Co-creating organizational performance and project success through customer participation, requirement risk and knowledge integration: a multi-study evidence

Received 14 October 2022
Revised 8 April 2023
6 June 2023
23 June 2023
Accepted 26 June 2023

Marya Tabassum
National University of Sciences and Technology, Islamabad, Pakistan
Muhammad Mustafa Raziq
University of Sharjah, Sharjah, United Arab Emirates and National University of Sciences and Technology, Islamabad, Pakistan
John Lewis Rice
University of Sharjah, Sharjah, United Arab Emirates
Felipe Mendes Borini
School of Economics, Business and Accounting, Universidade de São Paulo, Sao Paulo, Brazil, and
Anees Wajid
Hazara University, Mansehra, Pakistan

Abstract

Purpose – Taking a co-creation perspective and integrating knowledge-based and resource-based perspectives, the authors examine the role of customer participation in organizational performance and project success. The authors also investigate the mediating role of knowledge integration and the moderating role of requirement risk for these relationships in uncertain contexts.

Design/methodology/approach – The authors undertook two studies. The first study was carried out in 2018 in which the authors drew on survey data from 150 information technology (IT) sector employees and examined the mediating role of knowledge integration in the relationship of customer participation with organizational performance and project success. In the second study undertaken in 2020, the authors drew on data from 92 IT and telecom sector employees and examined the moderating role of requirement risk in the relationship between customer participation and knowledge integration. Study 2 was conducted during the COVID-19 pandemic when employees were largely working from home and were more sensitive to risks and uncertainty about the scope and system requirements. Both studies were survey-based, and analysis was carried out using structural equation modeling.

Findings – The authors' two-study examination indicated that knowledge integration positively mediates the relationship of customer participation with organizational performance and project success during the co-creation process. Furthermore, the authors demonstrate that when requirement risks are high, customer participation relationship with knowledge integration is weaker.

Originality/value – The authors show that integrating customer knowledge is critical to project success and organizational performance. By identifying risk uncertainties and environmental contingencies, the authors highlight the constraints of customer participation for knowledge integration, organizational performance and project success. The authors provide some key study findings based on survey data obtained from project teams during two periods (normal and pandemic).

Keywords Co-creation, Customer participation, Project success, Knowledge integration, Requirement risk, Organizational performance, Pandemic

Paper type Research paper

Benchmarking: An International Journal
Vol. 31 No. 5, 2024
pp. 1611-1642

1463-5771
DOI 10.1108/BIJ-10-2022-0632

1. Introduction

According to the project management literature addressing customer requirements is essential to the success of any project, as customers are one of the key stakeholders in project success (Edition, 2018). Therefore it is critical to have a positive working relationship with them throughout any project's development life cycle (Ika and Pinto, 2023). In the case of traditional organizations with ongoing business activities, the buyer-seller connection is a significant construct (Becker *et al.*, 2009; Biyik, 2017; Chavan *et al.*, 2018, 2019; Cortez and Johnston, 2017). Integrating a better understanding of this relationship is relevant in a dynamic project-based environment where firms have to rely much more on customer knowledge for project success (Ika and Pinto, 2023; Khosravi and Nilashi, 2018).

Studies show that customer knowledge is a neglected area in the project management field (Khosravi and Nilashi, 2018). Better customer knowledge facilitates the adoption of a customer-orientation approach by project-based organizations and has a substantial impact on the performance of small and medium-sized enterprises (SMEs) (Bagheri *et al.*, 2019; Ismail, 2023). Customer knowledge, when internalized in the organization, improves decision making by helping in the management of project complexities, requirement risks, mistake avoidance and complex problem-solving (Tang and Marinova, 2020). Customer knowledge is tacit, difficult to transfer and communicate and a strategic resource for firms (Valeri, 2023) all of which make it a key asset for the firm (Hock-Doepgen *et al.*, 2021; Yun and Hanson, 2020). In this regard, Wisner and Corney (2001) suggest that customer feedback capabilities and mechanisms improve business. Customer focus is an important management practice that leads to the completion of high-quality initiatives (Evans, 1996).

However, even if management strives to provide successful projects, there are still reasons why projects may fail and why organizations may fail to satisfy their customers. Based on the co-creation perspective, project success is determined by the combination of project type, project nature, industry and customers that make a project unique (Castro *et al.*, 2021). Similarly, the process of value co-creation, which is supported by relational engagement, teamwork and innovation, has a favorable impact on project performance, and the project's requirements uncertainty moderates this relationship (Heredia Rojas *et al.*, 2018). To co-create knowledge, numerous stakeholders must be involved at all times during the project (Ruoslahti, 2020). The idea of value creation through co-creation has been widely embraced in management and marketing literature (Smyth *et al.*, 2018).

Customers are the central actors of projects (Khan and Hussain, 2017; Ramaswamy and Gouillart, 2010). Customers contribute to the value-creation process by providing resources like knowledge to the firms (Plé, 2016). Similarly, a business and a customer jointly create value, allowing customers to customize the service experience (Smyth *et al.*, 2018). Using customer information, organizations can improve the effectiveness of new products, improve product quality and reduce costs (Khosravi and Nilashi, 2018). Organizations involve customers by contributing personalized requirements, preferences, solutions, knowledge and other feedback to the organizational processes (Dong and Sivakumar, 2017; Nardi *et al.*, 2020). Therefore, customers are not only passive product receivers but are also active collaborators in knowledge, assisting to generate co-created knowledge with firms that in turn gain some competitive advantage (Chaithanapat and Rakthin, 2021).

Although the extant literature highlights the importance of customers in creating value for firms, the economic benefits (e.g. successful projects, improved organizational outcomes and profitability) of customer participation lack clarity (Auh *et al.*, 2019; Yun and Hanson, 2020). Second, while customers benefit from customer participation (e.g. economic and relational value) (Chan *et al.*, 2010), only few studies have looked at the relationship between customer participation and its benefits to customers and organizations together, while it is an iterative process between customer and the firm. Third, there is little knowledge regarding the underlying mechanisms through which customer participation relates to project

performance and organizational level outcomes (Yu, 2017). Fourth, the management literature largely draws on concepts from permanent organizations ignoring the constraints in a project organizations (Raziq *et al.*, 2018), therefore limited knowledge of value co-creation in a project environment. Fifth, research has revealed little about the factors that may reduce or enhance the influence of customer participation on knowledge integration process (Auh *et al.*, 2019; Wang *et al.*, 2020b).

