

The impact of customer knowledge management capability on project performance-mediating role of strategic agility

Syed Arslan Haider and Umar Nawaz Kayani

Abstract

Purpose – The purpose of this study is to examine the relationship between the customer knowledge management capability (CKMC) on project performance through strategic agility in the context project based software companies of Pakistan. The aim of the paper is to find out whether and how is customer knowledge beneficial for project performance and recognized as the important source of advancement of the knowledge management (KM) theory and the essential subject in practical ground.

Design/methodology/approach – In this study, non-probability, simple random sampling method was used to collect the data because it excludes bias from the data collection process. Although, the population of this research includes 307 employees working in different 30 public and private projects based software firms, operating in twin cities Rawalpindi, Islamabad. The respondents are project supervisors, team members, customers working on these different projects. Because of time limitation data has been collected within four months (i.e. November 2018 to February 2019) for this study, it is not time-lagged study and the data were collected at one time, so the design is cross-sectional in nature. The analysis was established using partial least squares-structural equation modeling (Smart PLS-SEM v.3.2.8) software to test hypotheses.

Findings – The results revealed the structural equation modeling that the components creating, transferring, integrate and influence ensure the most significant job in clarifying the customer knowledge and enhancing the capability to understand the customer needs and want which lead to decrease project delay, over consumption of the budget and directly lead to increase the project performance. The analyzed results also successfully justified the gap of this research study by showing the significant relationship between CKMC and project performance, also the indirect effect of CKMC through strategic agility on project performance more than its direct effect. So, the strategic agility plays positive and significant mediating role between CKMC and project performance, therefore the all sub-hypothesis and primary hypothesis were accepted.

Originality/value – This study sets the context with a brief summary of the key characteristics of the CKMC to improve the new product performance, enhance product/service quality, also reduce costs and enhance the competitiveness of organizations. Organization ought to acknowledge how to use KM to generate their revenues and achieve their goals. However, available techniques and methodology to measure the sufficiency are dissatisfying and consistent need for assessments and evaluations of this issue are felt.

Keywords Customer knowledge management capability, Strategic agility, Project performance, Partial least square (PLS)

Paper type Research paper

Syed Arslan Haider and Umar Nawaz Kayani are both based at the Department of Management Sciences, Faculty of Management and Social Sciences, Capital University of Science and Technology, Islamabad, Pakistan.

Received 11 January 2020
Revised 26 April 2020
Accepted 11 May 2020

Conflict of Interest: The authors of the paper declare that they have no conflict of interest of any kind.

1. Introduction

Besides of the broad changes in business environments and the increase of competition, customer knowledge management capability (CKMC) is one of the most important issues

that contributes in the project performance (Lopez-Nicolas and Molina-Castillo, 2008; Wang and Xu, 2018; Tang and Marinova, 2020). CKMC is recognized as the essential source of advancement of the KM theory and is considered as the vital subject in practical ground. Salojarvi *et al.* (2013) proposes that CKMC is one of the criteria to improve the new product performance, enhance product/service quality, also reduce costs and enhance the competitiveness of organizations. However, organizations desire to construct a well-functioning CKMC to face challenges (Wang, 2015). Therefore, information should make sense of how to guarantee the methodology of fundamental goods and services to customers and accomplish their fulfillment (Bhatti *et al.*, 2011). The present focused economy and troublesome condition KM to arrange as a critical factor for the business benefits and competitive advantages. Associations ought to acknowledge how to use KM to create of their incomes, benefits and their goals (Korhonen-Sande and Sande, 2016). However, accessible techniques and methodology to measure the sufficiency are dissatisfying and consistent require for assessments and evaluations of this issue are felt (Al-Qatawneh *et al.*, 2019; Ahammad *et al.*, 2020).

