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RESEARCH ARTICLE **Open Access**

Evaluating the Performance of the Organization based on the Total Quality Management CSF*s and Knowledge Management CSFs; The case of MSL Company

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Abstract
This study aims to analyze and identify critical success factors of Total Quality Management (TQM) for evaluating organizational performance using a framework based on the Knowledge Management (KM) approach. Initially, the study determines the success factors of TQM and KM by reviewing research history, and then assesses the significance and performance of each factor through questionnaires. Data mining algorithms are used to cluster the factors, and a Data Envelopment Analysis (DEA) model is employed to evaluate the organizational performance by considering the success factors of KM as inputs and success factors of TQM as outputs. The Return-to-Scale (RTS) variable model is used to calculate the performance indicator for the organization. The study reveals that, while KM and TQM have some differences rooted in their distinct focus, they also have many similarities that can complement each other if properly planned.
Keywords: *Total Quality Management, Knowledge Management, Critical Success Factors, Data Envelopment Analysis, Importance-Performance Analysis*

Introduction

Knowledge management and total quality management are complementary; a combination of the two forms a cycle of improvement and development that ultimately leads to organizational excellence and improved factory production lines. A knowledge-based total quality management approach leads to continuous improvement and learning in the organization, helping factories better meet the changing needs and expectations of customers. (Lehyani et al., 2023) Whereas total quality management focuses on the result and the quality of the final product, both emphasize the optimization of resources and increased productivity. Knowledge management, on the other hand, establishes the key to achieving desired results in the organization by better utilizing intellectual capital and knowledge assets. Consequently, integrated management should be adopted for success; comprehensive quality management should pay attention to environmental changes and respond to market changes by improving knowledge management capacities and skills. (Lehyani et al., 2023) Stewart and Waddell (2008) and Barber et al. (2006) have emphasized the effectiveness of

* Critical Success Factors

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knowledge management in TQM implementation in their articles and also stated that the use of both mentioned methods increases the productivity of the organization. (Stewart et al., 2008; Barber et al., 2006). Honarpour et al. (2017) investigated the relationship between TQM and knowledge management using statistical methods and they have investigated the role of TQM and knowledge management on the productivity and performance of the organization using a balanced scorecard. (Honarpour et al., 2017) Using statistical methods.Choo et al, (2007) showed a conceptual framework based on quality programs and knowledge management. Based on this study, quality programs are effective enablers of knowledge management.(Choo et al.,2007) Molina et al. (2007) examined the relationship between TQM and knowledge transfer in their article and showed that there is a positive relationship between the two.(Molina et al.,2007) Similarly, Soares et al. (2021) demonstrated that knowledge management and comprehensive quality management have a positive effect on the improvement and better performance of organizations(Soares et al., 2021). Hong et al. (2010) showed that TQM supports knowledge management and that knowledge management helps to innovate in organizations. In fact, knowledge management is an introduction to TQM and innovation (Hong et al.,2010). Abbas and Kumari (2021) presented a conceptual framework for the implementation of TQM and knowledge management, which are effective enablers of knowledge management in organizations based on quality programs (Abbas and Kumari ,2021). Jayawarna and Holt (2009) examined the relationship between knowledge creation and transformation in the field of research and development. This study showed that TQM methods improve and transform knowledge in the organization. (Jayawarna and Holt, 2009). Talib (2011) presented a modeling method for implementing TQM in the service sector in their article. This method has been used in its model structure (Talib, 2011). In this article, the factors of this method have been used to assess TQM in production units. Ong & Tan (2022) further examined the three areas of TQM, KM, and Agile and stated in their article that the alignment of the three areas will improve the performance of the organization (Ong and Tan, 2022). In 2023, Kermani et al. conducted a study on the role of knowledge management in evaluating the performance of education personnel in Mazandaran. They presented a model and framework aimed at increasing performance through knowledge management.(Kermani et al., 2023)Dermina et al. 2021proposed a systematic method for enhancing durability, survival, and avoiding organizational decline through knowledge management. They analyzed the two factors of knowledge-oriented and capital-oriented management in banks. (Dermina et al., 2021)Babaeinjad et al.2019 introduced an intelligent management model based on intellectual capital for implementing knowledge management in organizations. (Babaeinjad et al., 2019) Harooni and Razeghi2020 explored the relationship between organizational culture and comprehensive quality management in organizations. They found that this factor has a positive effect on increasing organizational performance. (Soltani and Amanat, 2019) demonstrated the role of kaizen and its positive impact on total quality management, ultimately leading to improved organizational performance. (Soltani and Amanat, 2019)Table 1 provides a brief review of research literature.

