The Impact of Customer Knowledge Management on Service Quality with the Mediating Role of Open Innovation

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ABSTRACT

Service quality (SQ) is crucial for customer retention, making it essential for managers to understand the factors influencing it. In today's competitive landscape, organizations are increasingly investing in customer knowledge management (CKM) to enhance their service delivery. Although substantial research has been conducted on SQ, significant gaps persist, highlighting the need for further investigation. This study addresses these gaps by exploring the impact of CKM on SQ, with a particular focus on the mediating role of open innovation (OI). Adopting a quantitative approach, the research employs a descriptive correlational design and utilizes structural equation modeling for data analysis. The study sample comprises 200 companies in the information technology (IT) sector in Tehran, of which 139 completed the questionnaires. The obtained data were analyzed using AMOS and SPSS software. The findings indicate a positive and significant relationship between CKM and SQ, confirming that OI serves as a mediator in this relationship. Organizations that effectively integrate CKM with OI are more likely to achieve higher service quality, underscoring the importance of these strategies for enhancing customer satisfaction.

KEYWORDS

Customer Knowledge Management, Knowledge Economy, Knowledge Management, Open Innovation, Service Quality.

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Introduction

Recently, as the market has become consumer-oriented, improving SQ has been recognized as a strategic issue for businesses and a high-priority demand for customers (Yum & Yoo, 2023; Silvestri et al., 2017). Businesses that achieve a higher level of SQ have greater customer loyalty and brand attachment (Sharif et al., 2024; Rather & Camilleri, 2019; Budianto, 2019). To achieve such benefits, organizations must be aware of customer expectations and demands. One effective way to adapt to the changing needs of customers is through using CKM and treating it as an important source of tacit knowledge (Riggs, 2019).

Customer knowledge plays a significant role in the management of large organizations; therefore, organizations must acquire, develop, and enhance this knowledge to improve their performance (Tseng & Fang, 2015). Customer knowledge can support the development of new products, facilitate the understanding of emerging market opportunities, and improve long-term relationships with customers (Duarte et al., 2016). It is highly significant for a company's competitiveness, as customer engagement positively impacts outcomes such as customer loyalty and satisfaction, and value addition, which in turn affect business results like sales and market share (Fidel et al., 2015). Thus, organizations that focus on collecting, managing, and disseminating customer knowledge across their units are more likely to achieve a sustainable competitive advantage (Jaziri, 2019). In fact, 89% of the surveyed organizations considered customer-related information to be very significant and essential for their business success (Boateng, 2016).

Extensive research shows that the implementation of CKM leads to improved innovative activities, and increasingly emphasizes the role of customer collaboration in service delivery and innovation (Fidel et al., 2015). Also, understanding customer demands and managing the flow of knowledge between a company and its customers are vital for business model innovation (Wu et al., 2013). Rapid technological changes, short technology life cycles, high internal research and development costs, intense global competition, and advancements in IT have driven businesses towards creativity and innovation, a process which is referred to as open innovation (OI) (Secundo et al., 2019). Sharing knowledge through OI has become increasingly important since companies can use technological innovations to provide high-quality and personalized services at reasonable costs (Bican et al., 2017, Fisher & Qualls, 2018). A company’s capacity for innovation and competition depends on knowledge, highlighting that knowledge and innovation inseparable (Fidel et al., 2015).

The importance of customer knowledge (Gibbert et al., 2002; Wang & Xu, 2018), SQ (Solimun & Fernandes, 2018), and OI (Donate & de Pablo, 2015) in driving organizational success is well-established in the literature. Despite this extensive body of work, a comprehensive investigation of the interconnections among these three critical variables—CKM, SQ, and OI—remains considerably absent. While existing studies have partially addressed the relationships between these elements, they have mostly examined

them in isolation, focusing on the effects of knowledge management or customer relationship management (CRM) on individual outcomes such as SQ or innovation.

Accordingly, the current study seeks to bridge this gap by investigating the interplay between CKM and SQ, with a particular focus on the mediating role of OI within this dynamic. In doing so, this research not only aims to enhance our understanding of the relationships among CKM, SQ, and OI, but also underscores the crucial need for an integrated approach that acknowledges the synergies among these variables for improving organizational performance.

