

Critical Success Factors as Enablers to Achieve Quality Management System Benefits: An Engineering Organisational Case Study

Siyabonga Zwane, Annlizé Marnewick and Hannelie Nel

Postgraduate School of Engineering Management

University of Johannesburg

Johannesburg, South Africa

siyamzwane@gmail.com; amarnewick@uj.ac.za; hannelien@uj.ac.za

Abstract

The research identified benefits that are associated with implementing the ISO 9001:2015 quality management system as well as the critical success factors required to realise the benefits. Organisations often successfully implement the quality management system but fail to unlock benefits that are beyond achieving formal certification of the system such as reduced defects and improved internal communication. The study identified benefits associated with implementing a Quality Management System and grouped them as primary, secondary, and tertiary. Furthermore, twenty-one critical success factors have been identified that benefit the success of a quality management system. The research presents the findings of the case study which evaluated the existence of the critical success factors as well as their effectiveness in realising the benefits that the Quality Management System offers. The research benefits organisations who plan to adopt the system as well as those who aim to improve their implemented system utilising the identified success factors.

Keywords

Quality Management System, Critical Success Factors

1. Introduction

The International Organization for Standardization (ISO) 9001 series is a formal quality management certification system that is widely known and implemented internationally (Ismyrli, 2017). Global organisations implement Quality Management Systems (QMS) to enhance efficiency and competitiveness and to improve customer satisfaction (Psomas, Fotopoulos and Kafetzopoulos, 2010). While most organisations manage to acquire ISO 9001 certification, organisations exist that struggle to realise the benefits of a formalised quality management system. The QMS offers benefits that are beyond receiving formal certification, such as improved productivity, increased market share and client satisfaction (Psomas, Fotopoulos and Kafetzopoulos, 2010). The literature notes that although many organisations implement the QMS, not all organisations that implement the system experience the expected positive results (Terziowski, Power and Sohal, 2003; Denton and Maatgi, 2016).

Researchers have identified the following factors as the reasons why organisations implement the system but fail to unlock the full benefits that a certified QMS offers:

- According to Psomas, Fotopoulos and Kafetzopoulos (2010), the reason for the struggle often stems from the organisation's initial reason for seeking certification and also how well the organisation understood and implemented the quality management system.
- Marín and Ruiz-Olalla (2011) explain that organisations often struggle to sustain positive results if certification was achieved through complying with the standard requirements and not due to actual improvements made to the organisation's internal processes to meet customer requirements.

- Piskar and Dolinsek (2006) found that all advantages that are obtained from certification are linked to the advancement of the QMS in concurrence with the affirmative attitude of employees towards the system.

The polarised perceptions regarding the benefits that a certified quality management system offers provided the objectives of this research study, namely, to verify the benefits of a QMS as well as to identify the critical success factors required for an organisation to fully realise the benefits the system has to offer.

1.1 Objectives

The objectives of the study are as follows:

- To determine the benefits that organisations achieve from implementing the ISO 9001 certified quality management system as well as to determine the critical success factors that organisations can implement in order to achieve the determined benefits.

2. Literature Review

The literature review presents the benefits that organisations can expect from adopting the ISO quality management system as well as the critical success factors that lead to the effective implementation of the quality management system. Existing literature uncovered three groups of benefits that the quality management system has to offer. These groups are presented in Table 1.

Table 1. Benefits to be expected from adopting the ISO QMS system

Benefit group	Type of Benefit
Primary benefits	Obtain official ISO QMS certification (del Castillo-Peces, Mercado-Idoeta, Prado-Roman and del Castillo-Feito, 2018)
Secondary benefits	Operational and financial improvements (Cai and Jun, 2018)
Tertiary Benefits	Meeting customer expectations and improving customer satisfaction. (Priede, 2012)

Many companies implement the system due to external pressures (del Castillo-Peces, Mercado-Idoeta, Prado-Roman and del Castillo-Feito, 2018). This could be prompted by regulations that are set by the government for organisations to access certain markets (Pheng Low and Faizathy Omar, 1997). In an effort to avoid being excluded, organisations then implement the ISO system. According to a study conducted by del Castillo-Peces, Mercado-Idoeta, Prado-Roman and del Castillo-Feito (2018), such organisations tend to achieve certification but struggle to maintain the certified quality management system, thus unlocking only the primary benefits that QMS has to offer.