Table 1.
A brief review on research literature

Row No	Writer(s)	Year	Tool(s)	Research Attitude	
				KM2	TQM
1	Barber et al.	2006	Statistics	✓	
2	Choo et al.	2007	Statistics	✓	✓
3	Molina et al.	2007	Statistics	✓	✓
4	Stewart & Waddell	2008	Statistics	✓	✓
5	Jayawarna and Holt	2009	Statistics	✓	✓
6	Hung et al.	2010	structural equation modelling	✓	✓
7	García	2011	Statistics	✓	✓
8	Talib et al.	2011	interpretive structural modeling (ISM)		✓
9	Honarpour et al.	2017	Statistics	✓	✓
10	Abbas et al.	2021	Statistics	✓	✓
11	Soares et al.	2021	Statistics	✓	✓
12	Ong & Tan	2022	Statistics	✓	✓
13	Kermani et al.,2023	2023	Statistics	✓	
14	Dermina et al.	2021	Statistics	✓	
15	Babaeinjad et al.	2019	Statistics	✓	
16	Harooni and Razeghi	2020	Statistics		✓
17	Soltani and Amanat	2019	Statistics		✓

As the above table demonstrates, and previous research has highly emphasized, each managerial attitude can have a great impact on organizational performance. Among management orientations, TQM, which makes firms committed to customers' requirements, is important to be appraised. On the other side, to gain customer satisfaction in a competitive business world, it would be tremendously influential to have the power of adaptation to environmental change and changing customer needs. Therefore, a company that provides knowledge infrastructures would have a basic, yet paramount, foundation to increasingly improve organizational performance.

In this article, we seek to consider a method for evaluating the performance of the organization and strategies for improving the performance of the organization in the form of a case study, considering the success factors of Total Quality Management and Knowledge Management.

In the following, each of the methods is explained, the background of the article is discussed, and the results of implementing the presented framework are stated.

Knowledge Management (KM) Concepts and Principals:

Nonaka and Takeuchi (1995) stated that "knowledge is a justified personal belief that increases an individual's capacity to take effective action". Knowledge is shaped by one's initial stock of knowledge, what goes on inside one's head (how one reasons), and the inflow of new stimuli (such as new data and information). What is important in distinguishing between information and knowledge is not found in the content, accuracy, or utility of the supposed information or knowledge; rather, knowledge is information possessed in the individual's mind. Alavi and Leidner stated that it is personalized information related to facts, interpretations,

ideas, observations, and judgments. Therefore, without the human reasoning process, information can never become knowledge (Alavi and Leidne, 1999, 2001)

With this definition, the word "knowledge" still means different things to different people. Therefore, some research focused on the tacit side of knowledge, while the focal point for other researchers was the explicit side of knowledge. Some focused on the object side of knowledge, while others focused on the process side of knowledge. Therefore, it is necessary to clarify the object that we want to manage before we delve into a discussion on Knowledge Management Gao and Nakamori (2002) stated that, diverging from knowledge as an object and process, if knowledge is viewed as an object in Knowledge Management, then the focus should be on building and managing knowledge stock. If knowledge is viewed as a process, the focus should be on the knowledge creation, sharing, and distribution processes (Gao and Nakamori, 2002). However, simply putting too much emphasis on knowledge as an object over process is dangerous, as it is less the knowledge existing at any given time per se than the firm's ability to apply existing knowledge to create new knowledge that forms the basis for achieving competitive advantages (Alavi and Leidne, 2001). Furthermore, having knowledge transferred is not just a matter of acquiring it; it requires intensive and laborious interactions among people. Merely moving documents around can never generate knowledge. Focusing solely on knowledge as a Knowledge Management process is inadequate because a recipient's absorptive capacity to learn new knowledge is based on their preexisting knowledge stock. For individual B to understand individual A's knowledge, there must be some overlap in their underlying knowledge bases (Alavi and Leidne, 2001). Without enough overlapping knowledge stock on both sides, knowledge cannot be effectively transferred. Therefore, for the success of Knowledge Management, it requires both managing the knowledge stock accumulation and knowledge process flow within organizations.

Knowledge Management is an organized and systematic approach to enhance an organization's ability to utilize knowledge to improve decision-making, actions and results in support of key areas. It has its roots in various related disciplines, such as human resources management, total Quality Management, computer science, and economics (Moffett et al., 2003). Knowledge Management emphasizes organizational knowledge, not just individual knowledge, and how to make organizational knowledge support the business strategy. A potential risk for organizations is to view KM as the management of individual learning instead of collective learning. This overlooks the opportunity to leverage individual knowledge for the benefit of the organization. Isolated knowledge that resides in employee minds that is never transferred into the organization and never positively affects business performance. It is not enough for an organization to hire and promote the brightest individuals it can find. An organizational system must also support and nurture bright individuals to share their human capital through organizational learning (Bontis, 1998).

Many companies view Knowledge Management as an end in itself. The goal of Knowledge Management is not just to make Knowledge Management happen, but to address the organization's most pressing issues and not to expend energy managing all knowledge (Gao and Nakamori, 2002). Knowledge is a resource locked in the human mind, unlike the traditional factors of production land, labor, and capital. Sharing or creating knowledge are intangible activities that cannot be supervised or forced out of people. They occur only when people voluntarily cooperate. Therefore, organizations must provide a learning culture, infrastructure,

and appropriate incentives to generate and disseminate knowledge.