Literature review

Service Quality (SQ)

In today's business landscape, quality is essential for an organization's survival and success. Optimal quality and customer satisfaction guarantee the survival of an industrial unit, allowing for greater profitability and achieving competitive advantage (Solimun and Fernandes, 2018). To survive in today's markets, businesses must offer products and services that meet customer needs and address their expectations of product and service quality (Saglik et al., 2014). SQ is recognized as a vital factor affecting an organization's success in creating a competitive advantage (Rod et al., 2009). Quality refers to the development, design, production, and delivery of economic and usable services and products that satisfy consumer needs. SQ is "the measurement of how well the level of service delivery meets customer expectations" (Rod et al., 2009). In this research, the SQ model has been chosen as the foundational framework, and through a review of the theoretical foundations of SQ, the data points and dimensions have been identified, as outlined in Table 1.

Table 1.
The Dimensions and Indicators of SQ

Dimensions	Indicators	Sources
Responsiveness	Speed of responding to complaints	Fernandes and Coutinho, 2017; Lau et al., 2013
	Willingness to support customers	Duarte et al., 2016
	Service delivery speed	Tseng and Fang, 2015
Reliability	Maintaining customer records	Lau et al., 2013
	Assurance in dealing with problems	Duarte et al., 2016
	Assurance of financial communications	Duarte et al., 2016; Fernandes and Coutinho, 2017
	Fulfilling organizational promises	Lau et al., 2013; Tseng and Fang, 2015
	Providing accurate and high-quality services	Lau et al., 2013
	Providing timely service delivery	Tseng and Fang, 2015
Guarantee	Providing consultation and support to ensure the correct performance of tasks	Duarte et al., 2016
	Building customer trust in employees	Fernandes and Coutinho, 2017; Lau et al., 2013
	Creating a sense of security for customers	Fernandes and Coutinho, 2017
	Guaranteeing employees' politeness from the customers' perspective	Fernandes and Coutinho, 2017

Dimensions	Indicators	Sources
Empathy	Availability during hours suitable for customers	Lau et al., 2013
	Ease of communication with customers	Duarte et al., 2016
	Attention and patience of sales staff	Lau et al., 2013; Tseng and Fang, 2015
	Organizational attention to all customers	Fernandes and Coutinho, 2017
	Awareness of customer needs	Lau et al., 2013
Physical evidences	Using modern equipment in the organization	Duarte et al., 2016
	Suitability of the physical space for customers	Lau et al., 2013
	Personnel order and cleanliness	Fernandes and Coutinho, 2017; Lau et al., 2013
	Appropriateness of the physical space for the organization's services	Duarte et al., 2016; Lau et al., 2013

(Source: Researcher's Findings)

Customer Knowledge Management (CKM)

The development of technology has enabled organizations to collect, store, and manage information about their customers. To address the challenges posed by increasing competition and to remain in the competitive market, businesses must utilize customer information (Davenport & Völpel, 2001). Customer knowledge is defined as information regarding customers that has a direct or indirect impact on organizational performance (Zanjani et al., 2008). Customer knowledge is an essential intangible asset for organizations, as it helps them to align themselves with value creation (Tseng, 2009). According to Taherparvaret al. (2014), customer knowledge has become an important resource for improving company performance and achieving success. Therefore, given that customer knowledge plays a significant role in the management of companies, organizations must acquire and utilize it to enhance their performance (Boateng, 2016). Consequently, organizations that focus on collecting, managing, and disseminating customer knowledge across their units are more likely to achieve a competitive advantage (Jaziri, 2019). Customer knowledge can be categorized into three types, which are discussed below:

1) Knowledge for the Customer: It refers to the insights, data, or information that can be analyzed, interpreted, and ultimately transformed into knowledge to reach the target customer. In the literature, sources that provide knowledge for the customer are often overlooked. This knowledge can be obtained from various sources, including other customers, consulting institutions, competitors, and the company itself, to meet customer information needs.

2) Knowledge from the Customer: It refers to the insights, data, or information that can be analyzed, interpreted, and ultimately transformed into knowledge that an organization acquires to enhance its products and services.

3) *Knowledge about the Customer:* It refers to the insights, data, or information that a company uses to understand its target customer. Companies not only gather information about customers but also acquire information and knowledge related to them (Zanjani et al., 2008).