In addition to the gaps above, a possible contingency not sufficiently considered by the extant literature is the presence of risk in projects (e.g. IT and telecom firms). Risks can be classified as internal (from within an organization, e.g. people risk, management risk and financial risks) and/or external (outside an organization and difficult to control, e.g. estimation risk, technology risk and requirement risk) (Asif and Ahmed, 2014; Chen and Deng, 2022; Ghazali *et al.*, 2020). In the case of customer participation in a project, requirement risk is a relevant factor as it reflects negative events related to unclear, vague and continuously changing requirements (e.g. new requirements from the customer, stakeholders not engaging properly and changes in the project requirement) during the project development process (Gallati, 2022). Requirements risks imply uncertainty related to continuously changing requirements (Krancher, 2020), or in other words unclear, incorrect and ambiguous requirements. Requirement risks can influence the project's budget, schedule and quality (Arnaut *et al.*, 2016; Ghazali *et al.*, 2020).

Lastly, there is little research that has looked at such risks in environments that are more exposed to uncertainties. Research-based on requirement risks in normal circumstances includes requirement change risks (Chen and Deng, 2022), software requirement risks (da Luz Siqueira *et al.*, 2017), requirement risks in information systems (Ramesh *et al.*, 2010), requirement and user risks (Keil *et al.*, 2013), requirement risks in global software development (Ramesh *et al.*, 2010), requirement risk management (Ikram *et al.*, 2010) and user requirement risks (Drljevic *et al.*, 2020). Similarly, literature does not explain much the process of customer knowledge integration in environments with uncertainties such as pandemics. COVID-19 pandemic, for example, had a variety of impacts (Maqsoom *et al.*, 2020) and had more general impacts on employees working from home, which reduced their collaboration due to higher physical distance and in turn creating greater environmental uncertainties and risks (in terms of the scope and system requirements).

To summarize, studies that investigate the significance of customer participation in project and organizational performance in project-based businesses are rare. It is necessary to bring clarity on the mechanisms that allow these performance benefits to be achieved. Furthermore, research on potential variables that could improve or lessen the effects of customer participation on knowledge integration is rare. To this end this study seeks to examine the relationship of customer participation with project success and organizational performance. Furthermore, we seek to examine if the relationship of customer participation and project success and the relationship of customer participation and organizational performance are mediated by knowledge integration. Lastly, we examine if the relationship between customer participation and knowledge integration is moderated by requirement risk.

We seek to achieve the study objectives across two studies by adopting a mono method quantitative research approach. Study 1 was conducted in 2018 to investigate the mediating effect of knowledge integration in the relationships of customer participation with organizational performance and project success. Study 2 was conducted during the COVID-19 pandemic and looks at the effect of requirement risk (interfaced by project teams) in the association between customer participation and knowledge integration [1].

From the co-creation literature, we know that customer participation behavior results in value co-creation through resource integration (Caridà *et al.*, 2019; Plé, 2016). Coupling this understanding with the perspective that customers and their knowledge is a key resource we

can argue through the knowledge-based view (KBV) and the resource-based view (RBV) that customer participation will result in organizational benefits once such knowledge is integrated with firm resources. Results from SEM (Structural Equation Modeling) analysis offer support for our hypotheses. These indicate that knowledge integration positively mediates the link between customer participation and both organizational performance and project success. Furthermore, the positive role of customer participation in knowledge integration is weaker when requirement risks are high.

This study provides several key contributions to theory and practice. We extend the project management literature by increasing our understanding of the roles of customer knowledge and organizational outcomes for project environments. Further, we empirically examine the customer participation–economic benefit model (Auh *et al.*, 2019; Dong and Sivakumar, 2017). We also identify knowledge integration as an underlying mechanism through which not only project success is achieved but also organizational performance is improved. Finally, by examining the role of requirement risks during the COVID-19 pandemic through a dual study approach, our work incorporates key contingencies that can be a challenge for the knowledge integration process (Bagheri *et al.*, 2019). Our research benefits industrial organizations and managers to conceptualize and cope with software risks whereby the integration of knowledge across customers and project teams could be difficult and challenging. As follows, we conceptualize the associations between customer participation, requirement risk and knowledge integration, organizational performance and project success. For a summary of literature, see Table 1.

2. Literature review

2.1 Co-creation, knowledge-based view and resource-based view

This study integrates the co-creation perspective with value creation (Ramaswamy and Gouillart, 2010) and draws on the resource-based (Barney, 1991) and the knowledge-based views (Carter *et al.*, 1951). The co-creation perspective argues that firms create value by integrating the resource (Castro *et al.*, 2021) that customers offer with those of the firms' to create value (Ramaswamy and Gouillart, 2010; Ranjan and Read, 2016; Taghizadeh *et al.*, 2016). Smyth *et al.* (2018) define the process of value co-creation as an interaction and integration of resources within and across service systems. Traditionally, value is created within the organization (i.e. the supplier) through its goods, activities and capabilities. Value co-creation refers to the process by which customers and suppliers collaborate to create value, typically through high-quality interactions. Despite the fact that value co-creation theory was developed on a service-dominant logic in a business-to-business context, projects and programs can be understood as processes of value co-creation when examined as an interconnected network of relationships and interdependencies between parties (Heredia Rojas *et al.*, 2018). Ruoslahti (2020) suggested that complexity in multiple ways characterizes the co-creation of knowledge in innovation projects. The components of self-organization, connectivity and interdependence, co-evolution, and the development of new order received the most attention. Contrary to the classical perspective where a firm is considered the sole value creator, co-creation takes a dyadic approach to involve the customer as a resource integrator in the value creation process (Vargo and Lusch, 2012). However, the understanding of what is considered a resource in the co-creation process is contextual and varies from context to context (Caridà *et al.*, 2019; Castro *et al.*, 2021; Kleinaltenkamp *et al.*, 2012).