Critical success factors of knowledge management

Ronald Daniel first introduced the concept of Critical Success Factors (CSFs) in the 1960s. In the following decade, John F. Rockart popularized the idea, and it has since been widely used to facilitate project management. CSFs represent key performance areas that are essential for an organization to achieve its mission, providing processes that help an organization to establish strong ways of thinking, communicating, and deciding. CSFs focus on the most important areas, helping to reach the heart of an organization's goal and ensure optimal results. Critical success factors are conditions or influences that contribute to a desirable or successful outcome of an endeavor. In the literature, many factors that can affect the success of Knowledge Management implementation have been identified. For example, Holsapple and Joshi (2000) developed a framework for identifying the factors affecting the success of Knowledge Management in organizations using the Delphi method with the help of 31 experts in the field. Their framework includes three dimensions of managerial influences, resource influences, and environmental influences (Holsapple and Joshi,2000) Furthermore, Machuca and Martínez (2012) used structural equation modeling to investigate the success of Knowledge Management projects in consulting firms in Catalonia, Spain. They found that cultural factors had the greatest significance in the success of Knowledge Management in consulting firms (Mas-Machuca and Martínez Costa, 2012). Finally, Akhavan et al. (2009) identified five key factors for implementing Knowledge Management in Iranian university research centers: human resource management and flexible structures, knowledge management architecture and readiness, knowledge storage, benchmarking, and a senior knowledge manager (Akhavan et al. , 2009).

Total Quality Management (TQM) Concepts and Principals

Total Quality Management (TQM) addresses the issues of customer satisfaction and guidance on implementing the marketing concept. In the 1980s, a business process of continuous improvement was developed to satisfy customer needs. Through an external focus on customer satisfaction and an internal focus on operational excellence, TQM has promised superior performance and also offers managers a host of organizational prescriptions and supporting tools. The TQM concept is a general philosophy of management that goes beyond the customer's perceived view of quality, by including all key requirements that contribute not only to customer perceived quality but also customer satisfaction. TQM broadens our previous notion of quality because it provides complete customer satisfaction with a full range of product and service needs (Price and Chen, 1993)

In the 1990s, this total quality concept was recognized by various management scholars. Many studies and books were conducted entirely on TQM, focusing only on service and product quality management. The concept of TQM is often confused with other practices such as quality circles and ISO 9000. Although similarities exist between TQM and other business process improvement practices, the TQM philosophy is an all-encompassing one. It is a much broader concept of product, service, and process quality improvements, relating to costs and productivity, and people involvement and development. As TQM is so comprehensive, one can easily see why it is often misconstrued. Many organizations view TQM as a quick fix to all the ills that have caused poor performance. However, TQM is not an easy solution to organizational problems, but an approach to managing an

organization that is based on continuous improvement and cultural change.

Critical success factors of TQM

Critical success factors of Total Quality Management (TQM) can be described as "the best practices of Total Quality Management implementation" (Sila, 2003; Al-Ababneh and Lockwood, 2012). The main objective of the technique of Critical success factors is to determine the main activities in which a company must focus its attention. Talib and Rahman (2010) stated that additional objectives include assisting in the planning of activities and resources, and companies need to identify and evaluate the key quality factors of Total Quality Management before its implementation. This is because successful Total Quality Management implementation, often associated with Critical success factors, is responsible for achieving business excellence (Al-Ababneh and Lockwood, 2012; Anil and Satish, 2016; Holsapple and Joshi, 2000; Talib and Rahman2010; Talib et al., 2010). Thus, it is necessary to understand the concept of Total Quality Management and its success factors to determine the level of commitment and resources required for its successful implementation.

Total Quality Management is a complex procedure and TQM considers a company's management style, policy, culture, and size, etc. There is no one standard procedure or formula that can be followed to identify the key factors of Total Quality Management. Thus, an extensive literature review was carried out by the researcher (such as Deming, Crosby, Feigenbaum, Saraph, et al., Ahire, et al., Flynn, et al. Black and Porter, Yusof and Aspinwall, etc.) The concept of continuous improvement is a critical success factor of any organization and should be used as the foundation upon which every successful Total Quality Management initiative should be built. The main components of Total Quality Management are supported by several techniques and activities. If Total Quality Management is to be successful in an organization, it must be actively supported by senior management. If employees are confident that senior management strongly supports a Total Quality Management initiative, they are more likely to become involved in that organization's Total Quality Management efforts. Successful employee empowerment and involvement are essential components of any Total Quality Management program and difficulties experienced in adopting Total Quality Management have mainly focused on people issues. In terms of the input-output process, total quality management (TQM) is a transformation of a set of inputs, including plant equipment and raw materials, procedures and methods, information and knowledge, and people and their skills. The outputs of the transformation are products, services, and any results that meet customer needs and expectations. Both TQM and knowledge management take information, knowledge, and people as their basic inputs, and applied knowledge and intellectual capital (maybe in the form of information and paperwork in the case of TQM) as their desired outputs. However, their focuses and strategies are quite different. Knowledge management regards knowledge as the source of competitive advantage, while TQM relies on quality processes to achieve customer satisfaction. The following illustrates further the similarities and differences between Knowledge Management and TQM in terms of objectives, goals, focuses, and strategies. Because management trends keep changing (e.g., business process re-engineering, organizational learning, and Total Quality Management), managers have difficulties gaining practice with all these new practices in their organizations. We chose Total Quality Management instead of others due to the numerous similarities between Knowledge Management and Total Quality Management.