Depending upon information as a significant factor of intensity in the overall economy, associations may be looking for a key part which called CKMC (Rai *et al.*, 2015; Braganza *et al.*, 2017). This information is superior which enables firms to exploit the assets and increase its ability for conflict (Jaziri, 2019). Customer information handling associated with customer relationships management which his goal in commercial process is holding customers. Customer relationship management is propelled stage to gather information about customers so as to distinguish and control customer behavior (Um and Kim, 2018). In projects, customer interests are the key points because of their buying behavior clearly influences the project financial performance, as well as making other new business opportunities (Servaes and Tamayo, 2013; Zhang *et al.*, 2018). The latest studies have reflected that the conceivable challenge between the KM and customer relationship the organization to achieve a viable economic benefit (Yun and Hanson, 2020). The blend of these two theories is known the CKMC which is a decent technique to acquire data of the customer and supply the most suitable knowledge for him (Hock-Doepgen *et al.*, 2020). CKMC is regarding the procurement, distributing and the advancement of customer knowledge to the generation of new items and market improvement; it will be more effective in advancing development yield (Santoro *et al.*, 2018; Xie *et al.*, 2018).

Therefore, organizations are required to look for agility in the 21st century on the grounds that current organizations face with progressively strain to discover better approaches to contend productively in the worldwide dynamic market (Johnsen and Lacoste, 2016; Zhou *et al.*, 2018). Strategic agility gives the opportunity by reorganizing the system, respond quickly to change, capable to reforms, be flexible and develop procedures to control the environmental changes and uncertainty (Gao *et al.*, 2015; Shams *et al.*, 2020). Software industries are such organizations in which the issues of KM, agility and performance are essential modules. Software industries are comprehended as a basic segment of economy systems in the economy significantly affects the world economy and financial trade (Santoro *et al.*, 2018; Xie *et al.*, 2018). With expanding competitors, software houses understood the significance of drawing in the customers and points of interest. Customer is one of the key factor and the state of achievement of the software business (Jahan *et al.*, 2019; Kilu *et al.*, 2019). CKMC preferences ought to be taken in the software firms so information and experience are intentionally applied, with the end goal that creation, ability, effectiveness and responsibility of the association are enhanced (Esterhuizen *et al.*, 2012; Akhtar *et al.*, 2018). Finally, this study test the framework on quantitative data set and give critical data by following an entire explanatory methodology and using an exceptional data set, to address this question “Is there relationship between CKMC, strategic agility and project performance?”

2. Research literature

2.1 Customer knowledge management capability and project performance

The concept of KM was presented in the mid-1990s (Demarest, 1997; Meyer and Sugiyama, 2007). Traditional KM is about proficiency gains (evolution of “re-developing the wheel”), though CKMC is not the same as traditional KM. Customer knowledge is about innovation and growth in light of KM theory (Nonaka and Takeuchi, 1995; Alavi and Leidner, 2001), this research builds a hypothetical support for setting up a positive relationship between CKMC and project performance. Regarding the customer knowledge literature, Gebert *et al.* (2003), Belkahl and Triki (2011) described customer knowledge into three significant classes. The first type called knowledge “from” customer recommends to learning about items, markets and providers associated with satisfying customer’s information needs. The resulting type alludes as knowledge “about” customers, which is prepared based on the investigation of true customers’ data and information. The third sort, which is known as knowledge “for” customers, alludes to the customers’ reactions. While, project performance was conceptualized as a multidimensional construct (Gable *et al.*, 2008; Pollanen *et al.*, 2017). Atkinson (1999), Boyne and Gould-Williams (2003) and Sarhadi (2013) also defined project performance as a combination of budget and schedule variances alongside considered cost and efficiency, service and provide actual quality that was initially expected, which capture the characteristics of performance.

Nowadays, the customer is known the most significant wellspring of information for projects. The scholars consider when customer uses the product or a service they get a lot of knowledge and experience (Yun and Hanson, 2020). This knowledge has transformed into a significant resource for projects and getting it has transformed into another competitive advantage for projects (Hock-Doepgen *et al.*, 2020). Then again, customers need information to best purchase that must be given by associations. Customer knowledge management contains procedures that are associated to identifiable and acquiring of customer data, just as the creation and process of customer knowledge (Gebert *et al.*, 2003; Awad and Ghaziri, 2008; Carmeli *et al.*, 2017). Such data is past the external furthest reaches of the association and this knowledge extricated can be to make an incentive for the association and its customers (Acosta *et al.*, 2018).