Coupled with this thinking, the RBV states that competitive advantage is based on the extent to which resources can be valuable, inimitable, rare and non-substitutable (Valeri, 2023). The KBV of the firm describes the strategic importance of a specific type of knowledge. Customers and their knowledge are increasingly being recognized as the most significant organizational assets (Ismail, 2023) and are key differentiating components in today's

Studies	Purpose	Sample	Findings
Ika and Pinto (2023)	To explore the criteria and dimensions for successful projects	Chapter	Project success is not only measured by triple constraints but is also related to efficiency, effectiveness, sustainability, complexity, time, uncertainty and stakeholder view
Valeri (2023)	To examine the study on knowledge management in small firms	686 articles	In knowledge management research for small businesses, there are five main themes
Gaetjens *et al.* (2023)	To examine the role of wine involvement and wine knowledge on customer engagement	220 survey respondents	this study advances our knowledge regarding the role of motivations, as well as of wine involvement and wine knowledge for customer engagement
Ismail (2023)	To investigate the mediating role of customer loyalty for customer and technology orientation	383 owner-managers. Tanzania	Customer and technology orientation both influence consumer loyalty. Furthermore, it was revealed that customer loyalty reduced the impact of customer and technology orientation on the success of SMEs
AbdelAziz *et al.* (2023)	To investigate the purpose of value co-creation through consumer participation during the COVID-19 epidemic	Literature review of popular press articles and managerial insights from interviews	Through the characteristics of affective and behavioral involvement by customers, customer engagement is a crucial mediator
Khan *et al.* (2023)	To investigate the impact of customer engagement and customer experience on customers quality/loyalty intention across mobile app-based services	420 customers	The findings show a greater positive relationship for customer engagement and customer experience
Lim *et al.* (2022)	To investigate past, present and future trends of customer engagements	Bibliometric and thematic analyses on 861 articles	Identifies important trends in article, author, nation and journal performance, as well as previous, present and future customer engagements research thematic trends
Japutra *et al.* (2022)	The stimulus, organism and response framework were used to investigate the drivers of customer engagement behavior with mobile commerce applications	Online survey of 717 users of m-commerce	Customers' perceptions of enjoyment and control lead to higher customer behavior
Hurtak *et al.* (2022)	To explore the darker side of customer participation	A survey of 105 managers	Relationship performance positively moderates the negative effect of customer participation on calculative commitment

(*continued*)

Table 1.
Literature review

Studies	Purpose	Sample	Findings
Tuan (2022)	Aims to validate an integrative theoretical model of customer participation	57 customers in e-services in Hochiminh City	Customer readiness and perceived value and satisfaction as outcomes of customer participation
Barari *et al.* (2021)	To provide a generalizable explanation of customer participation	Meta-analysis of 184 publications	Moderator analysis show the influence of the two pathways on customer engagement depends on industry type (service vs manufacturing), engagement context (online vs offline) and product type (hedonic vs utilitarian) and cultural context
Castro *et al.* (2021)	To define project success criteria regardless of the project's type or setting	264 Brazilian managers	A broad performance metric for project success was put forth, allowing for various projects to receive varying grades on the same scale
Chaithanapat and Rakthin (2021)	To study of customer knowledge management (CKM) in SMEs	97 articles	Discussed about the idea of CKM from a thorough literature analysis that is expected to have linkages with CKM in SMEs, specifically knowledge-oriented management, management trust and company performance
Wang *et al.* (2020a)	To explore how teachers' beliefs influence how teachers think about how students learn	Qualitative case study of 6 teachers	Three components were identified. Teaching goal, team size and collaboration
de Oliveira Santini *et al.* (2020)	To explore customer participation and customer satisfaction	Meta-analytic model of 97 studies	Findings reveal that customer engagement is driven by satisfaction, positive emotions and trust, but not by commitment
Nardi *et al.* (2020)	To investigate the connection between consumer involvement and brand performance	135 studies	The findings show that customers with a high inclination to trust participate at high rates. Customer involvement, on the other hand, can support brand outputs including brand loyalty, brand satisfaction and brand performance
Yun and Hanson (2020)	To investigate connection between reduced price sensitivity, client satisfaction and client loyalty	500 employees American	Service staff members have a greater beneficial impact on client satisfaction than client loyalty; satisfied client do not always turn into devoted client

Table 1. (*continued*)

Studies	Purpose	Sample	Findings
Auh *et al.* (2019)	To look into the advantages of customer participation (CP) for both clients and businesses	200 employees	The impact of CP on branch profitability is totally mediated by customer satisfaction and empowerment. When the circumstances in which CP is employed and participation are compatible, it increases customer empowerment and happiness
Bagheri *et al.* (2019)	To create a model that offers a structured range of customer knowledge exchange	52 articles	This reference model can be used by value network decision makers to come to a consensus regarding the problems with customer knowledge transfer
Raziq *et al.* (2018)	To look at how goal clarity affects the relationship between project success and leadership styles and	248 employees, Pakistan	The association between the style of transformational leadership and project success is somewhat mediated by goal clarity. The transactional leadership approach, on the other hand, is not linked to goal clarity, hence there is no mediation in this situation
Yun and Hanson (2020)	To investigate connection between reduced price sensitivity, client satisfaction and client loyalty	500 employees American	Service staff members have a greater beneficial impact on client satisfaction than client loyalty; satisfied client do not always turn into devoted client
Chavan *et al.* (2018)	To look into the development and underlying conceptual structure of published industrial-buying research	357 papers 1965–2015	The systematic modeling of scientific investigations depicts the evolution of the important factors in research activities
Yu (2017)	To investigate how and why consumer involvement might enhance project performance	245 software team members	The beneficial association between customer involvement and project performance is mediated by knowledge integration. Moreover, project complexity enhances the primary impact of customer involvement, while knowledge integration was found to have a secondary impact
Biyik (2017)	To analyze the substance of services marketing from an industry perspective	20 years studies	Researchers offer 20 interesting theoretical sub-categories that are pertinent to B2B marketers and compelling for academics

(*continued*)

Table 1.

Studies	Purpose	Sample	Findings
Khan and Hussainy (2017)	To define the consumer behavior parameters for value co-creation	397 students Karachi	As components of consumer co-creation behaviors, customer engaging behavior and customer citizenship attitude were considered
Dong and Sivakumar (2017)	To provide an inclusive typology that defines the domain, range, or limits of CP	Studies from 1970–2017	Develop a typology to divide CP into three groups: voluntary, mandatory and replaceable. They show how the conceptual and empirical clarity of CP research is enhanced by the proposed typology
Wang *et al.* (2020b)	To examine the potential challenges and down falls of customer participation	194 firms	Market novelty diminishes the contribution of CPI to conflict resolution and the beneficial impact of CPC on conflict; in contrast, technological novelty increases the impact of CPC on conflict
Chen and Deng (2022)	To create the DDERM data-driven software model for risk assessment	Analysis of software risks standards	The risk priority was determined using a risk matrix. An example case study illustrates how well the suggested approach works. The framework for risk modeling that has been suggested is a fresh method that offers a logical basis for evaluation
Asif and Ahmed (2014)	To investigate relationships, trends and some other data mining-related tasks	Document analysis	In this study effort, a novel notion of employing the FP-Tree algorithm to discover correlations between various risk mitigation elements has been put forth
da Luz Siqueira *et al.* (2017)	To explore different software project risks	Document analysis	Schemes are helpful in identifying, posing and analyzing requirement risks, providing suitable basis for requirement risk discussions
Gallati (2022)	To provide details about risk management	Chapter	Details of different types of risks and risk management
Krancher (2020)	To investigate the impact of specific agile methods on project success	60 developers	When requirements risk is high, interaction analyses reveal that some positive benefits are boosted, and negative impacts are tempered
Keil *et al.* (2013)	To explore different risks and controls	63 projects	The impacts of formal and informal constraints on performance are moderated by risk. Particularly, it was discovered that both user risk and requirement risk diminished the beneficial effects of controls on process efficiency

