funds to invest in new technologies is also a consideration, the automation in the Industry 4.0 approach requires adequate Capex investment to maintain the pace of improvement and development (Samanta, et al., 2023; Yadav, et al., 2021).

2.6 Quality Control and Assurance

2.6.1 Quality Control / Quality Culture

TQM does not in any way minimize human involvement in quality assurance. Equipping employees with the skills to use digital tools is essential for quality assurance in future factories (Nguyen, et al., 2023). Quality control personnel will spend fewer hours on operational functions such as testing and instead focus on problem solving and preventive measures (Chiarini & Kumar, 2021). Chiarini & Kumar (2021) showed that new statistical process control tools integrated with machine learning predict defects during manufacturing and automatically adjust parameters without human intervention. Quality data is automatically collected and processed within ERP modules.

Quality Culture is crucial for the introduction of new technologies in TQM (Nguyen, et al., 2023), people embrace new technology and become familiar with new tools (Antony, et al., 2022). Introducing Total Quality in the absence of a culture of quality may be the wrong move. Quality culture requires observation, determination and not just compliance and automation (Nguyen, et al., 2023).

2.6.2 QM tools & techniques / Statistical process control

QM tools/techniques are hard practices and TQM methodologies for measuring performance (Lim, et al., 2022). They embrace networking, automation, performance improvement, rely on real-time decision making data, stakeholder participation, and insight (Ali & Johl, 2022).

Statistical process control is the application of statistical data to monitor a production process. They help in observing the performance of a process, identifying errors in internal systems and solving production problems. The application of statistical process control reduces the price of products, and improves quality, customer satisfaction, and energy and resource savings, contributing to increased financial performance (Agyabeng-Mensah, et al., 2021).

2.6.3 Automation / Appraisal System / Feedback

Automation is used in a wider range of sectors, organizations are more automated and teams working from remote locations require timely data availability (Yadav, et al., 2021). Integrated quality management systems are leading to greater automation to achieve quality and customer satisfaction goals, but advances in artificial intelligence, machine learning and software automation will affect the employment of people in an organization (Antony, et al., 2022).

According to (Arunachalam & Palanichamy, 2017) the evaluation of employee performance according to quality standards is a feature of TQM having central importance in monitoring the achievement of quality objectives. Instead of holding employees accountable for failures or evaluating them according to performance objectives outside their scope, the TQM-based appraisal system focuses on employee skill development,

commitment and motivation, resulting in enhanced employee morale and satisfaction. Deming (1982) argued that an obstacle to achieving workplace excellence is performance appraisal as it discourages risk taking and disrupts teamwork, however for TQM to be effective, performance appraisal requires fundamental modification.

Companies need to pay attention to the development opportunities for their employees, with feedback. Providing feedback and training will help create an engaged work environment (Arunachalam & Palanichamy, 2017).

2.7 Integration of Technology and Data Management

2.7.1 Automated document control and data collection

TQM 4.0 provides automatic document control (Chiarini & Kumar, 2021; Nguyen, et al., 2023) noted that the quality management system will be paperless, and quality-related documents will be integrated into an ERP. Various types of product data such as the number of defective parts, manpower and machine hours for repairs, complaints and returned products, product specifications, and satisfaction levels are collected in an automated manner as part of TQM (Nguyen, et al., 2023). A barrier to not successfully integrating TQM will be the absence of a concise data collection program (Yadav, et al., 2021; Yas, et al., 2021).

2.7.2 Technology utilization

The utilization of technology is a soft TQM factor (Do, et al., 2021) and appears to be a key contributor to ongoing economic growth (Kumar & Sharma, 2017). Big data and prescriptive analysis are key elements (Antony, et al., 2022) required for successful implementation of quality in larger enterprises (Sony, et al., 2020). The accurate data obtained requires intelligent technologies to handle it and helps firms to achieve competitive advantage as it has a crucial role in performance, facilitating decision-making and project delivery, enhancing employee motivation, and resulting in the creation of innovative products (Samanta, et al., 2023). A flexible organization committed to technological advances outperforms its competitors by introducing innovative products and services (Samanta, et al., 2023).

2.8 Stakeholder Engagement and Value Creation

2.8.1 Collaboration and quality relationship among stakeholders

To successfully achieve a change model, collaboration between people and organizations leads to the intended outcomes (Elibal & Özceylan, 2022; Samanta, et al., 2023). Supplier management has a powerful beneficial effect on operational performance measured in financial results and customer satisfaction (Hassan & Jaaron, 2021). Suppliers should therefore be included in the quality improvement process. As a result, contractors and vendors work together to meet the business's quality improvement targets (Budayan &

Okudan, 2022). Collaboration facilitates the smooth flow of information across the communication spectrum and ensures sustainability within the organization (Samanta, et al., 2023). According to (Sader, et al., 2022), horizontal, vertical, and end-to-end engagement of all stakeholders and communication technologies that facilitate this engagement improve the ability to manage relationships.

The quality of services provided by each stakeholder affects the services provided by other stakeholders involved in the same business (Budayan & Okudan, 2022; Hassan & Jaaron, 2021). A long-term and in-depth relationship with suppliers ensures the quality of the final product (Budayan & Okudan, 2022). Because suppliers are selected based on cost, unfortunately, it is detrimental to trust, making it difficult to establish long-term relationships, therefore, it is necessary, to propose alternatives to the selection criteria (Budayan & Okudan, 2022).

ISO 9001-certified companies cooperate and maintain long-term relationships with a small number of trusted suppliers (Budayan & Okudan, 2022). ISO 9001 encourages companies to develop long-term relationships with their suppliers but plays no role in creating a trust-based partnership concept like TQM (Budayan & Okudan, 2022). Companies that adopt TQM impose strict requirements on suppliers and subcontractors to ensure quality (Budayan & Okudan, 2022).

2.8.2 Communication / Promotion

Communication, which is described as a set of interpersonal relationships (Do, et al., 2021), is considered the core of an organization, as in the absence of proper communication, people are unable to understand the mission and vision of the organization (Verma, et al., 2022). Communication skills address the emotions of colleagues, facilitate understanding of policies and regulations, increasing productivity (Samanta, et al., 2023). Clear and consistent communication of the vision defines the culture of quality (Verma, et al., 2022). Senior managers must ensure that organizational levels communicate effectively (Samanta, et al., 2023) and implement top-down and bottom-up communication strategies to engage employees and provide frequent updates on the organization's performance and development (Verma, et al., 2022).

Companies provide equality to all employees in terms of training, and promotion by adopting a strategy to retain skilled employees in the organization (Verma, et al., 2022) and ensure fair promotions (Elibal & Özceylan, 2022).

2.9 Sustainability and Social Responsibility

2.9.1 Sustainable development and Corporate sustainability

The three dimensions of sustainable development (environmental, economic and social) require measures to limit the exploitation of the earth's natural resources, and to promote social development, i.e. the health and well-being of society, the provision of an appropriate lifestyle and ensuring the appropriate distribution of resources among different

social groups (Hudnurkar, et al., 2023). Albloushi (2023) found that green innovation mediates the relationship between TQM and corporate sustainability.

Corporate sustainability is the business policy towards socio-economic and environmental sustainability (Davenport, et al., 2019). Stakeholder demand from customers, employers, and government resulted in the adoption of a sustainable development strategy (Ji & Zhang, 2019). For companies, contributing to the three dimensions provides a competitive advantage in terms of customer satisfaction, and reputation from the perspective of investors (Calza, et al., 2017).

2.10 Performance Management and Evaluation

2.10.1 Performance Monitoring / Evaluation

A personalized performance monitoring system is necessary to compare the performance of the organization, recruit new employees with knowledge and skills, and retain and train existing employees which is evident as the technological environment is evolving which requires employees to continuously learn (Samanta, et al., 2023). Deming (1982) argued that quality is improved by changing processes rather than people. However it is people who cause change, therefore literature argues that evaluation fits with TQM as long as it meets the quality criteria. Moreover, without a continuous flow of information, companies will not identify past mistakes and will find it difficult to manage their current and future performance, which will lead to inaccurate evaluation of the quality of their products and services (Budayan & Okudan, 2022).

2.10.2 Effective project management / Reliable data collection / Employee satisfaction

Integrated business and project management involves carrying out planned tasks to achieve objectives, while integrating new technologies into established processes for product development involves state-of-the-art infrastructure and knowledge (Samanta, et al., 2023).

Collected data is the data gathered from groups, individuals, and machines. Data is automatically accessed on an ongoing basis and utilized up and down the entire process pipeline. Consequently, a business system demands reliability to prevent the data from being compromised. Therefore, a successful integrated system relies heavily on robust data gathering (Samanta, et al., 2023).

Empowerment, rewards, teamwork and leadership are important factors in employee satisfaction and satisfied employees will be more engaged in the organization (Chang, et al., 2010), creating a culture of commitment (Verma, et al., 2022).

2.11 Product Development and Management

Product development is a set of stages concerned with how to develop the product involving the conception, design, development, marketing, and post-marketing, of products or services, whether new or improved. Product management refers to what to produce, the

process of managing the product lifecycle, from design to marketing and pricing, by keeping the emphasis on the vision of the product and the needs of customers. Both should emphasize product quality and influence in TQM implementation.

It also includes the internal and external quality characteristics of a product, such as functionality, performance, physical properties, and safety, indicating the extent to which it meets customer expectations. Thus, when product quality is improved, wastage is reduced, efficiency and profitability of a firm are increased (Kafetzopoulos & Psomas, 2015). To effectively integrate TQM throughout the new product development process, it is important to adopt a TQM culture in the new product development team, ensuring that the customer is seen as a valuable asset to the firm (Lockamy & Khurana, 1995).

For today's companies, it is a challenge to develop timely, long-term strategies for product development, innovation, for managing and increasing R&D productivity, which is vital for a company's competitiveness (Wu, et al., 2011). Cole & Matsumiya (2008) argue that if a firm considers in-depth warranties or unstable production processes in the early stages of product development, many innovative projects risk being stopped or postponed because in firms with a dynamic market and technology environment, integrating quality into product development at an early stage may lead them to be unable to respond to rapid changes in end-user or technology requirements.