According to Cai and Jun (2018), the key to realising secondary benefits such as operational improvements is through the internalisation process. Internalisation involves converting the existing organisational procedures to align with the ISO management system requirements. For this process to be successful, education and employee participation are crucial. Research conducted by Benner and Veloso (2008) suggests that the benefits to be expected are in series, meaning that the drive to achieve certification in order to improve internal processes will lead to the organisation expecting to make improvements with their finances as well. Organisations need to ensure that quality is consistently measured, and corrective action takes place when defects occur, this will decrease the defects rates and assist the organisation to identify defects at an earlier stage. In order to realise benefits that extend beyond receiving the ISO certification, Priede (2012) found that spending time to develop well defined and documented procedures lead to improved output and consistency. This study identified critical success factors that assist an organisation to achieve the primary, secondary and tertiary benefits that are offered by a certified QMS. Table 2 presents a summary of the identified critical success factors.

Table 2: 21 Critical success factors that lead to achieving QMS benefits

No.	Critical Success factor	No.	Critical Success factor
1	Leadership (Ingason, 2015)	12	Process and data management (Ismyrlis, 2017)
2	Training of employees (Boiral, 2011)	13	Align company practices with ISO QMS. (Boiral, 2011; Ivanova, Gray and Sinha, 2014)
3	Participation from the whole organisation (Wahid and Corner, 2009)	14	Employee attitude towards QMS. (Wahid and Corner, 2009; Denton and Maatgi, 2016)
4	Availability of resources (Denton and Maatgi, 2016)	15	Time of implementation (Psomas, Fotopoulos and Kafetzopoulos, 2010)
5	Customer focus (Psomas, Fotopoulos and Kafetzopoulos, 2010)	16	External pressure (government and competition).
6	Intentional continuous improvement. (Ingason, 2015)	17	Reward system. (Cai and Jun, 2018)
7	Clearly defined and explained objectives. (Boiral, 2011)	18	Utilise external consultant. (Ingason, 2015)
8	Planning/ preparation (Ingason, 2015)	19	Strong quality culture. (Ivanova, Gray and Sinha, 2014; Denton and Maatgi, 2016)
9	Auditing. (Wahid and Corner, 2009)	20	Benchmarking. (Mardani, Jusoh, Bagheri and Kazemilari, 2015)
10	Past experience with QMS system (Cai and Jun, 2018)	21	Working Environment. (Clegg, Rees, Titchen, Clegg, Rees and Titchen, 2010)
11	Reduce unnecessary paperwork (Boiral, 2011)		

Wahid and Corner (2009) conducted a case study of one organisation in comparison with literature findings and uncovered a comprehensive list of factors that are critical to the successful implementation and maintenance of the ISO quality management system. The factors identified are involvement and commitment from top management, organisation collaboration and company awareness of the system, employee participation, the correct reward system, knowledge of the system and continuous improvement amongst other factors.

Internalisation is evident as a critical success factor in the work conducted by Priede (2012), who found that well-written procedures lead to improvements in outputs and sustainable improvement. By investing valuable time into preventative measures such as timeously monitoring for defects and areas of improvement, organisations can reduce defects, improve efficiency and ensure that the adopted QMS stays in line with ISO requirements (Priede, 2012; Cai and Jun, 2018). Ismyrlis (2017) conducted research on the critical success factors identified in ISO certified Greek companies. The study consolidated and proposed six critical success factors that aid the successful implementation and operation of a quality management system. The identified factors are leadership, customer focus, people-workforce management, supplier's quality management, strategy and process & data management. The findings from Ismyrlis, Moschidis and Tsiotras (2015) regarding leadership involvement are similar to those of Wahid and Corner (2009); Ingason (2015) who concluded that the role and participation of top management are responsible to facilitate and guide the organisation in utilising the quality management system.