Table 1. (*continued*)

Studies	Purpose	Sample	Findings
Drljevic *et al.* (2020)	What weight does risk have in determining whether to embrace a block chain?	50 articles	Various risk management models are presented. Further investigation is needed in several areas, which are mentioned. The adoption and sustainable usage of block chain technology are impacted by normative frameworks
Maqsoom *et al.* (2020)	To look into the relationship between project performance and control modes	171 construction projects	It is discovered that complexity risk greatly modifies the association between project performance and control modes. The findings show that complexity risk modifies the link between outcome clan and control and project performance in a beneficial way
Ranjan and Read (2016)	To investigate the theoretical constraints and empirical elements of value co-creation	149 papers	There are three dimensions that have been identified. Each dimension has empirical measurement components
Taghizadeh *et al.* (2016)	Validation of scale measurements of dialogue, risk, access analysis, and transparency constructs as a value-co-creation process	249 managers	Transparency and risk assessment have a significant positive relationship with innovation strategy. These findings demonstrated the significance of value co-creation in developing a firm's innovation strategy
Baima *et al.* (2022)	To determine what factors motivate customers to share product and service knowledge on social media	358 customer Italy	Customer knowledge sharing is positively influenced by the frequency of online reviews, social bonds, subjective happiness and reciprocity
Menguc *et al.* (2013)	To investigate relationship between empowered leadership and the ability to create customer knowledge	92 employees, Turkey	The greater a sales team's ability to create customer knowledge, the better its customer experience and financial performance
He *et al.* (2019)	To identify pertinent consumer knowledge, such as that for customers, about customers and from customers on social media	385,614 tweets from Twitter	Writers can assist businesses in creating content for customers by using knowledge from and about customers
Alani (2019)	To create a framework to improve comprehension and explore the connection between strategy implementation and innovative products	150 employees	Strategic orientation's direct and indirect effects on innovative products are influenced by specific organizational and environmental circumstances as well as other competencies, such as managing customer information

(*continued*)

Table 1.

Studies	Purpose	Sample	Findings
Fidel *et al.* (2018)	To research how SMEs' ability for innovation is affected by customer orientation and customer knowledge management	210 Spanish SMEs	The mediating role of innovation orientation is supported by the findings. Customer orientation and CKM are important in fostering innovation and performance, according to empirical research
Kennedy (2017)	To suggest that prompting a consumer's co-creation with a brand will raise the consumer's value to the brand commitment and buy intention	Study 1: 137 consumers, USA; Study 2: 115 consumers	Brand loyalty and buying intent can both rise with co-creation posts from a company. Also, a branded message exhibits a rise in brand commitment and purchase intention compared to a celebrity-endorsed message
Dong and Sivakumar (2017)	To provide a typology that defines the scope, domain and limits of customer engagement	81 articles	A typology was put up to divide CP into three categories: replaceable, mandatory and voluntary
Gray and Meister (2006)	To put forth the hypothesis that different categories of information source techniques used by employees resulted in various performance outcomes	71 articles	Group knowledge sourcing supports a larger variety of performance goals, although different kinds of knowledge sourcing approaches are not as replaceable as the KM research might suggest
Abusa and Gibson (2013)	To ascertain the degree of TQM application in Libyan manufacturing enterprises	42 employees, Misrata	The six tested TQM components showed positive and strong connections with one another. Contextual elements, such as firm ISO 9000 accreditation and size, have an impact on how well TQM is implemented
Goyal *et al.* (2020)	To look into how partner and consumer knowledge affects innovation	655 firms	Companies that create more knowledge are more likely to innovate by filing new patents. Discovered organizational elements and explanations for the influence of outside knowledge on invention
Rauniar *et al.* (2019)	To investigate the main influences and connections between knowledge integration in the project team for product development	191 employees, USA	Performance and knowledge integration are positively correlated. The ties of knowledge integration and shared project mission are partially mediated by mutual trust
Nishikawa *et al.* (2013)	To investigate the user generated and designed generated products	Interviews, managers of Muji, Japan	Compared to designer-generated goods, user-generated goods had a higher likelihood of becoming profitable and lasting the three-year evaluation period

Table 1. (*continued*)

Studies	Purpose	Sample	Findings
Xie *et al.* (2020)	To investigate the impact on tourism service providers of access and customer knowledge for service teams	576 employees of travel agencies	Service teams' co-creation of customer knowledge, which can foster service innovation, is influenced by customer orientation and engagement intensity
Salunke *et al.* (2019)	To investigate how B2B service providers store and arrange their knowledge	Study 1: 192 Study 2: 261 Employees Australian and USA	In order to provide cutting-edge service solutions that address clients' needs, new knowledge obtained through internal and external resources alone is insufficient and must be combined with current knowledge
Akumba *et al.* (2020)	To explore project risks in requirement gathering phase	299 data instances	A model was created based on 4 Catastrophic, 11 High, 18 Moderate, 33 Low and 7 to be insignificant risk factors
Gupta and Chandani (2021)	To explore the requirement risks assessment	Chapter	A software risk estimator aids in the early detection of potential risks so that cooperative preventative and remedial measures may be taken to reduce risk and avoid project delays
Salunke *et al.* (2019)	To identify risks for supply chain digitalization	Chapter	Presented the methodology and choices adopted to identify and mange risks in an aeronautical supply chain case
Hassan (2019)	To find relevant information for risk management in supply chain	Machine learning to find risk in documents	A conceptual model was illustrated
Yeng *et al.* (2020)	To explore security requirement analysis for healthcare industry	Analysis of software security standards	It was discovered that conventional software creation approaches, such as the Waterfall Model, integrated security requirement capture activities more thoroughly than agile ones
Raziq *et al.* (2020)	To research the relationship between organizational structure, knowledge transfer and project effectiveness	220 employees of project-based firms in Pakistan	Project success is inversely correlated with centralization. Both public and private telecom firms use knowledge sharing to mediate the relationship between integration and project success, but only public firms can use knowledge sharing to mediate formalization