2.12 Risk Management and Compliance

Risk management is a project management practice where top-down and bottom-up methods are required to communicate its importance so that the company culture adopts it, therefore, the tools, and processes used by companies to address risks, including the identification, assessment, control, prevention and elimination of unwanted risks and the maintenance of a risk inventory are useful throughout the life cycle (Menon, 2024).

For effective project control, companies should implement a risk management plan in all critical processes of risk identification (Al Qayoudhi, et al., 2021), analysis (quantitative and qualitative), response planning and monitoring because it affects processes such as scope, time, cost, quality and supplies (Menon, 2024). Risk management involves determining the nature of the risks to be mitigated and those to be controlled (Al Qayoudhi, et al., 2021).

Risk management facilitates the link between continuous improvement and profitability, so that the primary purpose is to protect the firm from financial losses by focusing on trusted partners, human behavior or inadequate training (Lepistö, et al., 2022).

2.13 Infrastructure and Support System

To implement innovation initiatives, companies need a range of resources, including infrastructure expertise (Damle & Krishnamoorthy, 2022)

As cybercrime continues to grow and new risks emerge constantly, it is clear that organizations must identify, assess and manage their cyber risks effectively. ISO/IEC 27001

provides a valuable framework that helps organizations identify weaknesses and take action to become more cyber-risk aware (ISO, 2024).

Furthermore, organizations must ensure that they can withstand all potential disruptions. This is the best way to avoid them and ensure the continuity of operations and services. The best way to do this is with ISO 22301 (ISO, 2024).

The infrastructure capacity of SMEs is better, because it is more convenient for them (less employees) to embrace a digitization strategy. Nevertheless, large enterprises, they are probably stronger than SMEs in technological capabilities and resources (Ngo, et al., 2023).

3. Methodology

3.1 Introduction

This study uses qualitative research methods. Using semi-structured interviews (Panagiotidou, et al., 2024) to collect open-ended qualitative data, the participants' thoughts and beliefs on the topic of the dissertation were explored.

Our research focuses on the impact of the 13 CSFs on Greek technology companies of all sizes and the comparative analysis between Large/Medium and Small companies.

3.2 Data collection and sample characterization

Throughout Greece, 13 semi-structured interviews were performed. Our participants are QM experts who work in ISO 9001-certified companies in the Greek technology industry. The list of companies we have contacted has been obtained from technology company databases via the Internet. Success factors for businesses in different sectors have been derived from the literature. They have been carefully categorized into 13 CSFs, which form the core of this dissertation.

The initial communication was conducted via telephone, after which a written communication was sent via email containing all the relevant information. The participants were afforded the option of conducting the semi-interview via telephone on the spot, or they could arrange a telephone appointment, or respond to the questions in writing via email or a Google form. The interviews were conducted in the following ways: one via Google form, four by telephonic arrangements, one by written response to email questions, and seven via telephone on the spot. The duration of the telephone interviews was between 20 and 40 minutes.

The interviewees were entitled to express their opinions and beliefs based on their expertise. Throughout each interview, comprehensive notes were taken. After each interview, a ranking of the 13 CSFs was compiled to verify the accuracy and fidelity of the data acquired.

Participant Code	Role	Years of Experience	Education	# Employees	Company Profiles
P1	Senior Quality Engineer, Quality & Environment Department	10+	MSc	900+	Technology systems and solutions provider – Wireless Access & Transmission, Telco & Enterprise Software Solutions, ICT-Smart City & Surveillance Solutions, Energy Solutions
P2	Data Protection Officer – Risk Management	30+	MSc	250+	Software Development
P3	Deputy Quality and Information Security Manager	10+	MSc	150+	Software R&D, ICT solutions
P4	Head of Quality and Security of Information Systems	15+	MSc	143	Information systems and Services developing – Agricultural sector
P5	Chief Operating Officer	20	MSc	90	Independent Software Vendor (ISV) – Value-Added Reseller (VAR)
P6	Quality Assurance & Configuration Management Specialists	10	MSc	85	Software Development & System Integration – Defense & Security sectors
P7	Quality and Information Security Manager	10	BSc	78	Geoinformatics
P8	Administration Manager – Quality Management & Quality Assurance Inspector	10	MSc	70	Geoinformatics, Land Development, Environmental Projects, Transport Infrastructure
P9	Quality and Information Security Manager	5+	MSc	50	Integrated Systems (IS) Development
P10	Quality and Information Security Manager	25+	MSc	28	Service Provider & Software Developer for Information & Communication Technologies (ICT)
P11	Quality and Information Security Manager	1+	MSc	22	Geospatial Intelligence
P12	Quality and Information Security Manager	30+	MSc	10	Geoinformation Tech, Aerial surveying, Mapping, Cadastral surveys
P13	Chief Executive Officer (CEO)	32	MSc	9	IT Business Solutions

Table 3.1 Participant Profiles

3.3 Data analysis

Thematic analysis (Panagiotidou, et al., 2024) was employed to interpret the data. This method enabled the identification of common topics, ideas, and patterns, thereby facilitating the research.

The following section presents an explanation of the six phases of thematic analysis, as outlined by (Thematic Analysis, 2024).

1. Familiarize the dataset: Upon a comprehensive review of the interviews and a thorough understanding of the participants' statements.
2. Coding: Underline important words mentioned either in the literature or if they are important expressions that help in the analysis of the CSFs.
3. Generation of initial topics: After examining the codes, we created themes, categorizing the data into sections with the same meaning.
4. Develop and review topics: The topics were also developed based on the codes, which were either split, merged, or dropped.
5. Clarify, define and label topics: Detailed analysis of each topic.
6. Writing: Linking the analytical text and relating the analysis to existing literature.

4. Results

4.1 Introduction

This chapter will analyze the 13 critical factors based on the interviewees' comments. Their quotes will be inserted between the analyses, as they expressed themselves during the interview or wrote them.

The demographic characteristics of the sample will be presented at the beginning. The 13 critical factors are then listed, with a clear explanation of what each is about, why they are considered important for a technology company, and a comparison between the sizes of the companies, large/medium and small.

4.2 Demographic Characteristics of Sample

The interview was aimed at quality experts and quality managers who are involved in the quality procedures of the ISO 9001 quality systems.

The dissertation includes interviews with 13 quality experts or quality managers working in companies of different sizes.

Of these 13 quality experts, 8 were women and 5 were men. All 13 of them had a Master's degree and some of them were certified for quality control. Also except for 1 who had about 1 year of experience in the quality position, the majority of them had more than 10 years in quality-related positions.

Of the 13 companies, 4 companies were large with +900, +250, +150, and +140 employees. The questions were answered by 3 women and 1 man.

Of the 5 medium-sized companies with 90, 85, 78, 78, 70, and 50 employees, 4 women and 1 man agreed to participate.

In the small companies, which were 4 with 28, 22, 10, and 9 employees, the quality experts were 1 woman and 3 men.

4.3 Interviews

Following are the interviews given by the managers, identified by participant code, discussing the CSFs, why they are generally important or helpful in implementing them in their business, and the comparison between large/medium and small companies.

4.3.1 1st Organizational Leadership and Management Commitment

This critical factor concerns, among other things, leadership, support and commitment from top management, fact-based management as well as the culture of change management, the organizational climate. Below we analyze the views of the quality experts interviewed on this factor and how they compare the importance of this factor between different sizes of companies.

Why it is important

Change management and process improvement depends on the support of top management.

"Without the support of top management, it is not possible to promote change management and process improvement." (P1)

"It helps to structure the company". (P10)

"It is the setting of a direction, a vision, and the communication of goals to all employees". (P2)

Quality managers (P5) and (P7) explained that management must engage in activities such as asking, questioning, challenging, demanding and demonstrating concern for quality, for the smooth running of all projects in an organization, and the smooth running of any company. Without leadership, it is not a strategic goal, with the consequence that progress and vision are hindered.

"New employees need to understand the company's vision and operations to understand their role and the company's goals." (P8)

"It is the principle of every company, for its organization and proper functioning". (P11)

"The establishment of a quality management system depends on the support of management. Without it, the system cannot achieve its intended objectives". (P3)

"Without the commitment of Top Management, it is not possible to provide the necessary resources (in terms of staff, equipment, time, etc.) to support, maintain & continuously improve the management systems." (P4)

Comparison of large, medium, and small enterprises

All respondents agreed that this factor is important for all sizes of businesses. According to their professional experience, they expressed their views on different sizes of businesses.

Regardless of the size of the business, it can provide advantages because quality issues do not depend on the size of the business.

Managers agree and specifically state:

"It is important for companies to have commitment from their leaders. It's great for companies to set strategic goals and make sure everything is working well!" (P6)

"Every leader must have a vision and be committed to it, no matter how big or small the business is." (P2)

In large companies, the reason for its existence and its objectives must be examined, to allow employees to understand the purpose of the company and to feel part of its progress. A targeted approach should be adopted so that all stakeholders can understand the information.

In larger companies, communication is increased, so there is a chance that processes can be overlooked. In smaller companies, there is more likely to be direct communication, which makes it easier to monitor processes explained expert (P12).

Regarding the comparison between the companies they state:

"Large companies need to adapt to changes in their environment by helping employees understand the concept of continuous improvement. Leaders also need to implement practices that lead to obtaining and maintaining certifications giving companies a competitive advantage." (P1)

"In large companies, we have to take it into account, for everyone to understand it so they feel part of the company's direction, it has to be targeted. What is the vision, the goals, the purpose? What is the strategy of the organization? Small businesses in Greece are usually family businesses where the owners are also employees, so there is no problem of understanding." (P2)

"In a large/medium sized company, it's a big deal, although the foundations are there from management, it takes top-down commitment because of the number of employees. The culture of the company, helps the commitment to quality. In smaller companies, leadership is all that is needed. There are fewer people, so it's easier to 'enforce' the culture and give direction." (P3)

"It is more important in large companies, in a small company, there is direct communication between employees and it is difficult for processes to escape the manager's attention." (P12)

4.3.2 2nd Strategic Planning and Policy

This factor will analyze, among others, the perception that companies have regarding process management, strategic design & quality policy, information and analysis, vision, etc.