Integrating CRM with knowledge management systems in a business environment and establishing knowledge-based CRM processes guarantee the success of CRM. Therefore, organizations have integrated CRM with knowledge management, leading to the emergence of CKM (Dous et al., 2005). CKM results from the integration of knowledge management and CRM, offering organizations insights into their customers' profiles, latent needs, and desires. This, in turn, creates a competitive advantage for organizations and enhances their value and service capabilities for customers (Boateng, 2016) .

An effective way to adapt to customers' changing needs is to leverage customer knowledge and treat it as an important source of tacit knowledge (Taherparvar et al., 2014). Furthermore, by gaining a better understanding of customers, companies can increase their consumer engagement and market penetration (Singh and Kaur, 2011). Therefore, companies must effectively manage their interactions with customers to acquire knowledge that helps them to recognize costumer needs, characteristics, and purchasing behaviors (Jaziri, 2019). CKM has been established with the aim of creating value in organizations by transforming intellectual capital into an organizational asset (Allee, 2012). Table 2 outlines the dimensions and indicators used in this research, based on the established theoretical foundations.

Table 2.
Dimensions and Indicators of CKM

Dimensions	Indicators	Sources
Knowledge from the Customer	Customer experience with the product or service	Taherparvar et al., 2014; Wu et al., 2013
	Customers' creative ideas about the product or service	Solimun and Fernandes, 2018
	Customer feedback regarding SQ	Belkahla and Triki, 2011; Rollins and Halinen, 2005; Peng et al., 2009
	Customer feedback regarding competitors' SQ	Rollins and Halinen, 2005; Wu et al., 2013
	Customer feedback regarding their service needs	Taherparvar et al., 2014; Peng et al., 2009
Knowledge for Customer	Providing knowledge about future products and services	Belkahla and Triki, 2011, Sulaiman et al., 2011
	Providing knowledge about current products and services	Belkahla and Triki, 2011, Rollins and Halinen, 2005
	Providing information on the benefits of innovative services or products	Taherparvar et al., 2014
	Helping customers make better decisions regarding the organization	Wu et al., 2013
Knowledge about Customer	Gathering information about customer history	Peng et al., 2009, Taherparvar et al., 2014
	Gathering information about the number of customer referrals	Rollins and Halinen, 2005, Sulaiman et al., 2011
	Gathering information about costumer needs and expectations	Sulaiman et al., 2011, Taherparvar et al., 2014
	Gathering information about costumer demands	Peng et al., 2009, Rollins and Halinen, 2005
	Gathering information about customer problems and concerns	Wu et al., 2013
	Gathering information about customers' jobs and income levels	Peng et al., 2009, Rollins and Halinen, 2005
	Gathering information about customers' preferences and tastes	Taherparvar et al., 2014

(Source: Researcher's Findings)

Open Innovation (OI)

Henry Chesbrough, a professor at the University of California, Berkeley, introduced the concept of OI. He regarded OI as a new necessity for creating and profiting from technology and explained how companies in the twentieth century made significant investments in research and development, hired the talented individuals to foster innovative ideas, supported them with intellectual property strategies, and reinvested the profits back into research and development (Singh & Kaur, 2011). Fundamentally, OI suggests that valuable ideas can originate from both inside and outside the company, and can be commercialized from within or outside the company. Based on IO, companies need to embrace both the benefits and risks of lifting the barriers between organizational knowledge and the outside world. In fact, instead of keeping their technologies and innovations confined, one the one hand, companies share their ideas and organizational knowledge and utilize external sources of knowledge and technology, . On the other hand, they create opportunities for others, including their competitors, to benefit from the results of their organizational knowledge (Hafkesbrink & Schroll, 2010).

In OI, a company collaborates with technology suppliers and customers to enhance its internal innovation capabilities and simultaneously expand the market by externalizing its internal innovations (Jacobides & Billinger, 2006). As seen, in OI, the boundaries of a firm are highly permeable, and innovative activities do not occur solely within the company but extend beyond its borders (Fetterhoff & Voelkel, 2006). OI is divided into four different types: external innovation disclosure, external innovation sales, internal innovation sourcing, and internal innovation acquisition (Dahlander & Gann, 2010). The theoretical foundations of the indicators and dimensions of OI are provided in Table 3.