It would be easier and better to integrate the philosophies of the two concept streams if they were similar. The results of the knowledge management and total quality management processes demonstrate their strength and complementarity. The effectiveness of the quality management process to achieve quality improvement and increased productivity is enhanced when knowledge management concepts are effectively integrated into the process. The comparison shows that organizational excellence can be achieved by incorporating knowledge management concepts into the total quality management process while interacting with environmental changes.

In today's ambiguous environment, organizations face critical issues of compatibility, survival, and competence. It is through the creation, acquisition, embedding, and application of knowledge that organizations can address these issues and gain a competitive advantage. Seeking and acquiring new sources of information and new technologies helps organizations to stand out in gaining market share in terms of their products and services. Knowledge of, and understanding, customer needs and requirements are essential for customer satisfaction. Embedded knowledge of quality products and services is critical to achieving customer satisfaction.

Proposed method diagram

Evaluating the performance of the organization by the proposed method requires the implementation of 6 phases in Figure 1.

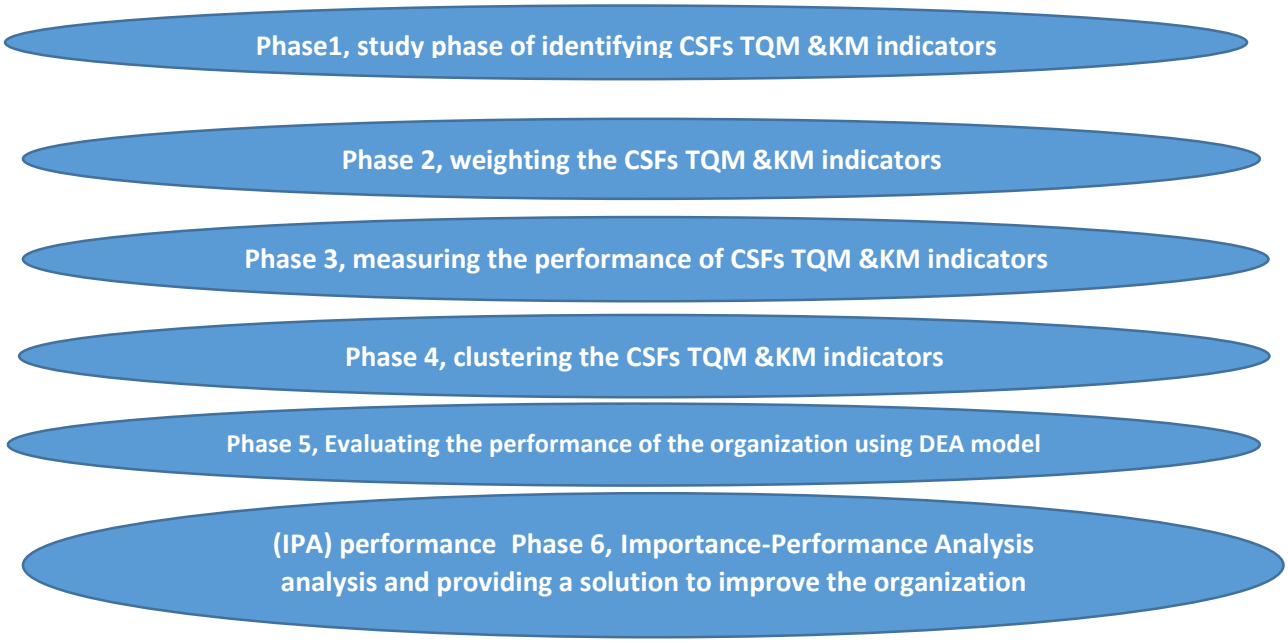


Figure 1: *Proposed method diagram*

Research implementation algorithm

In this part, the stages of conducting research are described; in each phase, a general description is presented, and the necessary steps to achieve the goals of each phase are stated. The stages involved in conducting this research consist of six phases and fourteen steps, as follows. As stated, the stages involved in conducting this research are summarized in Figure 1. To better explain the steps of the article, the reason for using each method and the relationship between each phase and the preceding phase is stated in Table 2.