Why it is important

A company's strategic plan is a crucial element in its growth and development. Without a clear strategy, businesses, are unable to expand.

Below the managers mention why it is important:

"If each person and each department goes its own way without a clear focus and plan, it is difficult to perceive the business launch." (P2)

"Process management is important, there has to be a quality management system to control the processes. Initially, plans are created and then managed. A company must have

a defined planning process and policy, which is communicated to all relevant personnel." (P8)

The Quality Manager (P1) pointed out that, it is vital for the formulation of corporate strategy, allowing the definition of priorities, objectives, and financial targets, the development of products or services based on market requirements, the exploitation of innovative ideas, the development of skills for the production and promotion of products. She also stated that, process management involves the analysis, design, implementation, monitoring and improvement of the processes. Its implementation and the establishment of a quality policy confirms the monitoring, control of the performance and efficiency of the company. Improving its processes through their review. Quality Manager (P6) added, if there is no strategic planning and strategic policy, it is not possible to predict direction in the future, which is a reference point and is expected to be followed by all employees.

They also indicate ways they can achieve this:

"The company must have a planned path for employees to follow." (P13)

"Without a quality policy and defined procedures (depending on the size of the company), certification is not possible." (P4)

The absence of strategic planning and policy makes this system without a basis. Leadership provides the direction to support the system, while strategic planning serves to create a backbone, it is a process of incremental building rather than laying foundations, they already exist. Building a skeleton is essential if one is aware of the destination and actions, remarked expert (P3).

"With strategic planning, feedback is important. If there is no input, the company cannot control or make the right decisions. There won't be good insight into the company's internal processes. Companies benefit from proper monitoring." (P5)

"It sets the plan for the new year, the new quarter." (P7)

Comparison of large, medium, and small enterprises

As far as the comparison between companies is concerned, some consider it to be equally important:

"For both large and small companies, it is important to have a strategy, along with a long-term plan and short-term goals." (P2)

"It is of great importance to all companies, regardless of size, to implement strategic planning. Without planning, a QM system cannot function effectively." (P3)

Strategic planning can facilitate the growth of small companies, increase their profits, and contribute to the quality of their deliverables. For large companies, it helps them

to stay large and meet their obligations on every project by influencing numerous decision points (P7) throughout the life cycle of products and services, such as analyzing and planning their product strategy, costs, and methods of development, production and marketing, supply chain, and profit margins. (P1)

In smaller companies, there are fewer employees, so it is easier to make decision-making processes more efficient. In large/medium-sized companies, strategic planning is a more complex process, requiring the involvement of many departments, quality managers (P12) and (P13) agreed.

Some others mention why it is more important for large companies:

"In smaller companies, there are fewer people, so decisions are easier to make. In medium-sized companies, once the strategic plan is prepared, it has to be distributed to each department, which will work on it." (P6)

"The standards require policies that are necessary for both large and small businesses. However, for larger firms, I believe it is important to have additional procedures and policies to set the compliance framework because of the complexity and interconnectivity." (P4)

The quality manager (P8) concurred, stating, that unlike large companies, which usually have well-defined processes and organized departments, medium-sized and small companies tend to prioritize quality policies, otherwise no advancement could be achieved in the field in which the business is conducted.

But also the view that it is more important for the small ones was mentioned:

"Medium and small businesses need to focus more on quality than large ones. This may seem paradoxical, but large companies already have their processes and departments in place, but in Greece, small and medium enterprises lack organization, clear structures and direction. Quality helps to fill this gap. ISO helps small and medium-sized enterprises. Otherwise they would not be able to afford it." (P5)

4.3.3 3rd Customer-Centric Approaches

This 3rd critical factor that we addressed in our interviews concerns customer satisfaction, customer focus, improving customer relationships, customer value strategy/engagement.

Why it is important

The quality manager (P3) emphasized that, it is vital to the survival and growth of the company. Without customers, the company will have no income and will cease to exist. Therefore, a QM system is necessary to ensure customer satisfaction. All companies strive to have a QM system to prove to customers that they offer a quality product or service.

All managers generally agree that it is important:

“Customer satisfaction is important. We need to find out if our customers are happy so we need feedback. We don't follow the logic that the customer is always right. He can be wrong. If we know our customers and they know us, they will be happy. Especially for B2B companies like us. We don't have thousands of customers, our customer base is specific and relatively small. So it's even more important to keep customers happy, because losing a customer can have a big impact on the company.” (P5)

“A technology company should definitely focus on customer satisfaction. One unhappy customer can do much more damage than 10 happy ones can do good.” (P2)

“Yes, it's important. The client pays all our salaries.” (P13)

Supporting this, the expert (P1) added, mutual trust and communication between the stakeholders is a crucial factor for the development of the business. The customer-centric approach allows companies to listen to their customers' needs and adapt their products and services accordingly. An open line of communication is essential for maintaining satisfied customers, attracting new ones, continuously improving processes and increasing the company's potential, profitability and reputation.

“This is the most important thing. If customers are happy, work becomes more efficient and the company develops better. It's that simple.” (P9)

“It is of the utmost importance for companies to have customers. Without them, they cannot succeed.” (P7)

“It is the most important factor in a technology company. Without meeting the customer's needs, there is no long-term viability for the business.” (P6)

By analyzing customer feedback, companies can identify areas for improvement, which allows them to improve the quality of their end products, remarked (P10). (P12) took it further, noting that service quality is the most important asset for a company and, it must be ensured that customers provide feedback that demonstrates their satisfaction.

“It's important for customers to be happy with the company's policies and approach.” (P11)

“If customers leave, it will affect the company, no matter how big it is. It depends on how important the customer is. Some may be long-term, so they have a different relationship with the company.” (P11)

“The focus of all business activity is the customer. Consequently, to maintain a management system, customer complaints and evaluation are taken into account to improve processes to provide better service.” (P4)

Comparison of large, medium, and small enterprises

Below they outline why it is important for all companies:

"In all businesses, customer satisfaction is the key that leads to success. The business makes a profit from customers. If we don't give what the customer wants, there will be no sustainability. In our business, we don't have many customers. Our profit scale is different. Customers don't come to the door and wait. We have to maintain a name in the market because the market is small. It's very important to respond well and respectfully to the customer's needs." (P6)

"I think it's just as important. For small companies it's easier to manage customer complaints because of the immediacy, meaning it's easier to approach to negotiate a solution to the problem. In large companies, a customer complaint can get lost in the gears of the resolution mechanism (either by waiting in a call center to voice select an option not recognized by the automated call center or through bureaucratic processes)." (P4)

Some quality experts believe it is more important in small companies than in large companies. Expert (P3) took it further, noting that large companies have a wide range of customers, have a reputation, and have established their position in the market and are obliged to have and maintain a quality product. She added also that small companies need to build it from scratch. This is why customer satisfaction is so important. Sometimes, small companies do the impossible by putting the customer's requirements first and foremost. They do this by going above and beyond, even though they have processes in place, just to satisfy the customer, gain a good reputation, and prove their quality.

They also explain the mentality that large companies have compared to small companies:

"You either get a little from a lot of customers or you get a lot from a few. A big company that is B2B and B2C takes a little from a lot of customers. It has a small profit margin and too many customers. That's how it makes its profits. We don't have that business model. We are a company with a few customers with a higher margin. A major risk in our case is that if we lose an important customer that we work with every year, it has an impact because it's not easy to replace. You lose 1/20th of your turnover. In the case of a large company, if one customer is unhappy, there are a thousand others. It's important to have feedback from your customers so you know if they are satisfied and you can continue to have them as a customer at the end of the day." "It's important for everyone, especially the small ones. For big businesses, losing a customer is not a big deal, but for small businesses, it's a different story." (P5)

"It's the other way around. It's more important for small and medium-sized enterprises. Big companies don't give the maximum they can to satisfy customers. Small ones try harder because of the small number of customers." (P9)

"The smaller the company, the more important the customer-centric approach is. This is the only way to attract customers, keep them satisfied and build a reputation. That's how they will grow." (P8)

The quality manager (P1) described that large companies should base customer/supplier relationships on a long-term plan with a common philosophy rather than on opportunistic treatment. There should also be a 'common' language between the two parties. Large companies should have flexible mechanisms to reduce delays in deliveries to the customer. A key mechanism for certifying the good functioning and development of the customer network is evaluation through customer surveys. Their results are analyzed and presented to senior management, providing a thorough indicator of performance and future targeting.

They also state:

"It plays a role when the company starts to grow because it's about different costs and volumes at all levels. The quality concerning the customer has to be maintained and continually improved. Once reaching an alpha level, additional values can be added that will be given to the potential customer." (P8)

"A large or medium-sized company must have many customers. If you don't keep them happy, you won't stay in the market. The same with a small company with fewer customers, it has to grow and at the same time keep them." (P7)

4.3.4 4th Human Resource Development

In the 4th critical factor the interviewers elaborated on their experience on the importance of teamwork, human resource management, employee training and learning, employee participation/suggestions/initiatives, employee empowerment etc.

Why it is important

A company that cannot function collectively cannot function individually, given the interconnected nature of the two. Therefore, it is important to have proper guidance, either from the processes a company implements or from the guidance of the respective departments, such as the HR department remarked (P10).

Certainly everyone agrees and reports:

"It's really important. It's all about the atmosphere within the company. There has to be a team spirit and a pleasant atmosphere among colleagues." (P11)

"It is a key factor, not only statistically, for the profitable growth of a company. Linking the HR development strategy, with the corporate strategy, enables and encourages employees to understand and develop the business objectives in their field. By strengthening the organizational culture, reducing the uneven distribution of activities and increasing the performance orientation and thus the profitability of the company." (P1)

The quality manager (P5) emphasized that the most critical function of a technology company is the dissemination of knowledge. That is, that the company has the know-how to implement projects with the latest technological advances. He and expert (P9) remarked

that the technology landscape is constantly evolving, with new standards, technologies, and tools emerging every day. Companies are constantly updating, and require ongoing training for employees to refresh their skills. This is of great personal importance to them, as it ensures their continued competitiveness in the job market. (P5) also added that employee training is not a challenge if the company is willing to facilitate it. (P5) explained that there is a high degree of mobility in the industry, known as 'leapfrogging'. Recruitment of senior managers in the technology sector is also a challenge. Companies compete for the best talent and often the ready-made staff have a mindset that is not aligned with the company's mentality or lack a strong work ethic, i.e. being committed to their work, i.e. having both soft and hard skills. It is more advantageous to create staff from scratch. Employees must be able to combine, in the same time, both their professional obligations and familiarity with new technologies.