Table 3.
Dimensions and Indicators of OI

Dimensions	Indicators	Sources
Acquisition of Internal Technology/Knowledge	Participating in exhibitions to stay updated with current knowledge	Donate and de Pablo, 2015
	Acquiring technical knowledge from outside the organization	Hitchen et al., 2017, Mount and Martinez, 2014
	Systematic search for ideas outside the organization	Donate and de Pablo, 2015
	Active collaboration with external partners	Hitchen et al., 2017
	Collaboration with external partners based on their innovations	Gassmann et al., 2010
	Efficient system for searching external intellectual property and knowledge	Gassmann et al., 2010, Hitchen et al., 2017
	Membership in business and research clubs	Mount and Martinez, 2014
	Collaboration with external partners for innovation and product development	Donate and de Pablo, 2015
Extraction/External Knowledge	Mastering formal processes for selling technical knowledge and intellectual property	Donate and de Pablo, 2015, Gassmann et al., 2010
	Dedicating units to knowledge commercialization	Mount and Martinez, 2014
	Welcoming the sale of intellectual property	Donate and de Pablo, 2015, Gassmann et al., 2010
	Extracting technical knowledge and sharing it with external partners	Hitchen et al., 2017, Mount and Martinez, 2014
	Using advanced products and new knowledge within the organization	Hitchen et al., 2017

(Source: Researcher's Findings)

As seen, the systematic review of the related literature highlights the importance of customer knowledge (Gibbert et al., 2002; Wang and Xu, 2018), SQ (Solimun & Fernandes, 2018), OI (Donate & de Pablo, 2015), and their impact on the success and performance of organizations. However, the simultaneous effect of these three variables has not been investigated in previous studies. Tseng and Fang (2015) have explored the relationship between CKM and SQ (). Wu et al. (2013), Wang and Xu (2018), and Su et al. (2006) have investigated the impact of CKM on OI (), while Bican et al. (2017) and Fisher and Qualls (2018) have examined the relationship between OI and SQ. Therefore, a study needs to be carried out to investigate the relationship among these three variables simultaneously, and take the mediating role of OI into account.

Conceptual Model and Hypotheses Development

Relationship between CKM and SQ

Customers are essential for the survival of organizations. To retain customers, it is essential to identify their needs. Organizations cannot engage with customers unless they understand which services are valuable to them, how and when they need these services, and what value these services hold for their different customers (Madhoushi et al., 2011). This information must then be applied in companies' products and services to enhance their SQ level in areas that matter to their customers. Achieving this requires the implementation of CKM concepts and systems. Knowledge management serves as a key enabler allowing businesses to leverage their knowledge assets and provide better services to their customers. By utilizing CKM, organizations become more competitive and offer more cost-effective, and high-quality services that foster customer intimacy (Zaharova & Zelmene, 2004). Accordingly:

Hypothesis 1: *CKM has a positive and significant impact on SQ.*

Relationship between CKM and OI

In a knowledge-based economy, customer knowledge is an important resource for the innovation process, directly influencing the discovery of innovative ideas and indirectly affecting the efficiency of innovation. Therefore, companies are increasingly integrating their resources with those of external actors, especially customers, to acquire new ideas for improving their innovation capabilities. Customer ideas and knowledge can lead to the creation of new products/services, or improve existing products/services that have been overlooked by the company. Thus, if customer knowledge is effectively managed, it can improve the innovation process, research and development activities, and the future of organizational innovation (Huizingh, 2011) .

CKM actively collects knowledge through various techniques, such as market studies, online discussion forums, social networks, and running focus groups with customers. By providing knowledge about and from customers, CKM helps companies acquire valuable information and ideas that can benefit the innovation process (Taherparvar et al., 2014). CKM is a strategic tool for organizations to enhance innovation (Abou-Zeid & Cheng, 2004), identify new market opportunities, and maintain long-term relationships with

their customers (Darroch, 2005). Attention to knowledge flows, which affects the speed and quality of innovation, is important for companies (Wang & Wang, 2012). Companies should implement special systems to create collaboration and reintegration, enabling them to identify and meet customer needs, create an environment appropriate for engaging customers in innovation processes, and achieve valuable knowledge and innovative ideas (Hoyer et al., 2010) .