3. Methodology

The study identified the case study as best suited to provide the required in-depth understanding of the research problem in order to provide an insightful and descriptive explanation of the reason why organisations that implement a quality management system only achieve certification but do not realise the full benefits that a certified quality management system offers. A single engineering consultancy organisation's quality management system which had been successfully implemented and remained functional was selected as the unit of study. Furthermore, the quality management system had been certified for a period longer than three years which was beneficial as literature stated

that organisations realise long-term and more long-lasting benefits when the system has matured with the passing of time (Piskar and Dolinsek, 2006).

The study considered utilising multiple sources to collect data, in order to improve triangulation and strengthen the case study Yin, (2003) it is for that reason that this research utilised semi-structured interviews with a written interview protocol in order to obtain data from individuals as primary source and documents review as a secondary source of information. This study identified employees who have undergone certificated training pertaining to the ISO quality management system. Employees selected had to be directly responsible for monitoring the ISO quality management system in their organisation or respective department in order to provide data for the case studies. Employees available for selection ranged from document controllers, internal auditors and quality management representatives. The selected individual's years of experience with QMS as well as roles occupied are reflected in Table 3.

Table 3: Interviewees target population

Interviewee number	Department responsible for	QMS Experience years
Quality management representative No. 1	Marketing	Less than 3 years
Quality management representative No. 2	Finance	Less than 3 years
Quality management representative No. 3	Operations	More than 3 years
Quality management representative No. 4	Project Management	Less than 3 years
Quality management representative No. 5	Technical	More than 3 years
Quality management representative No. 6	Human resource	Less than 3 years
Quality management representative No. 7	Legal	More than 3 years
Quality management representative No. 8	Administrator	More than 3 years

The interview protocol was designed to reflect the information covered in the literature review chapter. The interview protocol was divided into three main sections are Section A (Background Information): was designed to extract the characteristics of the employee being interviewed, such as the designation of the respondent, the total years of experience with QMS as well as courses the respondent had attended related to QMS. Section B (Benefits realised since formal certification of the QMS): This section was designed to extract answers that assisted the researcher to verify the existence of the benefits in a real-life implemented quality management system. The respondents were asked open-ended questions about the existence of the primary, secondary and tertiary benefits in their implemented QMS. Section C (Critical Success Factors): This section was designed to extract answers that assisted the researcher to verify the existence of the critical success factors from the real-life quality management system. For this section, the respondents were asked to verify the existence of the 21 critical success factors as well as to verify the extent of influence of these factors on their implemented QMS.

4. Results and Discussion

For the analysis, data determined in the literature review was used as the main domain knowledge that would be compared to findings made from the interviews as well as the documentation supplied. Information obtained from interviews and presented documentation was also analysed to verify the existence of these categories as well as investigate the existence of other factors which were not identified during the literature review. The results of the interview protocol were transcribed from audio recordings into Microsoft Excel and compared to the documentation supplied as well as the knowledge generated through literature review for the purpose of conducting an in-depth analysis of the information gathered. A total of eight quality management representatives participated in the interviews of which four respondents had more than the desired three years' experience while the remaining four respondents had less than three years experience.

The results confirmed the existence of the basic primary benefit such as achieving formal certification, which is in line with work done by Su, Dhanorkar and Linderman (2015) who found that organisations that implement the quality management system enjoy a competitive advantage over those that are yet to implement the system. Six of the eight participants agreed to observe the benefit of utilising QMS as a tool to gain bidding advantage in practice while two

disagreed stating that they were unaware of the existence of this benefit due to the fact that their work doesn't expose them to the bidding process and outcome thereof.

Furthermore, a majority of the participants agreed that their organisation managed to avoid exclusion from markets that require the QMS as a prerequisite. One respondent noted that this benefit can only be observed in bidding procedures that require the QMS as a prerequisite. All participants agreed that the quality management system assisted their organisation to enhance operational processes. A majority of five from the eight participants stated that their organisation's quality management system led to improvements in process awareness and ensured that individuals across other departments within the organisation follow correct procedures while the remaining three each noted improvements in auditing, customer satisfaction as well as improvement in the quality of work produced.

A majority of six out of a possible eight respondents agreed that the quality management system contributes to better internal communication within the organisation. A majority of seven out of the possible eight participants agree with the knowledge acquired from the literature review that the formal adoption of the QMS assisted in better understanding and executing the client's brief, while one respondent declined to answer based on their uncertainty of the existence or nonexistence of the said benefit.