Below they list the difficulties they face as technology companies:

"It's not difficult to train employees of a company, depending on how available the company is for this training." (P11)

"We carry out activities beyond and outside the normal activities of the company. Judging from this company, we put a lot of emphasis on that. There is a terrible shortage for software engineers in the technology industry and companies are grabbing what they can from each other. Senior staff is created through continuous training. You used to get a pension with a degree, now you get left behind if you don't train. I am 59 years old and do 2-3 certifications a year. Ten years in our field is an eternity." (P2)

"For technology companies, it's very important. We're probably the type of company where that's the most important thing compared to others. Employees need to be trained, not in the sense that we send them to be trained somewhere, but by having seminars internally and incentivizing them to prepare. The employee must learn new technologies to remain competitive in the job market. The most important thing we sell as a technology company is knowledge. We need to deliver projects with current technologies. Also, onboarding training is very important. We train new employees for 1.5 months with links, materials, and help from older colleagues. It's hard to find people with the right skills, especially now that the market has opened up and it's easy for employees to change companies every few months. It's also hard to find people with the right work ethic and social skills. That's the biggest problem at the moment." (P3)

"Education is of very high priority. In a technology company, it is a crucial factor in the transfer of know-how." (P12)

"We are investing a lot in this factor, especially in education. Everything is a chain! If there is no proper training, we can't produce the product, the customer is unhappy and so we are ruined as a business." (P6)

"It's important for new employees to understand that every company has processes and that quality matters. They say, 'I don't care,' but in reality, if they don't put out a quality product, they won't have a job. Empathy and learning are equally important." (P3)

Supporting this, the expert (P7) added, employees are the core of the company. This is why it is beneficial to show initiative in a technology company, as it allows them to showcase their work and background and differentiate themselves.

Below they indicate how they are trying to cope:

"Modern companies have ongoing training programmes for their employees, either through seminars (after the pandemic mainly in the form of webinars) or other forms. Training, employee participation, empowerment and the promotion of teamwork should be at the core of a company's strategy, as they facilitate decision-making and create the conditions for increased innovation." (P1)

"The more trained the staff, the better service they can provide." (P4)

Comparison of large, medium, and small enterprises

The participants of the survey agreed that this factor is of significant importance to all companies, regardless of their size. The following section presents their beliefs and offers a comparative analysis of the different types of companies.

The quality manager (P7) described it as an important factor in small and large entities alike, affecting them all to a greater or lesser extent. Whether large, medium or small, knowledge transfer is a critical aspect to keep abreast of market developments and to focus more on the products or services offered.

The managers replied that there is no comparison between companies:

"If you don't adapt, and to adapt you have to keep learning, business-wise you die. That's the word of nature." (P2)

"In general, if there is the possibility of education, it means development." (P9)

"Whether you are a large, medium, or small company, you need to keep up to date with what is happening in the market and be as focused as possible on what you offer." (P7)

"I don't know about very small companies, but it will be important there too. Employees need to have in-depth knowledge. As a company, we invest a lot in training because our area of expertise is special." (P6)

"A small company makes it more difficult to manage ongoing training, as it has to invest in it both in terms of costs and hours of absence from work (which are difficult to cover). In a large organization, the resources available for training are more readily available, and at the same time, days and hours of absence for training can be easily replaced." (P4)

The quality manager (P8) concurred, stating, that human resource management in small businesses is efficient due to the limited number of staff. A small company can train employees more easily and in an organized manner than a large company. However, it is more difficult financially, funding is available from external sources if the company is a start-up, but the small company needs to start growing. She also added that in terms of

teamwork, as there are fewer employees in a small company, there is a greater chance of direct contact with all team members as everyone is involved in the same tasks.

The experts mentioned why small companies have an advantage:

"For small businesses, there are clear advantages in terms of teamwork. There is direct cooperation and constant contact with all team members." (P8)

"For smaller companies, the financial implications of training staff can be more challenging." (P13)

"Smaller companies are better placed to provide structured training to employees than larger ones." (P11)

Expert (P7) also mentioned that a great company should prioritize teamwork. Because there are many employees there must be a clear definition of tasks so that cooperation between departments is beneficial. The more people express their opinions and knowledge, the more effective the company will be.

They also report how the large companies are responding:

"In large companies, HR departments apply methodologies, with modern knowledge management models, with the ultimate goal of retaining and valuing knowledge, while promoting the needs of employees." (P1)

4.3.5 5th Process Optimization and Innovation

The evaluation and comparison conducted by the experts in the fifth critical factor pertains to continuous improvement, QA, process innovation, benchmarking, and service design, among other factors.

Why it is important

Everyday challenges lead to improvements in areas such as employee satisfaction, efficiency and the quality of the final product, explained the quality manager (P10). Supporting this, the quality manager (P2) added, businesses need to prioritize process optimization based on metrics. With the right indicators, they can measure what is necessary for their operations and compare their performance with the ultimate goal of continuous improvement. The quality managers (P5) and (P6) emphasized that, in this way, businesses can achieve annual growth and avoid stagnation. (P8) added that new employees must work with the same logic and procedures to achieve the same result. Any changes can affect production and customers may receive a different result from what they are used to.

The managers indicated how this is made possible:

"Companies must maintain their commitment to continuous improvement." (P9)

"Leading the company into the next day, adapting to the ever-changing conditions of the global business environment. This factor seeks to improve efficiency, and quality, by redesigning workflow, leveraging technology, and QA." (P1)

"This is a process of continuous improvement which is necessary to achieve growth. The main objective of a QM system is to improve processes, which is achieved e.g. by employee questionnaires, feedback from internal and external audits and other techniques, on an annual basis or within set deadlines." (P3)

"Continuous improvement is the goal of ISO management systems." (P4)

Comparison of large, medium, and small enterprises

Some respondents like the quality manager (P9) and (P10) reported that big companies should not be complacent if they already have prestige or reputation, because they tend to operate in a monopolistic way and are experiencing stagnation. Moreover, the system is more fragile because of the number of employees. However, quality manager (P9) pointed out that, small tech companies represent a significant proportion of start-ups, which means that this factor is a priority for them.

"Small companies are difficult to grow and survive in today's business environment. With the emergence of large companies acquiring businesses and products, small companies face significant competition and struggle to maintain their position. It is vital for small companies to adapt and look forward to future opportunities. However, it is easier to maintain consistent processes." (P6)

Below are what some managers consider to be more important for small companies and some for large ones:

"I believe that the ISO process is more important for small and medium-sized enterprises and they will benefit greatly from this approach. Large companies often have their own quality departments and their own certifications, which means they don't need ISO. They are already familiar with the ISO logic (multinationals). Small and medium-sized enterprises, especially Greek ones, often perceive ISO standards as too complex and costly. This can lead to a lack of clarity and structure. ISO standards provide a framework for defining a company's unique identity, defining specific functions and adopting best practices that have been implemented by others and proven effective." (P5)

"In large companies, once a decision is made, it can take a considerable amount of time to implement it. The size of the business makes it difficult to execute quick decisions. In contrast, small businesses make decisions and implement them quickly, as changes are infrequent." (P13)

"Quality is a fundamental concept with the same importance regardless of the size of the company. ISO 9001, helps companies to implement and monitor certain processes. It

is more important for larger companies, where the volume of processes and the possibility of errors is greater." (P8)

"In a large company, it is obviously a key factor. In a small company, because there is a directness of cooperation between members, I believe it is not as important." (P12)

"Large companies need to optimize processes and invest in innovation to reduce costs, increase efficiency through process automation, optimize resource allocation and collaboration between work teams with new tools, and reduce risk due to regulatory compliance. As an example, our company has adopted the methodology of flexible project management, has harmonized robotic devices in its production process and applies quality control measures." (P1)

"Competition is the same for all businesses, especially small ones that want to become bigger." (P11)

4.3.6 6th Quality control and Assurance

Smart quality control, quality culture, QM tools/techniques, statistical process control, feedback were analyzed by the interviewed respondents under the 6th critical factor.

Why it is important

In the past, the product was completed and then quality checks were carried out. Now, however, flexible technologies are applied, so that quality checks are carried out during the development of the product. This involves a period of up to two months of continuous communication with the customer, with the company relying on their feedback, once they give final approval, the product is delivered. Companies' internal processes need to be related to quality, as the deliverable needs to be aligned with the customer's requirements. Adapting tools is not enough, companies also need to be structured internally, as the human factor is vital. Instead of statistical control, customer satisfaction is a better indicator pointed out the quality manager (P5).

Managers report that QA and QC help them in their companies:

"Agile technologies have been applied with great success in recent years. In the past, we did quality checks when we finished the product. Now, quality checks are done during product development - swift left. The customer has the final say, who of course will also take out all the 'childhood diseases' at the beginning. But you cannot put something on the market that is not of the right quality." (P2)

"This is important because results must be measured. However, in the Greek reality, some things are not happening." (P9)

"If this factor is eliminated, the other 12 cannot be implemented. QC and QA are two key methodologies that ensure the quality of products and services. By identifying failures and implementing corrective actions on the part of QC, combined with the implementation of procedures that confirm that customer requirements are met, it is possible to optimally manage the risk a company may face." (P1)

"If you don't have a tool that does process management and doesn't use indicators for evaluation, it is certain that the quality management system cannot be properly audited. Therefore, you are going in blind. You need audits, feedback and tools to manage the quality system properly." (P3)

"It is important for the company to understand its current position in order to develop a clear plan of action." (P11)

Quality managers (P5) and (P8) expressed skepticism, arguing that there are automatic checks in software systems, but there is still a need for human intervention to avoid errors, so automation is not the answer. Absolute confidence that procedures have been followed can result in something being unknowingly omitted by employees, who often fail to filter feedback at the end of the process.