At the point when customer requirements change and new needs are created, which cause new markets to develop (Battistella *et al.*, 2017). Kim *et al.* (2011) and Fu *et al.* (2020) describe within few years online shopping system, increase worldwide and enables the customer to directly purchase a product from a supplier over the internet (e.g. Amazon.com, OLX.com, Daraz.pk, etc.). Because of online shopping the interaction between customers and supplier is limited. Therefore, less interaction between customers and supplier make it difficult to understand customer’s requirement (Meyer *et al.*, 2015). To overcome the issue firm start, engage the customers for online reviews; such surveys give them a glimpse of purchase and product using experience of different customers (Attafar *et al.*, 2013; Thakur, 2018). While supplier-customer interaction improve innovation related knowledge (Schaarschmidt *et al.*, 2018). As, a sort of outside knowledge, customer knowledge is observed as a significant source that can be figured out how to plan new product advancement (Im *et al.*, 2016) to support the recognizing of growing business sector chances and to develop long-term customer relationships. Therefore, CKMC is anxious with the management and use of customer related information (Wu *et al.*, 2013; Martinez-Conesa *et al.*, 2017). Earlier studies have proven that while developing new product, manufacturers should not emphasize only product, process methods and technology they should consider a customer requirement as it becomes a critical factor in product innovation (Fidel *et al.*, 2015; Chang, 2017).

The internet retailer such as Amazon.com, monitor customer information effectively through online surveys, maintain their order histories and adapted proposals subject to prior

requests. Successfully, amazon is a business undertaking; they built up a stage to trade knowledge by inspiring customers to share their insight and ideas. By getting such sort of significant data, amazon gets striking accomplishment. However, CKMC is not restricted to, effective internet organizations. Fashion designs, car manufacturing companies, etc., do it, as well (Rowley, 2002). Meanwhile, IT industries face problems in the form of Big Data because the vast majority of the product and equipment to need store and oversee a lot of information (Del Vecchio *et al.*, 2018; Sousa and Rocha, 2019). To handle data firms, use customer knowledge management tools, perform an essential role in clarifying certain customer online behavior (Lopez-Nicolas and Molina-Castillo, 2008):

H1. CKMC is positively associated with project performance.

2.2 Customer knowledge management capability and strategic agility

As proposed by prior research, CKMC be viewed as an essential for achieving agility (Esterhuizen *et al.*, 2012). Moreover, (Martinez-Conesa *et al.*, 2017) demonstrated that using CKMC expands the possibility to constantly innovate, but also arrange a supportive atmosphere to accomplish agility within the organization. The customer knowledge management identifies with procuring, sharing and using the knowledge inside customers to figured out how to help new product development (Granados *et al.*, 2017). Therefore, agility encourages informal face-to-face interaction between project team and customer and information sharing through social practices. The effective knowledge sharing improves project performance (Singh Sandhawalia and Dalcher, 2011). Ofoegbu and Akanbi (2012) explained that agility has a significant association with organizations performance and as a critical source of high indicator for the organization's performance. Hence, the CKMC supports the strategic agility for reliable new regulatory procedures (Hanisch *et al.*, 2009). The hypotheses further enhanced with KM theory, where CKMC execution has been hypothesized as a resource and agility as an ability to adjust the unpredictable condition to the project performance:

H2. CKMC is positively associated with strategic agility.

2.3 Strategic agility and project performance

In dynamic and quick paced business condition, agility assumes an imperative role in project performance. Strategic agility reflects numerous essential capabilities that include various essential abilities that contain responsibility, capability, adaptability and speed (Shams *et al.*, 2020). Kumkale (2016) highlighted strategic agility as resources, giving a viable lead. To meet customers' desires in a frequently changing market, strategic agility helps to achieve high quality, novelty, flexibility and quickly respond to the changing environments, also recognized that when the project come to be strategically agile, how they can achieve an economical benefit and improve their project performance (Ravichandran, 2018). Researchers described agility as the capacity of the firm to modify strategies and tasks inside its supply chain to react to environmental changes, opportunities and threats (Martinez-Sanchez and Lahoz-Leo, 2018; Ravichandran, 2018). While satisfaction of customers and representatives is one of the agile association objectives. The term agility has three main practices, covering and exploring earlier information, checking present actions and anticipating the upcoming, ought to be high priorities. According to this, organizations must keep up a procedure of getting ready and embracing a strong situation for suitable decision-making (Stieglitz *et al.*, 2018):

H3. Strategic agility is positively associated with project performance.