All but one interview participant confirmed that the introduction of the quality management system was accompanied by a rise in client satisfaction. The one outlier disagreed based on the absence of a measuring tool within their department as their department was yet to implement the client satisfaction surveys. The results summarised in table 4 further confirmed the existence of the twenty-one identified critical success factors as well as the effect they have on the identified quality management system. From the twenty-one, critical success factors identified only five were unanimously agreed upon by the interview participants. The participants attested to the existence of such factors in their system and of the positive impact that these five factors have on their system which is namely: leadership involvement, availability of resources, intentional continuous improvement, auditing and external pressure which originates both from government and competitors. Factors such as participation from the whole organisation and strong quality culture received the second-highest rating with seven out of eight interview participants agreeing that these factors are applicable to their organisation's QMS and further verified that the factors have a positive influence on their QMS.

Table 4: Critical success factors verification results

Data sourcing	Participants Responses							
	Yes = ✓			No = ✗		Not sure = ?		
	No.1	No.2	No.3	No.4	No.5	No.6	No.7	No.8
1. Leadership involvement	✓	✓	✓	✓	✓	✓	✓	✓
2. Training of employees	?	?	✓	✓	✓	✓	✓	✓
3. Participation from the whole organisation	✓	✓	✓	✓	✓	✗	✓	✓
4. Availability of resources	✓	✓	✓	✓	✓	✓	✓	✓
5. Customer focus	✓	✗	✓	✓	✓	✗	✓	✓
6. Intentional continuous improvement.	✓	✓	✓	✓	✓	✓	✓	✓
7. Clearly defined and explained objectives.	✓	✗	✓	✗	✗	✓	✓	✓
8.Planning/ preparation	✓	?	?	?	?	✓	?	?
9. Auditing.	✓	✓	✓	✓	✓	✓	✓	✓
10. Past experience with QMS system	✓	✓	✗	✗	✗	✓	✗	✓
11. Reduce unnecessary paperwork	✗	✗	✓	✓	✗	✗	✓	✓
12. Process and data management	✓	?	?	✓	✓	✓	✓	✓
13. Align company practices with ISO QMS.	✓	?	?	?	?	?	?	?
14. Employee attitude towards QMS.	✓	✓	✓	✓	?	?	?	✓
15. Time of implementation	?	?	?	?	?	?	?	?
16. External pressure (government and competition).	✓	✓	✓	✓	✓	✓	✓	✓
17. Reward system	✗	✗	✗	✓	✗	✗	?	✓
18. Utilise external consultant	✓	?	?	?	?	?	?	?
19. Strong quality culture	✓	✓	✓	✓	✓	✓	?	✓
20. Benchmarking	?	?	?	?	?	?	?	?
21. Working Environment	✗	?	?	✓	✓	✓	✓	✓

Factors that received the third-highest affirmative response were the training of employees, customer focus and process and data management. For triangulation attendance registers were presented to confirm internal training of employees and a budget sheet to confirm external training booked and attended by the quality management representatives.

Factors that received lower confirmatory responses in comparison to those mentioned above, were working environment, clearly defined and explained objectives as well as employee attitude towards QMS which received five affirmations out of a possible eight. Past experience with QMS as well as reducing unnecessary paperwork all received four out of eight possible affirming responses while planning/ preparation, reward system, utilise external consultant were found to be of less influence as they received two out of eight affirmative responses.

Benchmarking, aligning company practices with ISO QMS and time of implementation were the least verified factors achieving eight out of eight and seven out of eight respectively for participants who could not confirm the existence and influence of such factors. This low response rate could be attributed to the fact that half of the respondents started being involved with the system when it had already matured and were left out of the planning phases which is likely to be when such factors get implemented.