Below they state specifically why they think it is important:

"Let's not even go there. If there are no procedures and no way to control quality, mistakes will happen." (P13)

"If this stage is not functioning properly, errors will go unnoticed, producing degraded results, exposing the company." (P12)

"It is the only way to identify and correct mistakes, preventing them from being repeated." (P7)

"We are ISO certified. We conduct internal audits in all departments to identify weaknesses and implement improvements. We then undergo regular audits to maintain our certification. Our customers can be assured that we are ISO certified." (P6)

"Culture is very important because it determines how the company operates." (P4)

Comparison of large, medium, and small enterprises

Quality manager (P1) explained that a large company must maintain appropriate procedures to enhance sustainability, i.e. have effective controls in place. The larger the company, the more stringent the controls need to be, because larger companies have more human resources to carry out controls at all stages. They also invest in QA and QC because their main objective is to ensure that products meet the specifications and customer requirements to achieve profitability and growth in the technological field. The key to success is a systematic approach and continuous process improvement. To this end, the company implements an annual inspection plan, data collection and analysis, customer surveys, statistical analysis of the results of production processes, etc.

"It is important, especially in small ones, to grow. In large companies, proper procedures must be maintained." (P11)

The expert (P2) pointed out that a small company needs to grow. He added that small businesses have a limited portfolio of customers, if a dissatisfied customer leaves, the loss

for a small business will be much greater than for a large one. On the other hand, for a small business, the many statistics and audits at the end can be cumbersome, so they need to be used in moderation explained (P9). (P6) points out that there is also the view that this factor is less or not at all important for small businesses because there is not as much complexity in the processes. The complexity arises when there are too many departments, and too many processes for each department.

Specifically they state:

"For large ones, it enhances sustainability." (P7)

"It is more important in large and medium-sized enterprises because they can go bankrupt more easily. Things can get out of control without us realizing it. It's nice to have it in the small companies, but not as necessary as in the big companies." (P3)

"The bigger the company, the tighter the controls. It has more human resources to carry out intermediate and final checks at all stages. In theory, the bigger the company, the better the controls." (P8)

4.3.7 7th Integration of Technology and Data Management

The 7th critical factor concerns automated document control, automatic data collection, the use of technology, and the handling of big data. The quality managers analyzed their views below.

Why it is important

Quality manager (P1) explained that this factor is very important as it facilitates the analysis of the data. It increases the speed of decision-making, the chances of early detection of failures, and the implementation of corrective actions. The same applies in case proactive actions are required to reduce the risk in certain processes. Some experts as (P5) believe that it is good to have automated solutions and tools, but the human factor should always intervene, for overview and monitoring. In a technology company, there must be someone responsible for each project or process.

In particular they mention:

"It has to be used properly so that there is an ethical approach to technology. Personal data should not be compromised." (P10)

"Yes, it is of significant importance. We are optimizing our cooperation." (P6)

"Automation is an extremely critical factor for saving resources, for example in terms of time, with a direct economic impact." (P12)

"Significant in a technology company, as information needs to be protected." (P9)

Another dilemma that expert (P2) arised is whether to take something off the shelf or develop something in-house or some combination of the two. This raises the question of

whether or not to leverage the technology to use it and develop it internally, or seek an off-the-shelf solution.

Of course there is the opposite view:

"It helps but it can be done without too much automation." (P4)

Comparison of large, medium, and small enterprises

The quality manager (P5) remarked that technologies and software are forms of knowledge, so individuals need to communicate and collaborate effectively as a team. Software development is not created by a single individual but by a team or multiple teams. Therefore, there must be a strong and productive relationship between these individuals which goes beyond the use of automated tools.

Experts agree that this critical factor is most important for large and medium enterprises:

"The automation of data collection processes is essential. Not so vital for small companies, which have less data, although it is beneficial for them too. For big companies, it's a no-brainer." (P3)

"The bigger the company, the easier it is to make a mistake. Automating processes reduces the likelihood of human error." (P7)

"Smaller companies also need to take this into account. But it's particularly important for larger companies because of the volume of data, workload and time required, where everything happens at a faster pace. Contracts and customers are more numerous, so automation and technology is needed for daily data generation. Automation and technology are essential for quality control." (P8)

(P1) pointed out that large companies rely on innovation and the integration of technology. This reduces the time to detect a problem or opportunity, the time to implement an action and the time to react. She explained that they also make better decisions because the sample used for analysis can be a multiple of what existed before data management was developed. She continued adding that having incorporated new technologies, the company is developing operations in a new business segment outside of traditional telecommunications products. An example is the development of the energy sector, smart cities, business solutions for utilities (data centers), etc.

In particular they emphasize:

"In a large company it is necessary because of the volume of data and the departments involved, as well as it may have some patents or personal data. Smaller companies need it for time limitations etc. Either way, all companies are accredited for this, so it's the law, the GDPR." (P9)

"It is more applicable to large enterprises." (P4)

Small companies have fewer needs and resources and less data volume. However, expert (P2) remarked that those that don't use technology are unable to manage simple things like customer turnover or the number of customers to whom each product has been installed.

Particularly with regard to small companies, they state:

"It also matters for smaller companies. Where we can optimize our collaboration, we use automated tools." (P13)

"It's very important for large businesses because it saves a lot of time and for small businesses because they have to have their data recorded. Document and information management tools are used by businesses of all sizes." (P6)

4.3.8 8th Stakeholder Engagement and Value Creation

Collaboration and coordination between stakeholders, identification system, supplier relationship/cooperation/QM, employee involvement, communication. These are some of the characteristics of the 8th critical factor developed by the quality managers.

Why it is important

There is no change and no progress without the commitment of the members concerned pointed out (P1). She continued explaining that the engagement factor is the key to success in creating, growing and sustaining a business. It is the process of collaboration and communication between different members, opinions, ideas and ways of dealing with crises. All parties must work together in the best possible way and coordinate their actions to achieve a common goal.

All the experts responded in almost the same way about the importance of the factor:

"There must be commitment from all stakeholders. Everyone involved is responsible for quality." (P3)

"Those who will be directly involved must commit themselves in this direction. Otherwise, there is no point." (P6)

"It is important for the proper functioning of the QA system. Some people lack commitment and adhere to procedures." (P12)

"We have suppliers, subcontractors and employees. We evaluate them based on previous work or guarantees. We carefully evaluate outsourcers because we want the quality to be the same from start to finish. Internal partners are guided by their manager and trained on processes and quality." (P8)

"Stakeholders and interested parties is a broad term. It is not just about customers and suppliers. It's about the neighborhood. 250 people and 250 cars come to park every morning." (P2)

"It has to do with the credibility of the company." (P10)

"We have a core of suppliers, which we evaluate every year. It's difficult to go to a new supplier. The process will be done carefully, there is an evaluation period where we will accept them or reject them. The board of directors are also the shareholders of our company, so there is close communication." (P5)

Some technology companies have a core of suppliers, even if they are not directly involved in their activities. This does not prevent them from evaluating them every year. It's hard to go to a new supplier. The process is done slowly, with an evaluation period and then the decision.

Specifically they state:

"It is crucial to establish a long-term partnership." (P11)

"The nature of the relationship with stakeholders varies, some are personal, some are impersonal. However, effective collaboration is essential." (P9)

The expert (P1) explained in detail that good cooperation, optimal coordination, employee participation, communication between all stakeholders lead to better quality execution of tasks, projects, cost reduction and achievement of desired results in a satisfactory time. The company cooperates with strategic suppliers, invests in customer satisfaction and is interested in their opinion, promotes and rewards employees' efforts, establishing a participative work culture.

Comparison of large, medium, and small enterprises

Small companies have more personal relationships, which has the disadvantage of making them less objective and they operate more on the basis of instinct and interpersonal relationships remarked (P2). Communication in small companies exists because everyone does everything, so everyone is involved anyway added expert (P13).

They say in particular:

"In large companies, relationships are more impersonal than in smaller companies. This should be avoided, the whole environment should be more people-oriented." (P7)

"Small businesses may not have much leverage over suppliers, whereas large businesses have easier lobbying mechanisms." (P4)

(P2) also mentioned that larger ones are more impersonal, so they measure indicators of cooperation. They see if a supplier is adhering to the terms of the contract, what the response is if there's a problem, about payments, about credits.

And they report:

"For large companies, this is of greater importance. In contrast, a small company has fewer stakeholders and a more direct and communicative relationship with them." (P12)

"In large firms, the relationships between partners and employees are not very personal, as they change more often. In small firms, however, there is more emphasis on personal relationships." (P11)

"A small company cooperates with partners long-term and it is difficult to stop the cooperation. As a larger company, we have the ability to decide which offers to accept. We will only work with those who meet the specifications and who are willing to accept our price." (P6)

Expert (P3) stated that regardless of the size of the company, all businesses require comparable control of suppliers and other external partners. For example, if a company has ISO 9001 certification, its supplier should also have specific certifications for its product. Because if the customer sees that the component is not certified, they will not buy it.

4.3.9 9th Sustainability and Social Responsibility

The objective is the integration of sustainable development, sustainable environment, sustainable society and economy.

Why it is important

Unlike industrial factories, technology companies do not produce waste. However, they still have to contribute to environmental protection by following certain certified environmental procedures. Some companies pay attention to environmental management because of their corporate culture, while others do so to align with customer expectations or to secure financial resources.

Experts (P1) and (P2) mentioned that great strides are also being made in corporate governance, with efforts in the area of workplace violence and harassment, and in addressing social inequalities and ensuring fairness and equality for all people.