Source(s): Authors' own work

Table 1.

business arena (Baima *et al.*, 2022). As such businesses are wise to utilize customer knowledge to enhance value creation (Auh and Menguc, 2013; Menguc *et al.*, 2013). Firms are depending on customers and their knowledge to assist their competitive position and to gain a

competitive advantage (Ika and Pinto, 2023) over their competitors (He *et al.*, 2018). Thus, the RBV perspective here suggests that customers are valuable and strategically important resources. Similarly, customer knowledge is tacit because customer knowledge is related to a specific project or a service within the organization (Chaithanapat and Rakthin, 2021) and is thus difficult to imitate. Therefore, the KBV perspective here suggests that an organization can create a competitive advantage by aggregating, integrating and coordinating specialized customer knowledge (Alani, 2019; Fidel *et al.*, 2018; Zhan *et al.*, 2019).

2.2 Customer participation, organizational performance and the mediating effects of knowledge integration

Customers are the partial employees of firms (Ismail, 2023), drivers in a total quality setting (Auh *et al.*, 2019) and co-creators of firm values and norms (Ranjan and Read, 2016). Companies such as DHL, Adidas, Google, Procter and Gamble, Unilever and Volvo take a wide range of actions for customer-centric product development to improve their firm performance (Kennedy, 2017). Customer-centric product creation involve customers throughout the organizational process and results in customer satisfaction (Chaithanapat and Rakthin, 2021). When customers are satisfied with the firms' deliverables, organizations earn stability in the market. So, in order for businesses to obtain a competitive edge, they must be able to recognize the strategic value of outside resources like customers (Chaithanapat and Rakthin, 2021). Both the public and private sectors believe that their knowledge management system is critical to the success of their organizations and that current knowledge possessed by people and organizations is the most essential source of ideas (Al-Athari and Zairi, 2001). Furthermore, research has looked into organizational performance metrics through customer behaviors (Dong and Sivakumar, 2017; Nardi *et al.*, 2020; Raziq *et al.*, 2018). Therefore, we conclude that when customers are appropriately integrated in organizational processes, organizational performance is improved.

Customers participate during the project development life cycle to provide personalized requirements, solutions and knowledge for organizational processes (Dong and Sivakumar, 2017; Nardi *et al.*, 2020). The goal of any organization is to achieve superior performance by satisfying its customers, and this is only possible when projects are optimized to provide all potential benefits required by customers. As such customer participation helps the project team members to integrate knowledge about their requirements, functional and non-functional project features (Xie *et al.*, 2020).

The KBV suggests that specialized knowledge drives the firm's competitive advantages (Whinston and Geng, 2004). Organizations may employ knowledge sourcing for value creation (Gray and Meister, 2006), thus improving the organization's financial and operational performance.

Abusa and Gibson (2013), Auh *et al.* (2019), Cai (2009). For example, the United States Postal Service encouraged customers to provide ideas for mail and shipping services, with these new services becoming more successful and profitable than previous offerings (Blut *et al.*, 2020). Customer knowledge assists the innovation processes of organizations and improves organizational performance (Goyal *et al.*, 2020). Financial performance, innovation performance, knowledge flow, transfer efficacy and new product creation are all outcomes of knowledge transfer and innovation in multinational corporations (Leung *et al.*, 2004). Singh (2022) suggested that knowledge integration impacts emotional commitment and career satisfaction. Therefore, organizations try to incorporate diverse knowledge management approaches into their operations and gives light on the evolving nature of knowledge management in general (O'Dell *et al.*, 1999).

However, research focusing on the processes through which organizational performance is achieved is scarce. For example, organizational performance only improves when the

available customer resources are integrated with those retained within the organization (Caridà *et al.*, 2019; Kleinaltenkamp *et al.*, 2012). For example Plé (2016) demonstrate how value is co-created when customers and project members merge their resources in a dyadic service framework. In the case of knowledge as a resource, when customer information is appropriately integrated, project team members efficiently use it for project development and promote useful outcomes and performance. Customer knowledge integration is the underlying mechanism through which organizations can improve their performance (Ismail, 2023). Because customer knowledge is of no use if it is not properly integrated within the project development life cycle, knowledge integration ensure that appropriate knowledge is available at the appropriate moment and at the necessary locations, to the relevant people (Rauniar *et al.*, 2019). Kumar *et al.* (2023) suggested that organizational performance is improved when knowledge-based supply chain quality management practices are implemented. Research also supports knowledge integration as the underlying mechanism between customer participation and performance outcomes, for example, between shared project mission and performance outcomes (Rauniar *et al.*, 2019) and between customer participation and process performance (Yu, 2017). Therefore, we hypothesize that:

H1a. Knowledge integration mediates the positive relationship between customer participation and organizational performance.

H1b. There is a positive relationship between customer participation and organizational performance.

2.3 Customer participation, project success and the mediating effects of knowledge integration

Market and technological information shared by customers promotes effective project development by saving time and cost (Wang *et al.*, 2020b; Yu, 2017). Project performance of different industries was enhanced with customer participation (Nishikawa *et al.*, 2013). In the analysis phase, customers are involved to share their requirements. During the design phase, the project team designs solutions and gets feedback from customers. A project will only be successful when customers are satisfied with the solutions and all their feedback and suggestions are incorporated into the project. Thus, there is a positive link between customer participation and project outcomes.

Customer participation is supported to acquire external knowledge that can provide several advantages including contributing first-hand knowledge of requirements (Bogers *et al.*, 2010), more diverse ideas (Yoo *et al.*, 2010), achieving continual innovation, increasing new product acceptance and lowering innovation costs relative to internal R&D (Goyal *et al.*, 2020). Three types of customer knowledge are identified in the literature: knowledge derived from customers, knowledge about customers and knowledge aimed at customers (Sanayei and Sadidi, 2011; Wilde, 2011; Xie *et al.*, 2020). Knowledge aimed at customers is the information about a firm's services and products and it is transferred from a firm to its customer (Gibbert *et al.*, 2002; Valeri, 2023). Knowledge *about* customers refers to demographic information, motivations for purchasing, customer behavior and personal preferences (Smith and McKeen, 2005). Knowledge derived from customers is the customers' knowledge of services, products, markets and suppliers (Gebert *et al.*, 2003). Knowledge management for all three types of knowledge can provide customers with successful projects and services.