2.4 Mediating role of strategic agility between customer knowledge management capability and project performance

Considering the earlier studies, the idea of agility at first showed up in 1990s by Iacocca Institute study situated in the USA initially agility was used measured the environmental dynamic management and a strategy for empowering so as to keep competitive advantage in an unstable atmosphere (Anderson and Tushman, 2004). Later on the meaning of agility has extended and differentiated. Similarly, Doz and Kosonen (2010) and Kale *et al.* (2019) describe strategic agility as organizations need, the ability to stay competitive in their business by modifying and changing the new creative ideas and using these ideas to make new item, services and new strategic models. Due to the dynamic business environment, which makes it difficult for identifying the benefit plan of action or proper strategy, hence, challenges and dissatisfactions are expected (Chan *et al.*, 2017). Strategic agility is associated to the capability to encounter unpredicted variations and take financial benefit of the change as an opportunity and attract customers (Zhang and Sharifi, 2007; Battistella *et al.*, 2017).

Organization needs agility to compete with worldwide competitors and effectively meeting the changing needs of customers, presenting new things, in adjusting to negatively progressing political change, forming significant relations with customers and offering top-level management (Oyedijo, 2012; Martinez-Sanchez and Lahoz-Leo, 2018). Customer knowledge and agility both give the capacity to the organization to respond the requirements of the customer rapidly; high responsiveness and high adaptability pick up a competitive advantage over rivals in the business sector (Belkahla *et al.*, 2011). The impact of agility on project performance was also examined by (Al-Qatawneh *et al.*, 2019; Kale *et al.*, 2019), whose objective was to confirm whether industrial agility might be the important success component in numerous businesses. Tallon and Pinsonneault (2011) established a mediating role of agility in the influence of IT position on project performance. While, projects are assumed to be unique and short-term task and are constantly initiated to complete a specific set of objectives (Williams *et al.*, 2015), also having uncertainty in extent of work and goals that should be accomplished when responding to the environment of project performance (Queiroz *et al.*, 2018) (Figure 1):

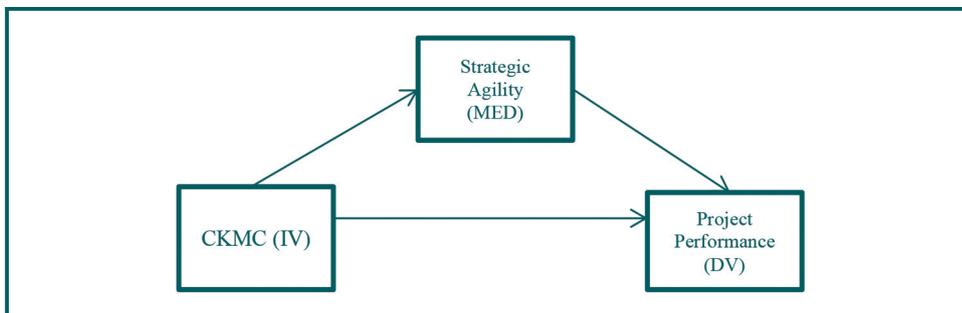
H4. Strategic agility mediates the relation between CKMC capability and project performance.

3. Research methodology

3.1 Sampling and procedure

Different kinds of projects are currently working in Pakistan. It is not possible to gather information from whole the population because of resource and time constraint that is the reason sampling is used to gather and investigate data. The population of interest included

Figure 1 Conceptual model of the study



cross-section of firms in the twin cities Rawalpindi and Islamabad. The methodology of this study benefited from the KM theory of [Nonaka and Takeuchi \(1995\)](#). The sample size is sufficient for getting a realistic result. The target population of this research is 30 public and private projects based software firms. Out of these 30 firms, 15 firms are also the customers firms which are availing the services of these other 15 projects based software developing firms. A total of 307 out of 360 surveys were usable. The respondents comprising project supervisors, team members from both customer firms and software developing firms on these different projects. The customer firms have been included in this survey, as this study is measuring the project performance based on the CKMC. The study used the cross-sectional design because of time limitation for this study. This study is not a time-lagged study and the data of all constructs were collected at one time, so the design is cross-sectional in nature.

The reason to choose software industry of Pakistan because software sector strengthens the economy of Pakistan, by dragging overseas investors and this industry is also supported to the worldwide acknowledgment of Pakistan as an emerging country ([Hussain and Malik, 2011](#)). According to the Pakistan Software Export Board (PSEB), the total size of software industry is approximately US\$6.5bn, by continuing both exports and domestics turnover is expected to grow at least 3.5% in the next five years. The chief executive officer of Pakistan National Technology declares the software industry growth will be twice in year 2020 ([Talib et al., 2017](#); [Jahan et al., 2019](#)).