"The concept of sustainability concerns everyone and it is necessary to consider alternatives to achieve a circular economy in technology companies. As a company we have included the SDGs (Sustainable Development Goals) in our strategy. However, a smaller company will face greater challenges." (P2)

The responses given by quality managers are presented below, which show their understanding of their responsibility as individuals and as representatives of a company, regardless of size:

"You can't have a technology company if you don't adapt to the needs and changes of each era." (P7)

"The environment has proven that it takes revenge. We as a company are making efforts. We are becoming a little friendlier to the environment and society. We have hybrid

cars and we do carpooling, so three people come together and we keep the roads clear for those who need to have one person in the car." (P2)

"This is where ISO 14001 and 45001 come in. A company has to be socially and environmentally sensitive. It's our company culture. We have things that have to do with the environment, such as packaging items imported from abroad or domestically. We are certified for that as well. As well as for employee safety." (P6)

"It is important and there is a clear upward trend. Sustainability is now a key requirement because there is a problem with the environment. We are careful about the laptops we buy, for example, checking the energy class, using energy-saving light bulbs, turning off air conditioning and not printing." (P3)

"Sustainability and social responsibility are approaches that aim to balance economic growth and social justice and are therefore key drivers of growth. Sustainability takes into account the needs of the present without depriving future generations of the ability to meet their own needs. A commitment to social responsibility, on the other hand, promotes social well-being. In this way, the development environment of people and business is not in conflict but in cooperation, and opportunities are maximized for both sides". (P1)

"All companies must be in harmony with the environment and its rules. It is a trend. We as a company have established procedures. Other bigger companies have more organized activities because of customer requirements." (P11)

"It is now a trend. Everything that is produced will have an impact on sustainability. It's not just about tomorrow or the day after tomorrow. It's about people and society. All businesses have to strive for the best for the environment. If the customer wants certain environmental standards to be followed, there is no choice but compliance. They won't force it, but if the competitor has them, they will go to them." (P8)

"It doesn't help them internally, because none of them adhere to it. The most common thing companies do is to turn off their printing machines, their air conditioners or their taps to have a zero footprint on the environment. It's more about appearances and the incentive is the subsidy. They don't do it because they are environmentally conscious." (P10)

"Greece lags in terms of environmental awareness. Our society is more third world, oriental and we are not so familiar with such processes. If it is not taught from the beginning of education, people will not think about the environment on their own. They will only think about it if it is forced upon them by the company itself. Usually, they do it under ISO because everyone wants to get certified for competitions. After all, it's a requirement. Companies in Greece don't have that philosophy internally. They want to Europeanize, but they are closer to the east." (P10)

Comparison of large, medium, and small enterprises

In all the interviews on this crucial factor, it was clear that large, medium and small companies cannot be easily compared. Achieving sustainable development requires action in many areas, including sustainability in the use of natural resources, good governance, innovation and community empowerment.

Large companies are leading the way in replacing the modes of transportation of employees with environmentally friendly ones, disposing of their packaging in the best way for the environment and following SDGs Sustainable Development Goals.

At the same time, smaller businesses are also trying to comply with environmental principles in any way they can.

However, it is observed that environmental attitudes are becoming more and more widespread. This is evidenced by the fact that it is now seen as conferring prestige.

In more detail they report:

"The concept of ESG (environmental, social, and governance) is currently a popular topic in business circles. It is a form of marketing that appeals to large companies as it has an impact on their external image and the perception of their consumers. However, for medium-sized companies like ours, the impact is minimal. In our case, we have ISO 14001, which is an environmental standard. Although we do not produce waste and have low consumption, we have adopted this standard because it is a customer requirement. In addition, we face issues of violence and harassment in the workplace." (P5)

"It's important for large companies, but not for small ones. They're affected by trends like ESG to secure financing. Customers and banks are forcing them to adopt these practices." (P13)

"In a big company, it's important for image. In a small company it's not. Our customers ask for specific specifications and standards. Especially public sector clients. Private clients only if it's a big company." (P12)

"As a small company, we have not been asked by any partner to have anything more for the environment than what we already have, which includes recycling, reducing consumption, and going paperless." (P11)

"As tech companies are at the forefront of innovation, it is only right that they are active members. Although this is usually done by medium and large companies, smaller companies should also be involved. Some of our large partnerships have specific requirements from us, which we have to meet." (P9)

4.3.10 10th Performance Management and Evaluation

These factors include performance monitoring, measurement and evaluation, effective project management, reliable data collection, and satisfaction of employees and well-being.

Why it is important

The quality manager (P1) described it as a critical aspect of a company's management process. It involves monitoring, evaluating, and improving a company's performance, reflecting its evolution over time. As a result, stakeholders can gain an overview of the company's performance at both an overall and departmental level.

Specifically, the following:

"It is impossible to manage a management system without monitoring and measurement." (P4)

This factor must be 360 degrees, i.e. there must be both bottom-up and top-down evaluation. Employees should judge management and provide feedback to the Board of Directors, who will give feedback to those with whom they come into daily contact pointed out the quality manager (P5).

In particular:

"Mistakes will be made, but we have to learn from them and not repeat them. If we do not keep the data, which for continuous improvement to be correct and reliable, we will repeat the same mistakes." (P2)

"This factor allows us to make assessments through risk management. We examine the next steps, whether it's a supplier, an employee, or a product produced." (P9)

It plays a positive role and is part of a broader framework of controls and processes that provides companies with a clear picture of how employees are behaving, the results and productivity they are achieving. Employees need to understand their current level of performance, how to improve, and how much effort they need to put in to achieve their goals.

Below the managers indicate how and why they do the evaluations:

"It is important to evaluate employees. The majority of them want it and it leads to rewards for excellent performance. Staff retention depends on it." (P8)

"It's fair. Those who contribute more should be recognized, and those who contribute less should be trained to find their weaknesses." (P7)

"There is an annual evaluation and in between. Employees know if they need to improve, if their supervisor is happy. It's not done in a punitive way. Employees like it because they want to know where the company is going." (P6)

"The company conducts an annual evaluation, but employees can request a re-evaluation. For example, if an employee completes a major project and wants to change departments, he or she can request it. We also do a SWOT analysis to see where we are, and provide feedback to facilitate the process." (P3)

Comparison of large, medium, and small enterprises

The quality manager (P1) described it as, the well-being of a company means evaluating its processes. This shows where it is doing well and where it needs to improve. Rewards and corrective actions can be given to those who are high and low performers, respectively. This should happen regularly in large companies, with constant monitoring making the company more efficient, and productive and helping to develop its personnel.

One manager in particular made this comparison:

"In large companies, many departments are involved and there is a delay in data collection. In small organizations, there may not be the resources available to devote time to the metrics and data." (P4)

Some interviews suggest that a company cannot be evaluated when it is small, but the majority of experts disagree because in a small company, this factor affects the overall image of the company, and its employees are motivated to be evaluated:

"In both large and small companies, there must be an evaluation. The big ones have a margin for improvement, but we all need to look at the indicators." (P2)

"The bigger the company, the greater the benefit. In a small company, the daily friction with employees makes formal evaluation less valuable. In a large company, where things are more impersonal and there is no contact with all the people in the company, the formal assessment is more valuable." (P5)

"The smaller the business, the more important it is. If a key person, dissatisfied, leaves a business with 200 employees, it's a blow. But in a small business with only 5 employees, it's even worse." (P8)

"It's important for all companies because the employees are the company; they have to be happy for the company to do well."(P3)

4.3.11 11th Product Development and Management

This factor relates exclusively to product development and management.

Why it is important

Expert (P10) explained that technology companies need to evolve their products to meet the challenges posed by unfair competition, the pursuit of patents and the demand for high-quality services. When addressing a more demanding market, keeping up with the latest developments and responding to evolving market demands is essential. The frequency with which each company updates its products depends on the daily use of its products. Failure to promote new products and improve existing products will result in the company falling behind its competitors and losing market share.

And they report:

"It provides the company with new avenues for growth and expansion." (P12)

"Absolutely. Our goal is to establish the company in the business market. We are constantly strengthening our existing programs and developing new ones." (P11)

"Staying updated is essential in today's marketplace. If we don't adapt to the latest trends, we won't remain competitive." (P7)

Quality manager (P5) emphasized that B2B software development involves creating a software solution and then improving it annually. As opposed to the practice of developing new software solutions on an annual basis. Product development, therefore, involves improving the existing product.

More specifically, they analyze:

"Continuous evolution in the development of new products helps the company's viability." (P4)

"Product development is a priority for us. Our work involves long-term projects with varying requirements, so we work closely with our customers to ensure our solutions align with their specific needs and plans." (P9)

The main activity of the company is product development. Although the number of employees in the development department may be smaller compared to the support and sales departments, it is nevertheless the main focus of the company, stated expert (P2).

More obscurely reported:

"Once a product is developed, it is ready for the market. This allows for a more efficient and timely sales approach." (P6)

Comparison of large, medium, and small enterprises

Quality managers (P8) and (P11) stated that a technology company must align itself with the pace of technological progress. Staying current and evolving is vital to remain competitive in the industry, regardless of size.

"It is important to embrace innovation in all companies, regardless of size." (P9)

Large companies have the ability to consistently develop new software, which is considered more critical than for medium-sized or small companies.

For small companies, development and product management is important for continuous growth. For large and medium-sized companies, there are alternative routes to growth, which makes these activities less necessary expert (P3) mentioned.

However, this view is not shared by all:

"Without product development, the company will fall behind, regardless of its size, and eventually close. The concept of 'too big to fail' does not exist in Greece, because there are no companies of that size." (P2)

"Small companies don't develop products. It's a difficult process and they usually partner with larger ones. If there's a ready-made product at another company, we'll go get it ready-made and incorporate it into our own." (P6)

"For small companies, if they already have a product that is differentiated or not on the market, then it's hard to produce again. Also, if there is a competing product on the market at a better quality/price, the small business may be at risk." (P4)

4.3.12 12th Risk Management and Compliance

This factor comprises two distinct concepts, with some degree of overlap.

Why it is important

It concerns two different critical factors for any business. In many cases, they must be managed in parallel to ensure the prosperity of a company expert (P1) supported.

More specifically it was reported that:

"We consider risk management important and we apply it in all our projects as well as in the context of the certifications we obtain. We do not undertake any project without a risk analysis." (P6)

"Without risk management plans, projects can go off-course." (P12)

"It is important to protect a technology company from cyber-attacks. The company needs to protect its customers." (P8)

Expert (P10) describes that every company must have a contingency plan to mitigate potential risks. If a company takes a risk and suffers a loss, the cost of risk should be minimal. Foresight is essential. For example, we thought we were living in a time when there were no pandemics. Several companies went out of business because they did not foresee the need for insurance against the problems created by the pandemic.