However, like organizational performance, customer knowledge only acts as a resource if it is integrated by the project team with their skill (Jaakkola and Alexander, 2014). In this case, customer knowledge integration is related to distributing and the advancement of customer

knowledge to generate new items and project improvement (Santoro *et al.*, 2018; Xie *et al.*, 2018). Customer knowledge alone is not sufficient but it should be integrated with the project team's knowledge to deliver clients' needs (Salunke *et al.*, 2019). Muji (a Japanese clothing company), stated that sales growth of products based on the customers' views and ideas was significantly better than those based on products of professional designers (Nishikawa *et al.*, 2013). As such we can suggest that a project's success will be optimized when proper knowledge integration is implemented throughout the project development life cycle. Similarly, customer satisfaction is eventually used to assess the quality of a project. Benchmarking customer happiness can assist decision makers in identifying areas for improvement, making strategic decisions and setting goals for desired project performance (Shen *et al.*, 2000).

In the project development lifecycle, customer knowledge integration is critical. Customers are involved not only in providing requirements and feedback, but also in guiding project members and providing alternate solutions in the event of problems, issues, or uncertainties. Concerning the triple constraints of the project (time, cost and quality), project members can manage development time by having timely discussions with the customer about different issues. Project costs can be controlled because team members can get a clear line of the path from customers, and they can utilize their resources by working on customer guidelines (Castro *et al.*, 2021). So, project members are free from the burden of rework as they tend to know exactly what to do and how to do it. Similarly, quality projects are developed because team members can share different project prototypes with the customers to get feedback. If customers are involved during the analysis, design, testing and deployment phases of the projects, the project development life cycle is improved (Rauniar *et al.*, 2019), the end product will be error-free and a quality project will be delivered to customers. Research also supports knowledge integration as the underlying mechanism between customer participation and performance outcomes (Rauniar *et al.*, 2019; Yu, 2017). Therefore, we hypothesize the following:

H2a. Knowledge integration mediates the positive relationship between customer participation and project success.

H2b. There is a positive relationship between customer participation and project success.

2.4 The moderating effects of requirement risk

According to a survey by the Standish Group of Companies, 16% of software projects meet schedule deadlines and cost estimates, 52.7% are delivered to customers with less functionality than expected and 31.1% are delivered damaged or uncompleted due to the inherent risks (Akumba *et al.*, 2020). Despite the use of project management practices, most of the projects remain unfulfilled in terms of achieving targeted performance due to ineffective management of risks (Maqsoom *et al.*, 2020). High risk leads to poor project performance in terms of schedule lags or budget overruns. Requirement risks are one of the major reasons for project conflicts (Chen and Deng, 2022; Keil *et al.*, 2013) and failure in any software development process (Gupta and Chandani, 2021). Because team members will be utilizing their resources (e.g. time, skills and cognitive resources) in resolving conflicts.

Risks may influence the internal and external contexts of the organizations. Knowledge integration is an important element of an internal organizational context (Matuszak-Flejszman and Paliwod, 2022). The project team members can integrate customer knowledge with their expertise and knowledge at any stage of project development. Similarly, requirement risk encompasses uncertainties that can also appear at any stage of the project development life cycle. This can cause disturbance in the planned activities of the team members and can influence the development phases as well. Requirements risks can emerge

from continuously changing, unclear, or ambiguous user requirements (Chen and Deng, 2022; Wallace and Keil, 2004). For example, the project team designs algorithms and prototypes for project requirements through mutual agreement of customers. If a new requirement is placed by the customers that required significant change, then the team must analyze what other parts of the projects will be affected due to new requirement change. Project team members have to again perform analysis, review algorithms and assess prototypes designed to incorporate the new requirement changes. In the existence of requirements risks, it will be impossible to follow any pre-defined process to achieve goals (Chen and Deng, 2022; Keil *et al.*, 2013). So, the presence of requirement risks influences knowledge integration. The extant literature has also identified the negative effect of risk on performance (Boubaker *et al.*, 2021; Hassan, 2019; Haynes, 2020; Yeng *et al.*, 2020). Therefore, we hypothesized that:

H3. Requirement risk moderates the positive relationship between customer participation and knowledge integration, such that the positive effects of customer participation on knowledge integration is stronger when the requirement risk is low.

3. Methodology

According to Saunders and Lewis (2019), research involves decisions at different levels, which they classify through an onion onto three decision levels: The first two outer rings are research philosophy and research approach. The third level is research design, which includes (1) methodological choices, (2) research strategy and (3) time horizon and (4) tactics, which include data collection and analysis aspects. Research philosophy of our study is based on a positivist paradigm, which suggests a single reality (ontology) and an objectivist (epistemology). Reality and researcher are independent from each other, and knowledge is acquired objectively. Research approach is based on deduction in which hypotheses are derived from existing theory, and data is collected, in order to test the hypothesis. The study is based on mono method quantitative research approach. Research strategy is designed as survey-based; questionnaires are used for data collection, and the time horizon is cross-sectional.

3.1 Study1: methods

3.1.1 Description. Study 1 investigates our theoretical model by testing hypotheses 1a, 1b, 2a and 2b. The research was done in multiple organizations and also contained measures of customer participation, project success, knowledge integration and organizational performance. An assessment of the overall relationship is provided by Study 1 between customer participation, project success and organizational performance as well as its boundary conditions. As indicated earlier, Study 1 was not conducted assuming a pandemic may arise in the coming years; however, we proceeded further in the year 2020 and sought to add some more sense for both Study 1 and Study 2 to better

Respond to the pandemic situation that emerged.

3.1.2 Data collections. Study 1 used a cross-sectional quantitative survey design with self-administered questionnaires. The target population consists of multi-national firms and software houses registered by the Ministry of Information Technology of Pakistan. We gathered information from the project team members with the help of electronic surveys using random sampling. Data is captured by Google Forms which are online tools for creating questionnaires. The link was shared with project managers, team leads and team members of organizations interested to participate in the research, by a wireless communication for example WebChat or email. Online procedure reduces expense and permits the respondent to

work on the questionnaire in more easy way. A total of 15 organizations were approached to participate in the study. We also monitor nonresponse bias. Nonresponse bias occurs when a surveyor does not complete the questionnaire because they are unable or unwilling to do so (Bischoff, 2020). Using various strategies, we reduced the nonresponse bias. We kept the survey brief and straightforward. We described the survey's goals, how long it would take to finish and what they should expect from the survey in the introduction. The survey informed respondents on how their feedback will improve organizational performance outcomes. We also issued modest nudges through email reminders to keep our survey on the respondents' mind.