An aggregate of 360 surveys were conveyed just 307 were usable and the response rate is 85%. It is the most ideal instrument for collecting information because it helps in collecting quantitative information in an efficient and convenient way. The instruments used for the current research were already developed questionnaires for each variable, based on a Likert scale. A Pilot study was led so as to check the reliability of the adopted questionnaire. The respondents were 70.7% male and 29.3% female. Most of the population fell inside the ages of 25-40 years of old and had average occupation tenure of 3-5 years and educational level bachelor and Master degree. The five-point Likert scale used for data collection, with 1 representing "strongly disagree" and 5 representing "strongly agree".

To perform the research on a larger scale, pilot study was conducted to assured that the questionnaire was valid; Cronbach's alpha was used to determine the reliability, as the reliability above the threshold of 0.7, is considered acceptable ([Hair et al., 1998](#); [Gliem and Gliem, 2003](#)). Regarding the independent variable, a four-item scale developed by [Tanriverdi \(2005\)](#) was used to measure CKMC and Cronbach's alpha reliability for CKMC was 0.826. [Um and Kim \(2018\)](#) scale was used to measure the dependent variable project performance and alpha reliability for project performance was 0.76. As mediator strategic agility was measured using eight-item scale ([Queiroz et al., 2018](#)). This measure also validated by [Tallon and Pinsonneault \(2011\)](#) and alpha reliability for strategic agility was 0.794. Cronbach's alpha test results are given in [Table 1](#) and [Figure 3](#).

The multivariate factual examination incorporated the following tests: factor loadings, convergent validity, discriminant validity check and examination of the structural equations model through evaluation of the explained variance (R^2), predictive relevance (Q^2), t -test (5,000 bootstrapping) and effect size (f^2) (Cohen, 1998; [Hair et al., 2014](#)). This examination was established using structural equation model-partial least squares (Smart PLS v.3.2.8) IBM and SPSS v.21 software ([Ringle et al., 2015](#)).

4. Research findings

4.1 Measurement model

Based on the table for convergent validity found that reliability indicator shows the loading of each item is between 0.408 and 0.826. As per [Hair et al. \(2014\)](#) factor loadings between 0.40 and 0.70 ought to be deleted only when the deletion would lead to increase in average

Table 1 Measurement model

Construct	Item	Factor	Cronbach's alpha	CR	AVE	Source
CKMC	CKMC1	0.809	0.826	0.884	0.657	Tanriverdi (2005)
	CKMC2	0.826				
	CKMC3	0.829				
	CKMC4	0.776				
Strategic agility	SA1	0.619	0.794	0.846	0.413	Tallon and Pinsonneault (2011), Queiroz <i>et al.</i> (2018)
	SA2	0.656				
	SA3	0.710				
	SA4	0.654				
	SA5	0.697				
	SA6	0.628				
	SA7	0.713				
	SA8	0.408				
Project performance	PP1	0.754	0.765	0.842	0.516	Um and Kim (2018)
	PP2	0.710				
	PP3	0.748				
	PP4	0.703				
	PP5	0.674				

Table 2 Discriminant validity Fornell-Larcker criterion

	Construct	1	2	3
1	CKMC	0.810		
2	Project performance	0.571	0.718	
3	Strategic agility	0.567	0.548	0.642

Notes: $N = 307$; items displayed in boldface represents the square root of the AVE

variance extracted (AVE). However, according to Hair *et al.* (2016), if the average variance extracted is greater than 0.4 and composite reliability is higher than 0.6, the convergent validity of the construct is still acceptable (Fornell and Larcker, 1981; Lam, 2012). Hence, Table 1 and Figure 3 illustrates all composite reliability are above 0.80, so all the three constructs; CKMC, strategic agility and project performance are valid measures of their respective constructs despite of the fact that AVE of strategic agility for SA8 is 0.408.

Figure 2 indicated connection between factors, if the value of T is within range of -1.96 and $+1.96$, the connection between factors insignificant at the confidence level 95% and if $T < -1.96$ and $> +1.96$, the connection between factors will be significant at the confidence level 95%. Hence, Figure 2 shows connections between all factors are significant.