By providing an environment dedicated to obtaining appropriate feedback and information sharing among customers and between companies and customers, CKM enables companies to increase thier customer knowledge. Therefore, through CKM, companies gain access to a valuable source of new ideas that are suitable for innovation (Taherparvar et al., 2014). Accordingly:

Hypothesis 2: *CKM has a positive and significant impact on OI.*

Relationship between OI and SQ and mediating role of OI

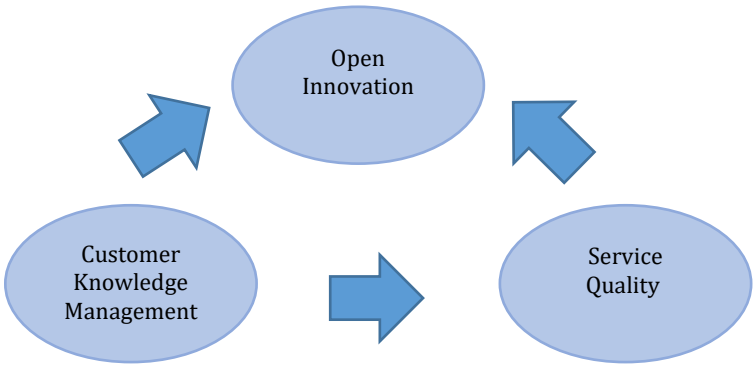
In OI, companies leverage the knowledge and skills of their partners during the innovation process, and accordingly, enhance the quality of their products, reduce costs, and manage risks (Fisher & Qualls, 2018). Factors such as increasing environmental ambiguities and uncertainties, changes in customer tastes and preferences, heightened competition, and technological developments have led companies to consider product quality more than ever as a critical factor for survival and success in competitive markets. Companies that implement OI processes based on external resources tend to be more profitable than those that rely solely on internal organizational resources. This can stimulate and encourage innovation by combining a wide variety of external resources. Additionally, the adoption of OI can manage the increasing diversity of products and lead to the better alignment of products with customer needs (Caputo et al., 2016).

Hypothesis 3: *OI has a positive and significant impact on SQ.*

Hypothesis 4: *OI plays a mediating role between CKM and SQ.*

Figure 1 illustrates the conceptual model of the research, designed to show the impact of CKM on SQ, while considering the mediating role of OI based on the identified variables.

Figure 1.
Conceptual Model of the Research



(Source: Researcher's Findings)

Methodology

The present research is quantitative in its purpose, and descriptive-correlational in nature. The statistical population consists of companies operating in the IT industry in Tehran. These companies were identified from a list provided in the database of active companies in the field of IT on the organization's website, . Then, questionnaires were distributed electronically and in person to managers and experts in the fields of customer relations, knowledge management, IT, and quality assessment, requesting their cooperation.

In this research, structural equation modeling was adopted to analyze the hypotheses, using Amos and SPSS. After persistent follow-ups and reminders over a period of one and a half months, from 200 distributed questionnaires, a total of 139 questionnaires were completed and used in the final analysis.

The main questionnaire of the present research was closed-ended and utilized a 5-point Likert scale. The questionnaire consisted of four sections: demographic information (6 questions), CKM (16 questions), SQ (22 questions), and OI (14 questions) .

To ensure the face and content validity of the questionnaire, it was sent to 5 professors in the field of management, particularly those specializing in knowledge management. After receiving their feedback, necessary revisions were made, and the content validity of the questionnaire was confirmed. For structural validity, indicators such as AVE and VIF were used. Additionally, composite reliability (CR) was employed to assess reliability.

Findings

The first section of the questionnaire includes demographic questions such as employees' gender, age, education, and number, and organization's age, and area activity. The results are presented in Table 4.

Table 4.
Demographic Statistics of the Participants

Feature	Dimension	Frequency
Gender	Female	44
	Male	95
Age	Under 25 years	6
	25-35 years	84
	35-45 years	32
	Over 45 years	17
Field of Activity	IT	50
	Communication Technology	19
	Information Society	29
	Producers and Contractors	13
	Consulting, Research, and Development	23
	Commercial Services	5

(Source: Researcher's Findings)

The results of validity and reliability, along with the mean and standard deviation of the dimensions are presented in Table 5. As shown, the reliability of all dimensions is

greater than 0.7, and the AVE of all dimensions exceeds 0.5. Additionally, the VIF for all dimensions is less than 2. Therefore, the validity and reliability of the questionnaire are confirmed.