3.1.3 Sample characteristics. We received 150 employee responses from different firms. Out of 150 responses, (47.5%) were male and (52.5%) were female. Most of the firms (71.3%) were service based providing IT services. The sample included 56.4% of firms with up to (50) employees, 15.8% of firms with (51–240) employees and 14.9% of firms above (500) employees.

3.1.4 Measures. Structured questionnaire was used for collecting data. The items of the variables were adapted from different sources and combined into a single questionnaire. Customer participation was operationalized using five items from (Yu, 2017) with a sample item as "customers have a high level of participation in the project.". Knowledge integration was measured using three item from (Yu, 2017) – a sample item as "project members integrate and synthesize their expertise at the project level". Project success was operationalized using a fourteen item from Butler *et al.* (2020). Organizational performance was measured using five items involving perceived firm performance relative to competitors in terms of profits, returns on investments, sales growth, building customer relationships and productivity. A seven-point Likert scale was used with options such as 1 = strongly disagree to 7 = strongly agree. Some theoretically relevant covariates were used to control for other relevant factors. These include gender, organization type, organization size and organization age.

3.1.5 Data analysis. Common method bias (CMB) refers to a systematic error or bias that arises in research studies due to the method used to collect data. It occurs when the measurement of variables is influenced by factors unrelated to the constructs being measured, leading to spurious relationships or inflated correlations between variables (Change *et al.*, 2010). There are various procedural remedies and statistical strategies available for reducing common method issues (MacKenzie and Podsakoff, 2012). For procedural remedies, we approached various project-based organizations from various industries such as IT, telecom and multinationals. We also use many informants to reduce CMB by gathering information from team leaders, project managers and team members (Fawcett *et al.*, 2014). We employed Harman's single factor score for statistical procedures, in which all items (measuring latent variables) are loaded into one common factor. The total variation for a single factor was 47.83% (less than 50%), indicating that CMB had no effect on data or findings.

We used partial least squares structural equation modeling (PLS-SEM) to examine the data. The analysis is performed in two phases. It starts by analyzing the structural model and then evaluates the measurement model. The structural model exposes the result of hypothesis testing, whereas the measurement model shows the validity of the construct. The structural model was tested using bootstrapping, and the measurement model was evaluated using the PLS algorithm (Hair *et al.*, 2019).

3.2 Study 2: methods

3.2.1 Description. Study 2 captures how knowledge integration from customers unfolded during the pandemic, and how this relationship is affected by the moderating impact of requirement risk. Hypotheses 3 is tested in Study 2. It includes measures of customer participation, knowledge integration and requirement risk. As with Study 1, we also tested

and measured for the direct and mediating effects of knowledge integration between customer participation and performance outcomes (project success and organization performance). Our second study examines customers with greater specificity-namely customer-knowledge integration relationship relative to Study 1 – and tested the moderating effect of requirement risk. By integrating these two studies we provide a comprehensive investigation of this phenomenon – specifically, its moderators, magnitude and its underlying mechanisms.

3.2.2 Data collection. Study 2 also used a cross-sectional quantitative survey design with self-administered questionnaires. Study 2 was conducted 2 years after Study 1, in 2020. It was the time of the COVID-19 pandemic and data were collected in April and May when strict lockdowns were implemented in the majority of countries including Pakistan. Like Study 1, electronic surveys were used.

3.2.3 Sample characteristics. A total of 25 organizations were approached to participate in the study. Respondents, however, turned out to be less receptive and we could get only 92 responses using simple random sampling. It was difficult to get survey responses from employees because they were not actively taking part due to their physical absence. Out of 92 responses, 75% were male and 25% were female.

3.2.4 Measures. Like Study 1 we used 7-point Likert scales with values ranging from 1 for Strongly Disagree and 7 for Strongly Agree. The same constructs of Customer Participation and Knowledge Integration were used as in Study 1. In Study 2, we focused on the Requirement Risk construct as a moderating mechanism between Customer Participation and Knowledge Integration. Requirement Risk was measured on a four-item scale adopted from (Keil *et al.*, 2013) – a sample item of the construct read as "continually changing scope and system requirements". The same control variables were used as in Study 1, including gender, organization type, organization size and organization life.

3.2.5 Data analysis. The PLS-SEM technique (Hair *et al.*, 2019), common method variance and non-response bias were employed for analysis in Study 2 just like Study 1.

4. Analysis

4.1 Study 1: analysis

Applying SEM, we first tested for the measurement model and tested for Cronbach's alpha (CA), composite reliability (CR), average variance extracted (AVE) and discriminant validity. Table 2 show that the data meets the SEM requirements showing CA and CR scores above 0.7 and AVE scores above 0.5 (Hair *et al.*, 2016). Testing for discriminant validity and following the Fornell and Larcker (1981) criterion, results (see Table 3) show AVE square root values greater than correlation coefficients, indicating good discriminant validity. Furthermore, data show a good convergent validity as all factor loadings of the constructs are above 0.7 (see Figure 1). The R Square Adjusted values for the endogenous variable Organizational Performance is 0.467, and for Project Success is 0.424.

Constructs	Cronbach's Alpha	Composite Reliability	AVE
Customer participation	0.855	0.894	0.627
Knowledge integration	0.815	0.890	0.730
Organizational performance	0.875	0.909	0.667
Project success	0.904	0.920	0.511

Source(s): Authors' own work

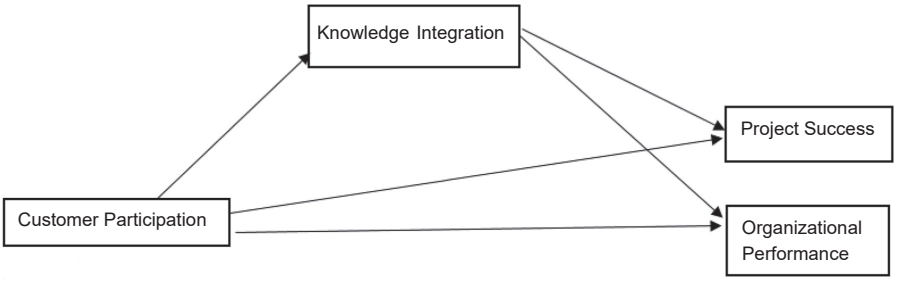
Table 2. Constructs' reliability and validity

We then test for direct and indirect effects and employ bootstrapping method (Preacher and Hayes, 2008). Results (Table 4) show that customer participation is positively associated with knowledge integration, and knowledge integration is positively associated with organizational performance and project success. Furthermore, knowledge integration partially (positively) mediates the relationship between customer participation and organizational performance, hence, confirming hypotheses 1a and 1b. Likewise, knowledge integration partially (positively) mediates the relationship between customer participation and project success, hence confirming hypotheses 2a and 2b. We discuss these results as follows.