4.2 Structural equations model

After measurement model of PLS analysis is done, next step is calculating the structural equations model. To examine the mediating effects of strategic agility, we pursued the processes suggested by (Henseler *et al.*, 2009; Vinzi, 2010; Hair *et al.*, 2016). Specifically, we first measured the direct effect model before toward indirect effect model as shown in Table 3. Furthermore, to examine both direct and indirect effect of the structural equation models, four criteria were used to be specific: (R^2) for endogenous latent variables are assessed to find the amount of variance in each constructs, effect size (f^2), estimate significance (Q^2) and assessments of the path coefficients (Hair *et al.*, 2014). We analysis the impact for the 5,000 bootstrapped samples from the initial 307 cases, to provide point measurement of clarified change and estimate significance in direct effect structural equations model (Hair *et al.*, 2016).

Figure 2 Graphical representation PLS-path analysis of ($n = 5000$ bootstrapped samples) - inner model path coefficients (T -value mode)

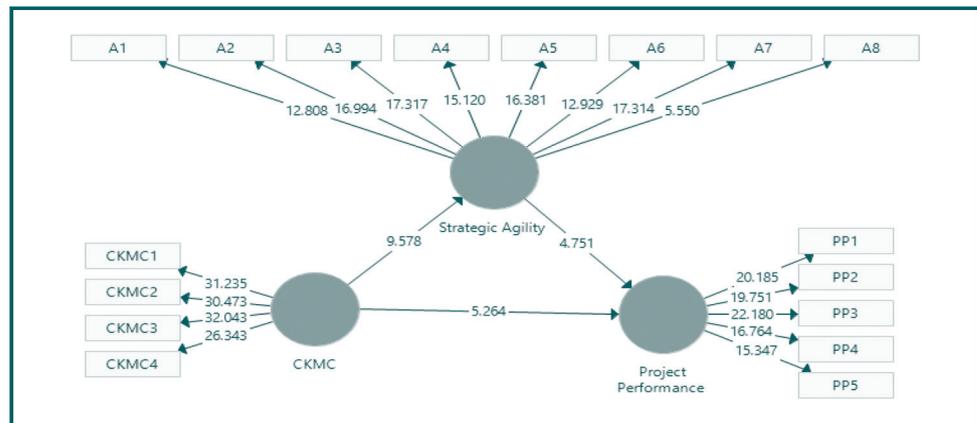


Table 3 Results of the structural equations model

Relationship between variables of Research	SD	T-values	Direct effect	Indirect effect	Total effect	p-values	f^2	
CKMC → project performance	0.072	5.305	0.383	–	0.571	0.000	0.166	Support
CKMC → strategic agility	0.062	9.208	0.567	–	0.567	0.000	0.473	Support
Strategic agility → project performance	0.070	4.705	0.331	–	0.331	0.000	0.124	Support
CKMC → strategic agility → project performance				0.383 * 0.331 = 0.126	0.693			Support

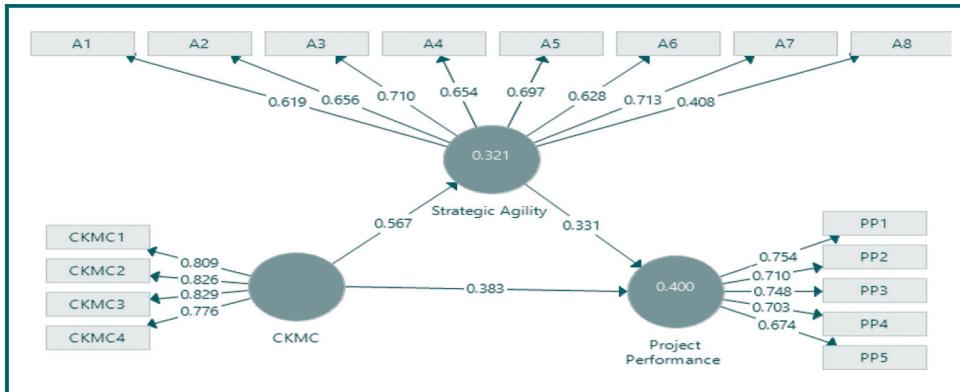
The value of R^2 is describes the percentage of variation in the dependent variables that can be clarified by the independent variables (Hair et al., 2014). Though a satisfactory value of R^2 relies upon the setting of study (Cohen, 1998) shows the value of 0.26, 0.13 and 0.09 express high, moderate and low sequentially, but in this study, R^2 value for endogenous variable, the direct effect model explained strategic agility is 0.321, which implies that 32.1% change of strategic agility is predicted by CKMC. Also, the R^2 for project performance is 0.400, which means that 40% change of project performance is explained by CKMC and strategic agility.