Table 5.
Validity and Reliability of the Questionnaire

	Question Number	Dimensions	Mean	Standard Deviation	CR	AVE	VIF
1	1-3	Responsibility	3.364	0.914	0.764	0.698	1.338
2	4-9	Reliability	3.570	0.671	0.725	0.734	1.182
3	10-13	Assurance	3.658	0.704	0.856	0.699	1.148
4	14-18	Empathy	2.895	0.875	0.835	0.635	1.283
5	19-22	Physical evidences	3.492	0.798	0.921	0.711	1.519
6	23-31	Technology/External Knowledge Acquisition	3.962	0.955	0.879	0.806	1.108
7	32-36	External Knowledge	4.02	0.764	0.954	0.722	1.362
8	37-41	Customer Knowledge	3.325	0.925	0.722	0.665	1.329
9	42-45	Knowledge for Customer	3.681	0.939	0.822	0.693	1.639
10	46-52	Knowledge about Customer	3.775	0.922	0.935	0.709	1.113

(Source: Researcher's Findings)

The relationship between the variables is shown in Table 6 using the Fornell-Larcker criterion. The diagonal of this table represents the square root of the AVE of the variables, which should be greater than the correlation between that variable and other variables. Additionally, the CMIN/DF index is 1.670, which is less than 3. The GFI is 0.915, the CFI is 0.97, and the RFI is 0.929, all of which are greater than 0.9. The RMSEA index at 0.076 is also less than 0.08, confirming the model fit of the research.

Table 6.
Fornell-Larcker Criterion Results

Dimensions	1	2	3	4	5	6	7	8	9	10
1. Responsibility	0.83									
2. Reliability	0.28	0.85								
3.Assurance	0.31	0.29	0.84							
4. Empathy	0.35	0.11	0.46	0.80						
5. Physical evidences	0.41	0.16	0.39	0.27	0.84					
6. Acquisition/External Knowledge	0.18	0.30	0.17	0.17	0.23	0.90				
7. Extraction/External Knowledge	0.27	0.43	0.34	0.16	0.22	0.43	0.85			
8. Customer Knowledge	0.36	0.42	0.25	0.34	0.27	0.32	0.38	0.82		
9. Knowledge for Customer	0.45	0.21	0.27	0.28	0.26	0.16	0.36	0.39	0.83	
10. Knowledge about Customer	0.37	0.34	0.14	0.26	0.22	0.17	0.46	0.29	0.33	0.84

(Source: Researcher's Findings)

After examining the validity and reliability of the questionnaire and confirming the model fit, the model was implemented. The results of the hypotheses are presented in Table 7.

Table 7.
Results of the Examination of the Hypotheses

Hypothesis	Path	Path Coefficient	p-value	Result
1	Customer knowledge management → Service quality	0.32	0	Hypothesis Confirmed
2	Customer knowledge management → Open innovation	0.64	0	Hypothesis Confirmed
3	Open innovation → Service quality	0.45	0.01	Hypothesis Confirmed

(Source: Researcher's Findings)

In the next step, the mediating role of OI in the relationship between CKM and SQ was examined. In statistical tests, two questions need to be addressed about mediating variables: a) What is the indirect effect of X through M on Y? and b) Is the indirect effect of X through M on Y significant? For this purpose, the Sobel test was used to assess the significance of the mediating role of the two variables mentioned above. In this method, the amount of the indirect effect is calculated using the following formula, where 'a' represents the effect of the independent variable on the mediator, and 'b' represents the effect of the mediator on the dependent variable.