4.1 Proposed Improvements

The primary objective of the study was to verify the benefits associated with a certified ISO certified quality management system along with the critical success factors required for an organisation to fully realise the benefits the system has to offer. The results obtained through this study are applicable only to the organisation studied and cannot be generalised as they were obtained through investigating a single organisation's certified quality management system as a research unit

Responses from participants were transcribed and analysed to determine common themes among the responses. The themes identified were assigned applicable codes in order to determine the frequent occurrence of these codes and finally determine the overall response to the question posed. From the interviews, it was noted that a majority of the participants agreed that their organisation had achieved certification and through doing so had unlocked the basic advantage of gaining access to tenders that require the QMS. However, participants agree that achieving certification does not automatically lead to winning the tender as the advantage is only applicable against other organisations that are without QMS and only within tenders that require QMS as a prerequisite. A second finding indicated that, for an organisation to enjoy benefits that result in improved operational processes, the organisation must spend valuable time in developing its processes and procedures to be in line with operational practices. A third finding was that, for an organisation to improve communication utilising QMS, the departments must share their procedures with other departments as well as continuously alert them of updates that are done on their procedures. Furthermore, the departments must dedicate time to develop their procedures and forms with the intention to extract all relevant information that will assist in the understanding of requirements of work that may be requested by other internal departments.

The fourth finding states that to better understand and execute client requirements that organisation needs to properly develop their forms and procedures to allow proper and exact extraction of requirements from the client, develop forms and procedures that are easily understood by old and new employees and lastly conduct regular audits to verify the applicability of these procedures and forms as the business improves operational methods. A fifth finding related to improving client satisfaction and it was found that organisations are required to conduct and review client satisfaction surveys on a regular basis, improve processes quality of service offered, and utilise client satisfaction surveys to identify areas of poor performance and improve on them.

4.2 Validation

In order to improve triangulation and strengthen the case study (Yin, 2003), this study considered utilising multiple sources to collect data. According to Yin, (2003), evidence for case study research can be gathered from six possible data sources namely documents, archival records, interviews, direct observation, participant-observation and, physical artefacts. This study considered six possible data sources and found documents and interviews to be beneficial to the study's objectives. Both the documents and interviews are complementary to one another with no data collection source exhibiting a complete advantage over another (Yin, 2003). Reviewing documents will allow the researcher to gain descriptive knowledge and conduct interviews which will help the researcher gain insightful knowledge from direct stakeholders who are responsible for the upkeep of the quality management system.

5. Conclusions

The effectiveness and existence of critical success factors in the identified QMS were evaluated against the list generated from the literature review and the summarised findings were as follows; leadership involvement, availability of resources, intentional continuous improvement, auditing and external pressure were found to be evident in this system and had the most impact while working environment and aligning company practices with ISO QMS were least verifiable factors in the system. The research findings indicate that a quality management system is beneficial for organisations and offers benefits that are beyond achieving certification, provided the organisation adopts practices such as taking time to develop procedures that are a reflection of how the work is carried out and procedures that allow for all crucial information to be captured when clarifying the scope and work to be done. Furthermore, continuous improvement of the twenty-one critical success factors is important to both the implementation and development of the quality management system. It is recommended that further research be conducted to verify the applicability of the findings made by this research on other organisations with certified quality management systems that have remained in existence for a period longer than three years.

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Biographies

Siyabonga Zwane is a Civil Engineer with knowledge in Municipal infrastructure design as well as Quality Management System within the Civil Engineering Consultancy sector. His specific expertise lies in designing, integrating, implementing and auditing the organisational as well as departmental Quality Management Systems adopted in line with guidelines from the ISO 9001 systems. He holds a National Diploma in Civil Engineering, a Bachelor of Technology Degree in Water Engineering all obtained from the University of Johannesburg, he is also a registered professional technologist (Pr Tech Eng.) with the Engineering Council of South Africa (ECSA).

Annlizé Marnewick is an Associate Professor at the Postgraduate School of Engineering Management in the Faculty of Engineering and the Built Environment, University of Johannesburg, where she focuses on the supervision of research masters and doctoral students. Before joining the academia, she was involved in industry with a technical record of 15 years in architecture, design and the implementation of system and software engineering projects with specialisation in requirements engineering. She is a registered professional engineer (Pr Eng.) with ECSA.

Hannelie Nel is a Senior Lecturer at the Postgraduate School of Engineering Management in the Faculty of Engineering and the Built Environment, University of Johannesburg, South Africa. She holds a Doctorate in Engineering Management with twenty years' experience in both industry and academia. Dr Nel is an Honorary Fellow of the Southern African Society for Industrial Engineering and a registered professional engineering with ECSA.