Table 2.
Research implementation phases

Phase	Phase title	The relation between phases	Motivation of using a method
Phase 1	**Study phase of identifying CSFs TQM &KM indicators**	Start	A wide range of factors can affect the successful implementation of KM and TQM. Determining an appropriate set of key success factors can help organizations consider the important issues they face when designing and implementing these initiatives. Therefore, success factors are essential for achieving success in these fields. If these factors do not exist in the organization, they must be created; if they do exist, they must be nurtured and developed. External factors are not considered, as organizations have no control over them in the implementation process.
Phase 2	**Weighting the CSFs TQM &KM indicators**	The critical success factors obtained from the first phase in both areas (KM and TQM) are inputs for the formation of this phase.	The purpose of this step is to determine the importance of each index in the discussed areas. By completing the questionnaire, the importance of the indicators in the production unit can be determined.
Phase 3	**Measuring the performance of CSFs TQM &KM indicators**	The critical success factor obtained from the first phase in both areas (KM & TQM) are as inputs for the formation of this phase.	The purpose of this stage is to determine the performance of the production unit in each area according to predetermined factors. By completing the questionnaire, the performance of the indicators in the production unit can be determined.
Phase 4	**Clustering the CSFs TQM &KM indicators**	According to the results obtained from Phases 2 and 3, the factors were clustered at this stage.	In this step, factors are clustered using the K-Means method. The K-Means algorithm is an iterative-based algorithm that tries to divide the data set into distinct, non-overlapping subgroups, which are called clusters; in these groups, each data point belongs to only one group. In this method, the aim is to make the data points in a cluster as similar as possible and at the same time make the clusters as distinct as possible.
Phase 5	**Evaluating the performance of the organization using DEA model.**	The result of Phase 4 is the average obtained from the clustering related to the Critical Success Factors of KM as input, as well as the average obtained from the clustering related to the Critical Success Factors for TQM as output of the DEA model at this stage.	Calculating efficiency using the Data Envelopment Analysis (DEA) method and determining whether the production unit is currently efficient or inefficient.
Phase 6	**IPA performance analysis and providing a solution to improve the organization**	The results obtained from Phases 2 and 3 serve as the inputs for this phase, which is used to draw the diagram.	Drawing an importance-performance diagram in each area and determining an appropriate strategy for implementation to improve the performance of the production unit, based on the results obtained from the diagram.

The proposed method and Experimental result

MSL Company has been able to modernize its production lines and build large machining, heavy metalworking, forging, and casting development workshops. With the latest hardware and software facilities, expert staff, and technical knowledge, it is a leading production unit in Iran. The company is known for meeting the needs of customers according to market conditions and is considered one of the infrastructure and strategic companies of the country due to its experiences and competitive advantages in machines, diverse production processes, and flexibility of production lines. MSL has successfully completed many projects where the design and construction technology were new and often implemented for the first time in the country. To evaluate the organization's performance using the proposed method, six phases are required in a fourteen-step process. The proposed model has been implemented in MSL, and the results obtained in each step are presented to better express it.

1. Phase1, study phase of identifying indicators

In the first phase, performance indicators are identified in two steps: a comprehensive review of the research literature and field study .

Step 1: The first step is to identify the success factors of TQM in Table 1.

Step 2: The second step is to identify the success factors of knowledge management in Table 2.

Table 3.

Critical success factors for total quality management (Talib, 2011)

no.	Critical success factor (CSF)	no	Critical success factor (CSF)
1	Top management commitment	8	Customer Focus
2	Quality Culture	9	supplier management
3	Strategic planning	10	Employee encouragement
4	Quality measurement and benchmarking	11	Resource innovation
5	Organizational structure	12	Training and education
6	Process management	13	Continuous improvement and innovation
7	Information and analysis	14	Human resource management

Table 4.

Critical success factors of knowledge management (Valmohammadi,2015)

no.	Critical success factor (CSF)	no.	Critical success factor (CSF)3
1	Management support	7	Processes and activities
2	Organizational culture	8	Employee motivation
3	IT	9	Eliminate resource constraints
4	Management strategy	10	Employee educational and Training
5	Performance measurement	11	human resource management
6	Organizational infrastructure management	12	Benchmarking

2. Phase 2, weighting the indicators

This phase is done in two steps: Step 3 and Step 4.

In Step 3, the importance of the key factors in the success of Total Quality Management (TQM) is weighed by academic experts in the industry under study, as indicated in Table 3.

In Step 4, the importance of the key factors in the success of Knowledge Management (KM) is weighed by academic experts in the industry under study, as indicated in Table 4.

To complete both questionnaires, a measurement questionnaire including 14 questions for Step 3 and 12 questions for Step 4 is designed and distributed among managers, supervisors, and experts in the study organization. The questionnaire is then evaluated based on a 5-point Likert scale.