Many managers have agreed with the following:

"It's too important to have a backup plan." (P7)

Quality manager (P2) concurred, stating, that risks must be taken properly from the beginning of a company's operation because failure can result in the company not achieving its objectives despite its best efforts.

In greater detail one manager said:

"The level of risk management required depends on the nature of the business. In large businesses, the level of risk management is much higher due to the greater complexity of operations and the need for tighter control. However, if the three first critical factors are addressed, risk management is effectively covered." (P13)

Expert (P5) added that the logic behind these factors is twofold. First, it allows the company to pursue a process of continuous improvement. Second, it helps reduce risk. In terms of quality, it is about business risk, which gives management some forms of risk to

consider. However, it is beneficial for everyone involved to have a good understanding of these risks.

In particular, it was reported:

"It shows what can go wrong and how we can improve. That's how we achieve continuous improvement." (P9)

Comparison of large, medium, and small enterprises

It is of critical importance for all companies to be aware of the risks involved. Neither small nor large companies should be complacent.

Managers without exception agreed and stated:

"Risk management plans are important for any company, as they help them meet deadlines." (P2)

"It helps small businesses to grow and big businesses to improve." (P9)

Quality manager (P1) in detail described that in a large company, risk management and compliance with regulatory requirements are particularly important because they offer, firstly, great complexity and influence; because large organizations typically operate in many markets and have complex operating structures, there are more potential risks to be addressed and more opportunities to be exploited. Secondly, maintaining a good reputation and business credibility, large companies often have an international presence which they need to maintain. Third, legal requirements, large companies are often subject to greater compliance requirements due to the volume of their scope. Fourth, financial incentives, failure in risk management and compliance can lead to significant financial losses through fines, lawsuits, penalties or even loss of customer and investor confidence.

Below they have explained exactly what they mean:

"The risk is particularly important for large companies. As a company grows, its operations become more dispersed, so it needs to find ways to reduce risk." (P5)

"Larger companies need to take more security measures to prevent cyber-attacks and protect their products." (P8)

"In a large company it is a more important factor because the bigger the clientele and the bigger the business, the easier it is to make mistakes." (P7)

"It is important for large and medium-sized enterprises, but small businesses should also move in this direction. They have less risks because they have fewer activities. We, a medium-sized company, have more activities, so it's easier a mistake to slip through." (P6)

This is a crucial aspect for small businesses. One wrong step leads to the closure of the business. Conversely, a larger business may be able to withstand a similar mistake. Expert (P11) emphasized.

4.3.13 13th Infrastructure and Support Systems

Infrastructure is scientifically identified as the essential physical systems of a business entity, frequently encompassing the production processes. The following illustrative examples of infrastructure may be considered: transportation systems and communication networks.

Why it is important

Quality manager (P1) noting the benefits of this critical factor: It is a fundamental aspect of business growth. An organization without the requisite infrastructure is not viable. It is widely acknowledged that an effective infrastructure is essential for the smooth operation of a business.

They were meticulous in their reporting:

"If the company doesn't have the right tools for employees to work and produce products, how can it compete?" (P10)

"Tools do not make the craftsman, but a good craftsman with useless tools cannot do a good job. You need the right tools to achieve the goals." (P2)

"We have a big budget to maintain and improve our infrastructure and technologies every year. We have ISO 22301 and ISO 27001, which require us to be compliant and improve our infrastructure." (P5)

Expert (P8) added that, in the case of technology companies, the most crucial factor depends on the specific area of the business in question. This is because the industry is characterized by a high degree of volatility. Buildings are not a priority, given that the workforce can work remotely. The most significant challenge facing Greece is the lack of a robust cybersecurity framework.

They have mentioned why they think it is important:

"A company's infrastructure and support system is important. I like a nice, friendly office when I'm not working from home and having good, modern equipment." (P11)

"Yes, it's a pillar. If the infrastructure is poor, the company's work will not progress." (P9)

Expert (P8) added that all companies must invest in this area, as well as in GDPR (General Data Protection Regulation), which is mandatory for some of them. Once a company is operating online, it must protect its communications and data to prevent any leaks, thereby avoiding any potential exposure to customers.

They also analyzed with the following expressions:

"If you don't have the right tools, you can't produce work. You need specific tools, and programs, if you don't have them, it's a serious issue." (P6)

"At our company, employees have the option to work from home or in a hybrid format, depending on their role. For those who work remotely, the building infrastructure, apart from support systems such as VPN, is not a major factor in determining their suitability for remote working." (P3)

Comparison of large, medium, and small enterprises

Expert (P12) noted that, nevertheless, the same issues, such as the environment, support systems, and equipment, are crucial for both small and large companies. The majority of interviewers concur with the above statement:

"For large companies, it's a code; for small companies, it should be a prerequisite." (P10)

"More a fact for large companies. More difficult to apply to small ones." (P4)

Expert (P1) reported, in particular, in large enterprises, infrastructure and support functions are key pillar of growth and should receive the necessary funding. They enhance the efficient operation of the company, its efficiency, productivity, and thus its competitiveness by increasing the speed of response through the automation of tasks while reducing the failure rate in its actions.

Below are more specific details:

"For smaller companies, the need for a quiet environment and comfortable offices is less pressing, given their smaller number of staff and more limited activities. However, for larger companies like ours, which have a large number of employees and a wide range of activities, it is essential. As a company, we invest heavily in new infrastructure and new programs and tools to make our work easier." (P6)

"For large companies in particular, as their staff numbers increase, there will be greater demands on the infrastructure." (P9)

4.4 Ranking

In the second part of the interview, respondents were asked to rank from 1 (important) to 13 (not so important) the 13 critical factors. Table 5.1 below shows their ranking.

To reach our conclusions, we conducted a ranking analysis on the factors, both overall and by firm size. In the ranking analysis, we calculated the average ranking position for each factor. Table 5.2 below presents the results.

Employees: 9	Employees: 10	Employees: 22	Employees: 28
1. Organizational Leadership and Management Commitment 2. Strategic Planning and Policy 3. Customer-Centric Approaches 4. Human Resource Development 5. Process Optimization and Innovation 6. Quality Control and Assurance 7. Integration of Technology and Data Management 8. Stakeholder Engagement and Evaluation 9. Sustainability and Social Responsibility	1. Organizational Leadership and Management Commitment 2. Strategic Planning and Policy 3. Customer-Centric Approaches 4. Human Resource Development 5. Process Optimization and Innovation 6. Quality Control and Assurance 7. Integration of Technology and Data Management 8. Stakeholder Engagement and Evaluation 9. Sustainability and Social Responsibility	1. Organizational Leadership and Management Commitment 2. Strategic Planning and Policy 3. Customer-Centric Approaches 4. Human Resource Development 5. Process Optimization and Innovation 6. Quality Control and Assurance 7. Integration of Technology and Data Management 8. Stakeholder Engagement and Evaluation 9. Sustainability and Social Responsibility	1. Organizational Leadership and Management Commitment 2. Strategic Planning and Policy 3. Customer-Centric Approaches 4. Human Resource Development 5. Process Optimization and Innovation 6. Quality Control and Assurance 7. Integration of Technology and Data Management 8. Stakeholder Engagement and Evaluation 9. Sustainability and Social Responsibility
Employees: 50	Employees: 70	Employees: 78	Employees: 85
1. Organizational Leadership and Management Commitment 2. Strategic Planning and Policy 3. Customer-Centric Approaches 4. Human Resource Development 5. Process Optimization and Innovation 6. Quality Control and Assurance 7. Integration of Technology and Data Management 8. Stakeholder Engagement and Evaluation 9. Sustainability and Social Responsibility	1. Organizational Leadership and Management Commitment 2. Strategic Planning and Policy 3. Customer-Centric Approaches 4. Human Resource Development 5. Process Optimization and Innovation 6. Quality Control and Assurance 7. Integration of Technology and Data Management 8. Stakeholder Engagement and Evaluation 9. Sustainability and Social Responsibility	1. Organizational Leadership and Management Commitment 2. Strategic Planning and Policy 3. Customer-Centric Approaches 4. Human Resource Development 5. Process Optimization and Innovation 6. Quality Control and Assurance 7. Integration of Technology and Data Management 8. Stakeholder Engagement and Evaluation 9. Sustainability and Social Responsibility	1. Organizational Leadership and Management Commitment 2. Strategic Planning and Policy 3. Customer-Centric Approaches 4. Human Resource Development 5. Process Optimization and Innovation 6. Quality Control and Assurance 7. Integration of Technology and Data Management 8. Stakeholder Engagement and Evaluation 9. Sustainability and Social Responsibility
Employees: 140	Employees: 150	Employees: 250	Employees: 500
1. Organizational Leadership and Management Commitment 2. Strategic Planning and Policy 3. Customer-Centric Approaches 4. Human Resource Development 5. Process Optimization and Innovation 6. Quality Control and Assurance 7. Integration of Technology and Data Management 8. Stakeholder Engagement and Evaluation 9. Sustainability and Social Responsibility	1. Organizational Leadership and Management Commitment 2. Strategic Planning and Policy 3. Customer-Centric Approaches 4. Human Resource Development 5. Process Optimization and Innovation 6. Quality Control and Assurance 7. Integration of Technology and Data Management 8. Stakeholder Engagement and Evaluation 9. Sustainability and Social Responsibility	1. Organizational Leadership and Management Commitment 2. Strategic Planning and Policy 3. Customer-Centric Approaches 4. Human Resource Development 5. Process Optimization and Innovation 6. Quality Control and Assurance 7. Integration of Technology and Data Management 8. Stakeholder Engagement and Evaluation 9. Sustainability and Social Responsibility	1. Organizational Leadership and Management Commitment 2. Strategic Planning and Policy 3. Customer-Centric Approaches 4. Human Resource Development 5. Process Optimization and Innovation 6. Quality Control and Assurance 7. Integration of Technology and Data Management 8. Stakeholder Engagement and Evaluation 9. Sustainability and Social Responsibility