Likewise, a cross-validated redundancy measure (Q^2) was applied to quantify the estimate significance of the research model (Stone, 1974; Hair et al., 2016). There was support for sufficient estimates significance of the direct effect model because (Table 4 and Figure 3) shows value of Q^2 greater than zero ($Q^2 = 0.191$) for the endogenous latent variable the direct CKMC and strategic agility and indirect effect of CKMC to project performance is 0.116 both values above 0, recommending satisfactory predictive relevance of the model (Henseler et al., 2009; Hair et al., 2016). Results also support the $H1$, $H2$ and $H3$, the direct effect of CKMC to project performance ($\beta = 0.383$, $t = 5.305$, $p < 0.000$), CKMC to strategic agility ($\beta = 0.567$, $t = 9.208$, $p < 0.000$) and strategic agility to project performance ($\beta = 0.331$, $t = 4.705$, $p < 0.000$) all were positive and significant.

Table 4 Coefficient of determination in the PLS method

Construct	R^2	R^2 adjusted	Q^2
Strategic agility	0.321	0.396	0.191
Project performance	0.400	0.319	0.116

Figure 3 Structural equations model



Effect size (f^2) is the impact given by independent (exogenous) variable explicit to the dependent (endogenous) variable to observe how large the impact of variable exogenous explicit to variable endogenous (Cohen, 1998). Hair *et al.* (2016) describes (f^2) estimations between 0.02, 0.15 and 0.35 as having small, medium and large effects, respectively. Table 3 shows impact size 0.166 for CKMC to project performance, 0.473 for a CKMC on strategic agility and 0.124 for strategic agility to project performance, respectively. Thus, following Cohen (1988) rule, the impacts sizes of these exogenous construct on endogenous construct can be reflected as medium and large, respectively. Finally, the indirect effect of CKMC practices on project performance through mediating strategic agility is positive and significant ($\beta = 0.126, p < 0.000$), but less than the direct effect. However, if indirect effect is significant but its effect is less than direct effect, it is still considered as partially mediated (Akhtar *et al.*, 2018; Chan *et al.*, 2017; Kale *et al.*, 2019). As described in Figure 3, the outcomes also show the total effect of CKMC on project performance through the mediation of strategic agility is also significant ($\beta = 0.693, p < 0.000$). Therefore, the hypotheses 3 is also accepted.

5. Discussion

The main purpose of this study was to examine the relationship between the CKMC on project performance by having strategic agility as a mediator in the context of project based software industries of Pakistan. So, the results revealed the structural equation modeling that the components creating, transferring, integrate and leverage ensure the most significant job in clarifying the customer knowledge and enhancing the capability to understand the customer needs and want which lead to decrease project delay, over consumption of the budget and directly lead to increase the project performance. The analyzed results also successfully justified the gap of this research study by showing the significant relationship between CKMC and project performance, though the indirect effect of strategic agility on project performance. Strategic agility plays positive and significant partial mediating role between CKMC and project performance which suggests that strategic agility has some direct impact on project performance. Hence, all hypothesis 3 were accepted.

In comparison with prier studies (Rowley, 2002; Belkahla *et al.*, 2011; Pollanen *et al.*, 2017; Jaziri, 2019) observed the association among customer knowledge management with organizational performance improvement in the modern era of globalization and proved that CKM is the key factor and contributing positively toward project performance. Moreover, Esterhuizen *et al.* (2012); Tang *et al.* (2020) demonstrated that using CKMC increases the opportunity to constantly innovate, but also arrange a supportive atmosphere to accomplish strategic agility within the organization. As proposed by prior studies, strategic agility has a

significant association with organizations performance and as a critical source of high indicator for the organization's performance (Ofoegbu *et al.*, 2012; Yang and Liu, 2012).