Table 5.
Weighting the indicators Critical success factors for total quality management

no.	Critical success factor (CSF)	importance	no	Critical success factor (CSF)	importance
1	Top management commitment	4.667	8	Customer Focus	3.833
2	Quality Culture	3.417	9	supplier management	4.333
3	Strategic planning	3.556	10	Employee encouragement	3.833
4	Quality measurement and benchmarking	4	11	Resource innovation	3.167
5	Organizational structure	3.75	12	Training and education	3.167
6	Process management	3.567	13	Continuous improvement and innovation	3.833
7	Information and analysis	3.889	14	Human resource management	4

Table 6.
Weighting the indicators Critical success factors of knowledge management

no.	Critical success factor (CSF)	importance	no	Critical success factor (CSF)3	importance
1	Management support	4.5	7	Processes and activities	3.5
2	Organizational culture	4.056	8	Employee motivation	4.167
3	IT	4.333	9	Eliminate resource constraints	3.833
4	Management strategy	4	10	Employee educational and Training	3.833
5	Performance measurement	3.833	11	human resource management	4
6	Organizational infrastructure management	3.5	12	Benchmarking	3.667

3. The third phase of measuring the performance of indicators:

This phase is done in two steps 4 and 5.

Step 5: Measuring the performance of the main success factors of total quality management by expert managers and personnel in the studied industry in table5.

Step 6: Measuring the performance of the main factors of knowledge management success by expert managers and personnel in the studied industry in table6.

In this step, a questionnaire comprising 71 questions is prepared to measure the performance of the success factors of total quality in the studied organization, and a questionnaire comprising 69 questions is prepared to measure the performance of the knowledge management success. The study is distributed and examined on the Likert 5-choice spectrum.

Table 7.
Performance of indicators Critical success factors for total quality management

no.	Critical success factor (CSF)	performance	no	Critical success factor (CSF)	performance
1	Top management commitment	3.722	8	Customer Focus	2.667
2	Quality Culture	3.271	9	supplier management	3.056
3	Strategic planning	3.194	10	Employee encouragement	2.625
4	Quality measurement and benchmarking	2.917	11	Resource innovation	3.933
5	Organizational structure	3.667	12	Training and education	3.611
6	Process management	3.37	13	Continuous improvement and innovation	2.833
7	Information and analysis	3.222	14	Human resource management	3.222

Table 8.
Performance of indicators Critical success factors of knowledge management

no.	Critical success factor (CSF)	performance	no	Critical success factor (CSF)	performance
1	Management support	3.69	7	Processes and activities	3.25
2	Organizational culture	3.104	8	Employee motivation	2.2
3	IT	3.333	9	Eliminate resource constraints	3.367
4	Management strategy	3.167	10	Employee educational and Training	3.167
5	Performance measurement	2.542	11	human resource management	3.333
6	Organizational infrastructure management	3.067	12	Benchmarking	3

4. The fourth phase, clustering

This phase is done in the form of three steps 7, 8 and 9.

Step 7: Clustering the success factors of TQM based on performing the industrial unit in table7.

Step 8: Clustering knowledge management success factors based on performing the industrial unit in table8.

The input of this algorithm results from completing a questionnaire on performing the factors of success of total quality management and knowledge management, which is done by SPSS software using the K-means method.

Step 9: Calculate the average for each cluster of the Critical Success Factors for Total Quality Management and Knowledge Management. The results are shown in Table 9.

Table 9.
Clustering the Critical success factors for total quality management

no.	Critical success factor (CSF)	Cluster number	no	Critical success factor (CSF)	Cluster number
1	Top management commitment	3	8	Customer Focus	2
2	Quality Culture	1	9	supplier management	2
3	Strategic planning	2	10	Employee encouragement	1
4	Quality measurement and benchmarking	1	11	Resource innovation	3
5	Organizational structure	3	12	Training and education	3
6	Process management	2	13	Continuous improvement and innovation	2
7	Information and analysis	2	14	Human resource management	1

Table 10.
Clustering the Critical success factors of knowledge management

no.	Critical success factor (CSF)	Cluster number	no	Critical success factor (CSF)	Cluster number
1	Management support	3	7	Processes and activities	3
2	Organizational culture	2	8	Employee motivation	1
3	IT	3	9	Eliminate resource constraints	3
4	Management strategy	2	10	Employee educational and Training	2
5	Performance measurement	2	11	Human Resource Management	3
6	Organizational infrastructure management	3	12	Benchmarking	2

Table 11.
Average of each cluster

Critical success factor (CSF)	Cluster1	Cluster2	Cluster3
CSFs TQM	3.0598	3.014	3.336
CSFs KM	2.2	2.996	3.456

5. The fifth phase, evaluating the performance of the organization

This phase is done in the form of a step to evaluate the performance of clustered data of knowledge management as model input and clustered data of total quality management as output variables of the data envelopment analysis model. The efficiency index of the examined organization was calculated. The model inputs and outputs were obtained from the average of each cluster, the results of which are shown in Table 9.

Step 10: Evaluate the performance of the industrial unit using the data envelopment analysis method (DEA).

The efficiency of the unit under study was calculated at 0.99766 using the data envelopment analysis method.