$$B_{indirect} = a * b$$

In addition to calculating the amount of the indirect effect, its significance can be assessed using tests such as Sobel, Baron and Kenny, and Goodman. In this research, the Sobel method was used for assessing the indirect effect. The test statistic is as follows:

$$z = \frac{a * b}{\sqrt{b^2 * sa^2 + a^2 + sxb^2}}$$

The assumptions are as follows:

a: The effect of the independent variable on the mediator

Sa: The standard error of the effect of the independent variable on the mediator

b: The effect of the mediator on the dependent variable

Sb: The standard error of the effect of the mediator on the dependent variable

As shown, the path coefficient for the relationship between CKM and OI is 0.64 (standard error = 0.079), and for the relationship between OI and SQ, itis 0.45 (standard error = 0.053). Therefore, as calculated below, the indirect effect of CKM on SQ is 0.288.

$$\mathrm{B_{indirect}} = \mathrm{a} * \mathrm{b} \rightarrow 0.64 * 0.45 = 0.288$$

Then, the significance of the indirect effect was examined using the obtained results:

$$\mathrm{z} = \frac{\mathrm{a} * \mathrm{b}}{\sqrt{\mathrm{b}^2 * \mathrm{sa}^2 + \mathrm{a}^2 * \mathrm{sb}^2}} = \frac{0.64 * 0.45}{0.45^2 * 0.079^2 + 0.64^2 * 0.053^2} \rightarrow \mathrm{t-value} = 5.538$$

Given that the calculated t-value is greater than 1.96, the indirect effect of CKM on SQ

through the mediating variable of OI is significant, and accordingly, the fourth hypothesis is confirmed. It is worth noting that since the direct effect of CKM on SQ is confirmed, the mediation of OI in the relationship between these two variables is partial, meaning that the CKM variable influences SQ both directly and indirectly (through OI).

Discussions and Conclusions

Today, competition to improve SQ is a strategic issue for organizations operating in the service sector. For many organizations, focusing on SQ is a necessary prerequisite for gaining customer satisfaction, building trust, and establishing long-term relationships with customers. As a result, SQ has become a vital factor guaranteeing organizations' success and competitive advantage in today's competitive market. Research has revealed that knowledge is the most important strategic resource for creating sustainable competitive advantage. Customer knowledge is an intangible and essential asset for any organization, helping them to create value. Customer knowledge can support the development of new products, facilitate the understanding of emerging market opportunities, and improve long-term relationships with customers. Therefore, organizations that focus on collecting, managing, and disseminating customer knowledge across their units are more likely to achieve sustainable competitive advantage. Innovation enables organizations to adapt to changing environments and enhance their efficiency.

Companies that invest in knowledge management and innovation can improve their performance and maintain their competitive advantage. Thus, being interested in the effect of customer knowledge on the goods and services provided to customers, we examined the effect of CKM on SQ with the mediating role of OI in this study. The analysis of the hypotheses showed that all hypotheses were confirmed.

According to *Hypothesis 1*, CKM has a positive and significant impact on SQ. The research findings regarding the first sub-hypothesis indicate that CKM has a positive and significant impact on SQ, with a coefficient of 0.35 and a significance level (critical ratio) of 2.589. One of the most important advantages of utilizing customer knowledge in an organization is the enhancement of products and services. For this reason, organizations must manage customer knowledge to enhance their efficiency and effectiveness, ensure the optimal delivery of high-quality products and services to customers, and achieve their satisfaction (Singh and Kaur, 2011). Studies conducted on this issue show that although implementing the CKM process is complex and challenging, organizations that successfully implement it improve their SQ and customer satisfaction (Denizci Guillet and Shi, 2019).

According to *Hypothesis 2*, CKM has a positive and significant impact on OI. The findings of the research regarding the second sub-hypothesis indicate that CKM has a positive and significant impact on OI, with an impact coefficient of 0.65 and a significance level (critical ratio) of 5.413. Many studies have demonstrated the effect of customer knowledge on fostering innovation (Gibbert et al., 2002; Donate and de Pablo, 2015). This hypothesis highlights the importance of customer knowledge flow in the IT industry. Through

utilizing the knowledge flow customers, companies active in the field of IT become aware of external ideas more quickly, and as a result, are more innovate and faster in their service offerings. Additionally, by leveraging customer knowledge, companies assure their customers that their opinions are important to the company. This assurance, in turn, paves the way for achieving better operational outcomes, such as high-quality products and customer satisfaction.