Table 4.1: Ranking of 13 critical progenitors by quality experts

Overall companies			
1. Organizational Leadership and Management Commitment	2.15		1.50
12. Risk management and Compliance	4.00		3.75
2. Strategic Planning and Policy	4.08		4.00
3. Customer-Centric Approaches	4.54		5.50
4. Human Resource Development	5.77		5.50
13. Infrastructure and Support Systems	6.77		6.50
6. Quality Control and Assurance	7.08		6.75
5. Process Optimization and Innovation	7.38		7.50
8. Stakeholder Engagement and Value Creation	8.77		7.75
10. Performance Management and Evaluation	9.31		9.25
7. Integration of Technology and Data Management	9.31		10.00
11. Product Development and Management	9.38		10.25
9. Sustainability and Social Responsibility	12.54		12.75
Medium companies			
3. Customer-Centric Approaches	2.00		1.25
12. Risk management and Compliance	3.40		2.50
4. Human Resource Development	4.40		5.00
5. Process Optimization and Innovation	5.00		5.50
6. Quality Control and Assurance	5.20		7.00
1. Organizational Leadership and Management Commitment	5.40		7.00
11. Product Development and Management	6.40		7.25
13. Infrastructure and Support Systems	8.40		7.75
2. Strategic Planning and Policy	8.80		8.25
7. Integration of Technology and Data Management	9.40		8.50
8. Stakeholder Engagement and Value Creation	9.60		9.00
10. Performance Management and Evaluation	11.00		9.25
9. Sustainability and Social Responsibility	12.20		12.75
Small companies			
1. Organizational Leadership and Management Commitment			1.50
12. Risk management and Compliance			3.75
3. Customer-Centric Approaches			4.00
2. Strategic Planning and Policy			5.50
7. Integration of Technology and Data Management			5.50
4. Human Resource Development			6.50
10. Performance Management and Evaluation			6.75
11. Product Development and Management			7.50
6. Quality Control and Assurance			7.75
13. Infrastructure and Support Systems			9.25
8. Stakeholder Engagement and Value Creation			10.00
5. Process Optimization and Innovation			10.25
9. Sustainability and Social Responsibility			12.75
Large companies			
1. Organizational Leadership and Management Commitment			1.25
2. Strategic Planning and Policy			2.50
12. Risk management and Compliance			5.00
3. Customer-Centric Approaches			5.50
4. Human Resource Development			7.00
5. Process Optimization and Innovation			7.00
8. Stakeholder Engagement and Value Creation			7.25
13. Infrastructure and Support Systems			7.75
6. Quality Control and Assurance			8.25
10. Performance Management and Evaluation			8.50
7. Integration of Technology and Data Management			9.00
11. Product Development and Management			9.25
9. Sustainability and Social Responsibility			12.75

Table 4.2: Analysis Ranking of the factors, both overall and by firm size

5. Conclusions

5.1 Introduction

This section presents the findings of our analysis, which was designed to receive feedback on the relative importance of the 13 CSFs and the comparative analysis of them in terms of company size.

The chapter is divided into three sections. The first presents the ranking of the 13 CSFs by quality managers. The second discusses the findings and conducts a further comparative analysis of the importance of the 13 CSFs between large/medium and small enterprises. The final section outlines the contribution of the study to the existing literature, identifies its limitations, and suggests avenues for future research.

5.2 Discussion

5.2.1 Comparative analysis for overall companies

The first table presents the comparative analysis for all companies. Our comments focus on how the 13 CSFs were ultimately ranked by the representatives of the 13 Greek technology companies, regardless of their size.

We note that the first 3 important factors are "Organizational Leadership and Management Commitment", "Risk management and Compliance" and "Strategic Planning and Policy".

It is worth noting that this result aligns with the Hoshin management approach, which is widely adopted in Japan. In Hoshin management, the organization first sets out its vision, strategies, and strategic objectives based on its mission and values. These are then deployed and shared by top management (Yang & Yeh, 2007).

The last in importance is "Sustainability and Social Responsibility". This is logical given that technology companies are not industries that produce waste. However, despite this, they do try to have activities for an eco-friendly environment and a friendly business environment as can be seen from their responses in the previous chapter.

5.2.2 Comparative Analysis between Large/Medium and Small Enterprises.

The following comparative analysis compares the large/medium companies with the small companies, as shown in Table 5.2.

In the context of Large companies, the factors of "Organizational Leadership and Management Commitment", "Strategic Planning and Policy", and "Risk Management and Compliance" are of significant importance. These align closely with the two most important factors of Small companies, however, Small companies also consider "Customer-Centric Approaches" to be of great importance. In addition to "Risk Management and Compliance", Medium-sized companies also prioritized "Customer-Centric Approaches", aligning

themselves with Small companies. Furthermore, they placed a high value on "Human Resource Development".

The ranking of "Process Optimization and Innovation" for large and medium-sized companies is relatively high, whereas for small companies it is almost at the bottom. A similar pattern is observed for "Stakeholders Engagement and Value Creation" and "Infrastructure and Support Systems".

As the company grows, the importance of "Stakeholder Engagement and Value Creation" increases.

The importance of "Quality Control and Assurance" is ranked ninth for Large and Small companies, but fifth for Medium-sized companies.

The apparent contradiction is that at the interviews, the "Performance Management and Evaluation" factor for small companies was not deemed to be of such significance (due to the relatively small number of employees) but was ranked higher in importance than that of large/medium companies. A similar pattern was observed concerning "Integration of Technology and Data Management". In the interviews, the experts indicated that, due to the limited number of employees, data and procedures in small companies are not as crucial as in large/medium companies. However, this factor was ranked higher in importance for small companies than for large/medium ones.

As a company grows, the role of "Product Development and Management" becomes less significant.

In the case of all companies, the ranking of "Sustainability and Social Responsibility" is the lowest, for reasons previously outlined.

Both Large and Small companies ranked "Organizational Leadership and Management Commitment" as the most important success factor of all, in line with the studies by Yadav, et al. (2021), Alawag, et al. (2023), Nguyen, et al. (2023), and Samanta, et al. (2023). Garcia-Alcaraz, whose study expressed that the commitment of management is the key factor in the TQM adoption and that management should empower their staff to carry out quality projects and meet the company's objectives in the long term, encouraging both horizontal and vertical interaction between departments. This is also in line with the statements of our quality experts (P2), (P3), (P4), (P5), and (P7). He also pointed out that all management policies have to be motivated towards increasing customer satisfaction, an important factor for medium and small companies, because it is essential for them to emphasize "customer-centric approaches" for the survival and growth of the company, because the customer pays their salaries (P3), so it is of the utmost importance for companies to have customers, because without them, they cannot succeed (P7), so there is no long-term viability (P6). Alshourah (2021) also noted that managers place a high value on TQM to improve the quality of customer service and to foster a long-term relationship with their customers. His results are in line with what we mentioned above and with the statements of (P9) that it is more important for small and medium sized companies because of the small number of customers. To keep them satisfied, build a reputation and that is how they will grow (P8). Yas, et al. (2021) and Elibal & Özceylan (2022) also stated that being engaged

and customer-focused is a major factor in the quality of a company, leading to higher productivity and improved organizational performance.

For medium-sized companies, 'Organizational leadership and management commitment' ranked 6th. When asked about this factor, the responses of the experts working in medium-sized companies indicate that the focus is indirectly on how top management contributes to the quality of the smooth running of all projects, the vision, the setting of strategic goals and the training of employees. This is why the factors relating to these elements are ranked higher than this one.

"Risk management and compliance" is a factor that all the experts considered to be very important for a technology company. Menon (2024) mentions that risk management is considered a proven method of project management with numerous companies effectively implementing risk management tools, practices and procedures. They shall establish an adequate risk management plan at the outset of the project, covering core processes such as risk identification, quantitative and qualitative risk analysis, risk response planning, and risk monitoring and control. His survey is in line with the statements of our experts, who all pointed out the importance of this factor, even though the experts indicated that it is more important for Larger companies in case a mistake slips through due to the complicated procedure (P6) (P7), this factor also ranks high in small companies because, as mentioned by the expert (P11), one wrong step leads to the closure of the company.

"Human resource development has also been ranked high for medium sized companies and of medium importance for large and small companies. The quality manager (P5) emphasized the importance of disseminating knowledge, supporting the contribution of Abbas (2021) on the impact of TQM on knowledge management and Ali (2022) who pointed out that training and learning of employees leads to the successful implementation of Quality 4.0. Cavallone (2022) likewise explained training and motivation as exerting a substantial and statistically meaningful intermediary role in promoting organizational performance. Expert (P9) also commented that the technology is evolving with new standards and as (P6) added it is all a chain, if there is no proper training the product cannot be produced and the customer will not be satisfied. Employees are the core of the company, noted (P7). Although the experts in our survey were skeptical about how easy it is for a small company to train its employees for financial or other reasons (P13) (P4), this factor was ranked almost as highly as in large companies.

Overall, our results are somewhat consistent with the Verma study (2022). He concluded that strategic planning and staffing, teamwork and leadership development emerged as the top three critical practices. At the same time, performance measurement and evaluation, work design and analysis, and promotion are identified as the lowest practices. In our case, 'performance management and evaluation' ranked 7th for small companies and 12th and 10th for medium and large companies respectively.

5.3 Contribution, Limitations, and Further Research

This study corroborates the pervasive impact of the 13 CSFs on Greek technology companies, enhancing their competence and operational quality, thereby facilitating business success.

This research contributes to the existing literature by providing an analysis of the 13 CSFs impact on the companies. The study aims to offer a comprehensive understanding of the different mentalities between large/medium and small companies.

It should be noted that this study is subject to certain limitations that require consideration. The research sample size of 13 participants is relatively confined, which may limit the general applicability of the findings. The sample size may also be subject to increase in future studies. Thus, there is yet a necessity to re-examine them taking into account these research limitations.

In this study data was only collected from tech Greek companies. Future research should aim to expand the geographical scope of investigation, analyze each factor independently, or investigate the factors from the perspective of employees. It may even be cross-sectional. Future studies should involve operational personnel to enable a holistic examination of such variables.

Further study can be done to develop a hierarchical relationship between newly identified CSFs and different classification approaches may be proposed in terms of TQM enablers. CSFs based on Quality 4.0 can also be reviewed.

Furthermore, it is recommended to conduct additional research in this area, in particular for start-ups, to determine whether the TQM CSFs are still appropriate for them.

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