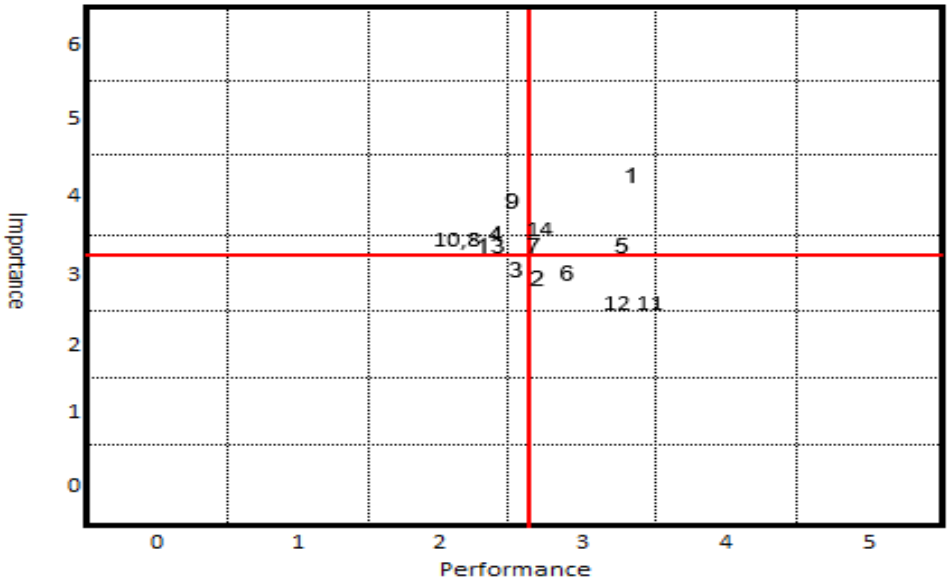
6. The sixth phase of IPA[3] performance analysis and providing a solution to improve the organization

This phase consists of three steps, which evaluate the performance of the organization in each of the two areas using the analysis of Performance-IPA diagram. Finally, according to the diagram, solutions and suggestions are provided to improve the performance of the organization under study.

Step 11: Draw a Performance-IPA Diagram to analyze the success factors of TQM in the organization (Figure 2).

Step 12: Draw a Performance-IPA Diagram to analyze the success factors of Knowledge Management in the organization (Figure 3).

Step 13: Provide a solution to improve the performance of the production unit.



Impornace-Performance Analysis[3]

Figure 2. *IPA chart of the success factors of TQM*

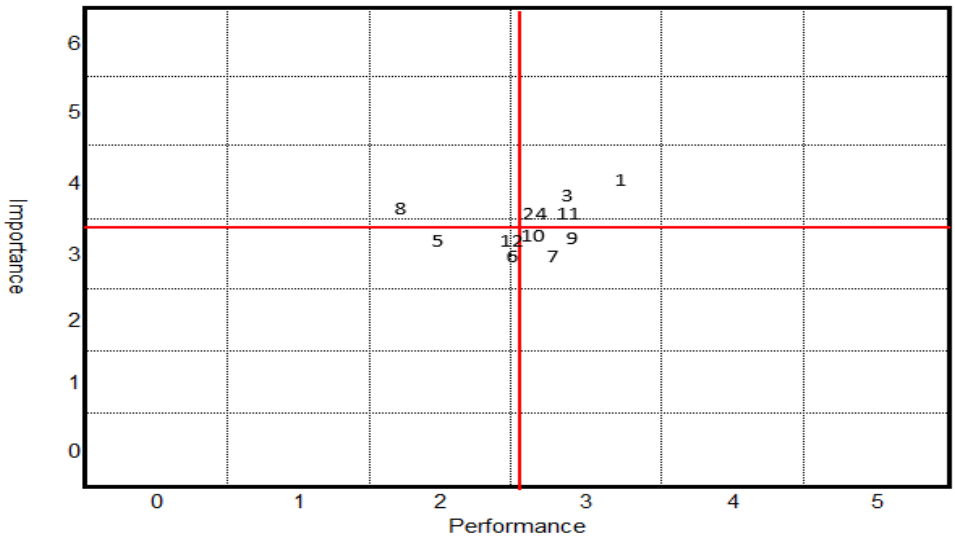


Figure 3. *IPA chart of the impact of success on knowledge management*

Step 14: Provide a solution to improve the performance of the production unit.

In the first quarter, where importance and performance are low, the main weakness of the organization is that they need to focus and pay attention to the factors in this area; this is a risk for the organization, and immediate improvement is a priority. Therefore, factors such as communication, quality system, benchmarking, employee encouragement, supplier management, total quality success factors, and employee motivation in the field of knowledge management should be given priority for immediate improvement.

The second quarter, which is of high importance and performance, is the main strength of the organization, providing a competitive opportunity for the organization. The appropriate solution is to continue activities in the same way as before. These factors include top management commitment, human resource management, teamwork, information, and analysis in the field of total quality success factors, as well as management support, organizational culture, IT, management strategy, and human resource management in the field of knowledge management.