This research has provided a theoretical implication by giving further empirical evidence in the domain of KM theory, where CKMC execution has been hypothesized as a resource and strategic agility as an ability to adjust the unpredictable condition to the project performance and enable the organization to react quickly to the customer needs, create, acquire and transform knowledge into the competitive advantage. Similarly, the results showed that strategic agility plays positive and significant mediating role between CKM and project performance. (Lindner and Wald, 2011; Martinez-Sanchez and Lahoz-Leo, 2018; Ravichandran, 2018) also described the impact of strategic agility on project performance that information gathering, analyzing and customer knowledge development have significant impact on customer relationship management. Similarly, information analysis has influence on the customer knowledge development and knowledge development has influence on information gathering (Gebert *et al.*, 2003). Since, that studies of CKMC and strategic agility are limited in the KM literature, the outcomes of this study may contribute to the literature and provide a basis for future studies.

Besides the theoretical implication, the findings have practical implications for project based organizations. Considering, the fact that the most software companies in Pakistan are small medium enterprises (SMEs). In this manner, dedicating the investment and employee resources for CKMC is extremely challenging for organization. As indicated by the outcomes, it is proposed to software firm managers that they provide mechanisms in their organization in which all the fundamental data are provided for customer and also they provide linked services to each market sector (Acosta *et al.*, 2018). Likewise, it is recommended to managers to support the procedure of acquire and transform information into the competitive advantage and strengthen the required structures.

6. Limitation and future directions

Regardless of the significant contributions, this article has few impediments that offer important opportunities for future research. First, this study was conducted exclusively in the project based software, banking and telecom sector in Pakistan. Queries may be raised about the generalizability of the results; caution ought to be practiced while inferring them to firms in o different businesses or regions. Second, the study is cross-sectional design as the environment of the software market is always changing, the current study may not reflect future business conditions. Which limits its generalizability, to strengthen it is recommended that for future studies investigators consider a longitudinal approach with a larger sample – that is, to test the proposed framework with a broader representation of firms in other industrial sectors (such as construction, fashion), as well as in other geographic contexts also compare the results with the findings of this study. Third, future studies could build on this one and examine other potential mediating and moderating variables that can influence strategic agility because it is also very limited in the literature, which also limits the estimation of the investigation results. Such as the team skills needed to deal with the customer knowledge management and organization cultural barriers to such modern implementations.

Fourth, the dramatic spread of COVID-19 has disturbed lives, source of revenue, societies and businesses globally. Large technology firms were some of the first to make the switch to remote working for all their staff and the fact that much knowledge work can be carried out remotely, companies including Amazon, LinkedIn, Microsoft and Google advised workers to stop coming in to the office in late February, 2020. In early March, 2020 Twitter “strongly advised” all its employees worldwide to do the same. COVID-19 is pushing companies to rapidly operate in new systems priorities and challenges – immediate decision-making, employee's efficiency and business continuity risks. Future studies need to address, once the immediate threat of the virus has passed, what will have changed in

the way we think and behave, how employees deliver relevant customer experiences, where they work and how digital channels can be used to increase the communication between customer and project team to understand the customer need and want? For example, consider banking sector where social distancing restraints will push customers toward digital channels for service and increase the need for a linked and quick to respond team. Furthermore, the fact that studies used agility scale to compute strategic agility, organization agility and operational agility future studies need to develop new scales to measure these variables separately.

7. Conclusion

The present study empirically clarifies the relationship between CKMC and project performance in project based organization of Pakistan, through a questionnaire analysis to measure the extent to which CKMC impacts project performance with a mediating role of strategic agility. We distribute 450 self-administered questionnaires and collected 330 and selected 307 questionnaires for analysis, the result of the study *H1*, *H2*, *H3* and *H4* all are accepted. CKMC means to enhance organizational knowledge to understand the customer needs and wants which leads to decrease in project delay, over consumption of budget and directly lead to project performance. The study contributes to the expansion of the conceptual framework of strategic agility the ability to effectively respond to dynamic and unpredictable business environments by reorganizing the system, respond quickly to change and develop procedures to control the environmental changes and helps to increase performance of project based software organization. Additionally, study suggests some direction on this issue as for CKMC and strategic agility and provides the stimulus to conduct this future research on this topic.

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Further reading

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Corresponding author

Syed Arslan Haider can be contacted at: haidershah24@gmail.com

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