According to *Hypothesis 3*, OI has a positive and significant impact on SQ. The findings of the research regarding this sub-hypothesis indicate that OI has a positive and significant impact on SQ, with an impact coefficient of 0.43 and a significance level (critical ratio) of 3.162. Rapid changes in the competitive environment of the new world have created a new form of competition. Today's economy is driven more quickly by innovative organizations (those that create, generate, or transform knowledge into new products, services, and methods) than by other competitors. Nowadays, companies no longer need to create the best knowledge themselves to succeed; it is sufficient to leverage both internal and external knowledge and combine them to create innovative products and services. Moreover, the IT industry is one of the most dynamic sectors in the world, characterized by a high rate of change. Hence, the more innovative companies in this field are, the better products and services they provide to their customers.

According to *Hypothesis 4*, OI acts as a mediator in the relationship between CKM and SQ. To examine the role of this mediating variable, the Sobel test was used. The Sobel test calculations obtained a t-value of 5. 538.Since this value is greater than 1.96, the indirect effect of CKM on SQ through the mediating variable of OI is significant, thereby confirming the fourth hypothesis.

A review of the research background shows that numerous studies have highlighted the importance of SQ and customer knowledge in delivering services and products (Duarte et al., 2016; Tseng and Fang, 2015). In examining the first sub-hypothesis, the research findings indicated that there is a positive and significant relationship between CKM and SQ. This finding is in line with previous studies in that Torbati et al. (2014) and Tseng and Fang (2015) have also demonstrated that there is a significant relationship between CKM and SQ. The examination of the second sub-hypothesis, in keeping with previous research (Taherparvar et al., 2014; Wu et al., 2013), showed that there is a positive and significant relationship between CKM and OI. The examination of the third sub-hypothesis, consistent with the results of Duarte et al. (2016), indicated that there is a positive and significant relationship between OI and SQ.

Theoretical and practical implications

In today's highly competitive market, understanding the factors that influence service quality is essential for improving customer experience. Despite extensive research on service quality, the relationship among CKM, OI, and SQ has not received the attention it deserves. This research aims to address this gap to enhance the theoretical understanding of these concepts and providing managers looking to improve their service delivery with valuable insights.

Based on the results of the hypotheses of the present research, the following recommendations are provided:

Based on the findings of hypothesis 1, regarding the impact of CKM on SQ, it is recommended that managers and experts in customer relations within organizations in the IT industry allocate specific times for consulting and guiding employees. This will help them become more familiar with customer needs, and adopt and disseminate customer knowledge in various ways. It is suggested that companies in the IT sector conduct periodic surveys to gather customers' attitude towards service deficiencies and improve their services through customer feedback. When customers encounter problems, organizations should provide them with systematic solutions through their websites. Organizations are advised to provide their customers with information regarding the services and products they offer in the form of brochures, booklets, or electronic files.

Based on the results obtained from hypothesis 2, regarding the impact of CKM on OI, organizations can classify customers and offer products and services based on their needs and expectations. It is recommended that companies in the IT sector establish a dedicated CKM unit within their organizations. Organizations can improve customer information storage by utilizing databases, newsletters, workshops, and article libraries. They can also gather innovative feedback from customers through various mechanisms, such as wish lists, customer surveys, customer ratings, and having meetings with customers.

Based on the findings of hypothesis 3, regarding the impact of OI on SQ, it is recommended that companies in the IT sector participate in exhibitions and conferences to stay informed about the latest global knowledge and utilize it. Companies in the IT sector are encouraged to enhance their research and development units and establish a unit dedicated to commercializing the knowledge of this field. They are also encouraged to join domestic and international research and business clubs.

In this research, in addition to confirming the direct impact of CKM on SQ, the indirect impact of CKM on SQ through the mediating variable of OI was confirmed. Accordingly, organizations and companies active in the IT sector are advised to strengthen the relationship between CKM and SQ by enhancing OI mechanisms, thereby providing improved services to customers.

Research Limitation and suggestion for future studies

Like other research, this research is not without its limitations, which also highlight opportunities for future quantitative and qualitative studies. Firstly, this study focused solely on companies within the IT sector. It would be beneficial to conduct similar research across different industries and compare the findings to see how they align or diverge. Second, future research could examine moderating variables such as organizational culture, company size, and organizational structure to better understand their influence on the relationships identified in this research. Exploring these aspects could provide a more comprehensive understanding of the phenomena under investigation.

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