The third quarter, in which importance and performance are low, is the sub-weakness of the organization. These factors do not require any additional investment and are irrelevant to the organization, not threatening it. These factors include Strategic Planning, Total Quality Success Factors, Performance Measurement, Organizational Infrastructure Management, and Benchmarking in the field of Knowledge Management.

The fourth quarter, in which low importance and high performance, is the sub-strengths of the organization and the factors that are placed in it, are more demanded by the organization, and it can be said that the organization can invest these factors in a better way. They need to improve the resources at their disposal and focus on other factors. These factors include Quality Culture, Process management, Continuous improvement and innovation, Training and education, in the field of total quality success factors and factors Processes and activities, Eliminate resource constraints, Employee education, and Training in the field of knowledge management.

Discussion

It is believed that knowledge management can create competitive advantages for companies. However, many production organizations have not been able to achieve the desired result. One of the main reasons is that organizations do not have a clear understanding of knowledge management. The main role of knowledge management is not information technology, but the application of human knowledge. Knowledge management is like total quality management, and since they have many similarities, they can complement each other if properly planned. Total quality management includes continuous improvement based on reality, and knowledge management is based on culture to support the creation and knowledge sharing. In this article, we have demonstrated how we can help increase productivity in production organizations by using these two areas in tandem.

Managerial and Policy Implications

Considering that TQM and KM are both important attitudes that play a key role in improving an organization, TQM says that commitment to customer needs leads to organizational improvement. To obtain customer satisfaction as the ultimate goal of any company, it is necessary to identify and manage customer needs. Additionally, the production line must be flexible to market changes and adapt itself to the customer needs. Therefore, performance evaluation is a solution and a tool that helps managers to know their strengths and weaknesses.

The results of organizational performance evaluation based on TQM, which takes into account the company's knowledge management infrastructure, can help managers draw a roadmap based on customer needs, adapt to environmental changes, and finally achieve the desired quality.

Limitations

Undoubtedly, researchers face limitations in how they do their work, which may affect the results. Recognizing these limitations can lead to a better interpretation of research results, as well as improving the quality of future research. The present study also faced limitations, such as only using a questionnaire tool to collect data, which can be problematic. Additionally, it should be noted that, in addition to the factors affecting the success of TQM and knowledge management, other factors may also affect these two variables; however, these cases are not considered in this study. Therefore, it is suggested that other researchers try to identify and measure other factors affecting them, and that the limitations mentioned in future studies be taken into consideration, with more components being used in the performance evaluation structure.

Case Study Conclusion

In the case study phase, a questionnaire was used to examine. MSL company located in Khorramabad. The information was completed by the managers and experts of the company. The obtained results were examined according to the DEA model. The

MSL company was inefficient in the investigated area. The obtained results were provided to the managers of the companies. The factors that caused to decrease in the score of weak company were identified and suggestions for improving the performance according to Table 10 were proposed.

In this production unit, according to the current conditions and the points obtained in the studied unit, the following suggestions have been made. Therefore, in other production units, according to the conditions and performance of the unit, the results should be examined. And according to the conditions of each organization, special management suggestions should be expressed.

Table 12.
Management suggestion For MSL Company

No	Management suggestion	factor
1	Immediate improvement	Factors such as communication, quality system, benchmarking, employee encouragement, supplier management, and total quality success factors, as well as employee motivation in the field of knowledge management, should be given priority for immediate improvement.
2	Continue activities in the same way as before	Top management commitment, human resource management, teamwork, information, and analysis are success factors in the field of total quality. Further factors include management support, organizational culture, IT, management strategy, and human resource management in the field of knowledge management.
3	These factors do not require any additional investment	Strategic planning in the field of total quality success factors and performance measurement, organizational infrastructure management, and benchmarking in the field of knowledge management are key components for success.
4	Focus on other factors and improve other resources	Quality culture, process management, continuous improvement and innovation, training and education are key success factors in the field of total quality. Processes and activities, elimination of resource constraints, employee education and training in the field of knowledge management are also important factors.

As a managerial suggestion, the indicators should be strengthened through a plan and an organizational road map should include the policies that assist the organization in improving. However, it should not be neglected to have a plan in order to maintain and improve the strength points. The indicators that are focused to be improved should be precisely considered by managers and should be evaluated in the specified periods of time.

Conclusions

This research focuses on the importance of Total Quality Management (TQM) and Knowledge Management (KM) in improving the performance of Production units. The proposed method evaluates the influence of factors in both fields, providing valuable insights for managers to formulate and implement TQM and KM strategies to enhance business performance. Innovation is key for Production units to regularly and continuously improve their processes and products. KM can help organizations increase their chances of survival and growth by fostering innovation and taking advantage of new opportunities to further improve their performance. To maintain a competitive edge in the market and achieve long-term success, management must ensure the implementation of all aspects of TQM and knowledge management. It is critical for Production units to prioritize continuous improvement and innovation to remain relevant in today's fast-paced business environment.

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