Constructs		1	2	3	4
1	Customer Participation	*0.792*			
2	Knowledge Integration	0.284	*0.855*		
3	Organizational Performance	0.367	0.663	*0.817*	
4	Project Success	0.388	0.618	0.651	*0.715*

Note(s): *AVE square root values on the diagonal (in italic)
Source(s): Authors' own work

Table 3.
Inter-correlations and discriminant validity



Source(s): Authors' own work

Figure 1.
Customer participation, knowledge integration, organizational performance and project success

Hypotheses		Path coefficients	T-stats	*P*	Result
	Customer Participation → Knowledge Integration	0.284	3.157	0.002	
	Knowledge Integration → Organizational Performance	0.608	9.514	0.000	
	Knowledge Integration → Project Success	0.553	7.849	0.000	
Hyp 1a	Customer Participation → Knowledge Integration → Organizational Performance	0.172	2.918	0.004	Supported
Hyp 1b	Customer Participation → Organizational Performance	0.195	2.515	0.012	Supported
Hyp 2a	Customer Participation → Knowledge Integration → Project Success	0.157	2.943	0.003	Supported
Hyp 2b	Customer Participation → Project Success	0.231	2.735	0.006	Supported

Source(s): Authors' own work

Table 4.
Structural model

4.2 Study 1: discussion

This study integrates theories from the co-creation literature (Prahalad and Ramaswamy, 2004; Ramaswamy and Gouillart, 2010; Ramaswamy and Ozcan, 2018), RBV (Barney, 1991) and KBV (Carter *et al.*, 1951) of the firm. According to resource based view, the customer is the major source of information for projects, providing a variety of practical information to improve performance (Yu, 2017). Although previous authors have investigated the relationship between customer participation and information sharing, high coordination effectiveness (Fang *et al.*, 2008), product performance, process performance (Yu, 2017) and service quality (Ngo and O'cass, 2013). Existing research suggest that customer participation improves performance outcomes (Chan *et al.*, 2010) and provide a competitive advantage to the organization (Raziq *et al.*, 2020). But it is unclear how customer participation improves performance outcomes and what are the underlying mechanisms through which an organization can get a strategic advantage from customers is missing from the literature.

Chang and Taylor (2016) made the claim that knowledge-related processes lead customer participation toward performance outcomes, however their findings were conflicting. There have been few empirical studies that indicate how customer participation increases performance. Yu (2017), for example, investigated the mediating effect of knowledge integration for process and product performance in new product development. Our study empirically evaluated Chang and Taylor's (2016) conceptual model, employing knowledge integration as a black box that leads to project success and organizational performance through customer participation.

The findings of Study 1 confirmed our hypothesis that customer participation contributes to project success and organizational performance. Despite its contributions, Study 1 has some limitations. This study explains the positive relationships between customer participation, project success and organization performance. But it does not investigate the circumstances under which these relationships would be stronger or weaker. Secondly, Study 1 was conducted with the IT sector only.

Given these constraints, we designed Study 2 to address the shortcomings of Study 1 while also expanding our theoretical understanding of the relationship between customer participation and knowledge integration. The link between customer participation and performance outcomes is already tested in Study 1, so Study 2 only examines the link between customer participation and knowledge integration (hypothesis 3). In Study 2, we collected data from the IT, telecom and services sectors.

4.3 Study 2: analysis

Following the same procedures and tests, measurement model results (Table 5) for Study 2 show scores for CA and CR above 0.7 and AVE scores above 0.5, hence showing a good measurement model (Hair *et al.*, 2016). Similarly, testing for discriminant validity and following the Fornell and Larcker (1981) criterion, results (see Table 6) show good discriminant validity as the AVE square root values are higher than the correlation coefficient values between the latent variables. Furthermore, data show a good convergent

Constructs	Cronbach's alpha	Composite reliability	AVE
Customer Participation	0.893	0.921	0.700
Knowledge Integration	0.901	0.938	0.834
Requirement Risk	0.868	0.909	0.715

Source(s): Authors' own work

Table 5. Constructs' validity and reliability

validity as all factor loadings of the constructs are above 0.7 (see Figure 2). The adjusted R Square value for the endogenous variable Project Success is 0.544.

Employing the bootstrapping method (Preacher and Hayes, 2008), results (Table 7) show that customer participation is positively linked with knowledge integration, as was the case in Study 1. Requirement risk negatively moderates the positive relationships between customer participation and knowledge integration, showing that customer participation would lead to knowledge integration mostly for cases where project requirement risk is low. This confirms our hypothesis 3. This moderating effect is presented in Figure 3. We discuss these results as follows.

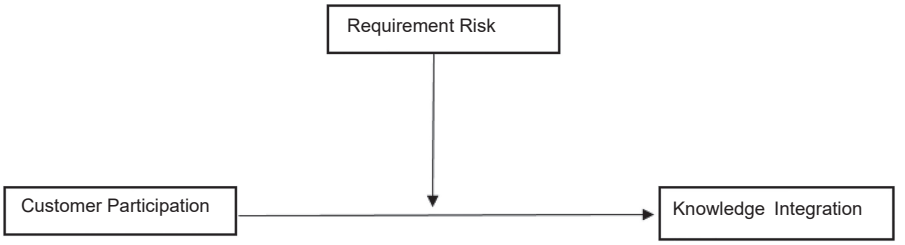
4.4 Study 2: Discussion

This study aims to enhance our understanding of the role of customers and requirement risks play in knowledge integration process by integrating theory from a firm's Knowledge Based View (Carter *et al.*, 1951) with risk literature. Our findings are aligned with the previous research that recognized knowledge as a critical intangible resource that might provide a competitive advantage to an organization (Kogut and Zander, 1992; Nickerson and Zenger, 2004). Considering knowledge integration as a possible predictor of competitive advantage (Collins and Smith, 2006; Menguc *et al.*, 2013), it can be concluded that under some contingencies, such as high project risk, project team members may be unable to integrate the necessary customer knowledge. This study analyses the impact of requirement risks as a

Constructs		1	2	3
1	Customer Participation	*0.836*		
2	Knowledge Integration	0.627	*0.913*	
3	Requirement Risk	0.504	0.587	*0.846*

Note(s): *AVE square root values on the diagonal (in italic)
Source(s): Authors' own work

Table 6.
Inter-correlations and discriminant validity



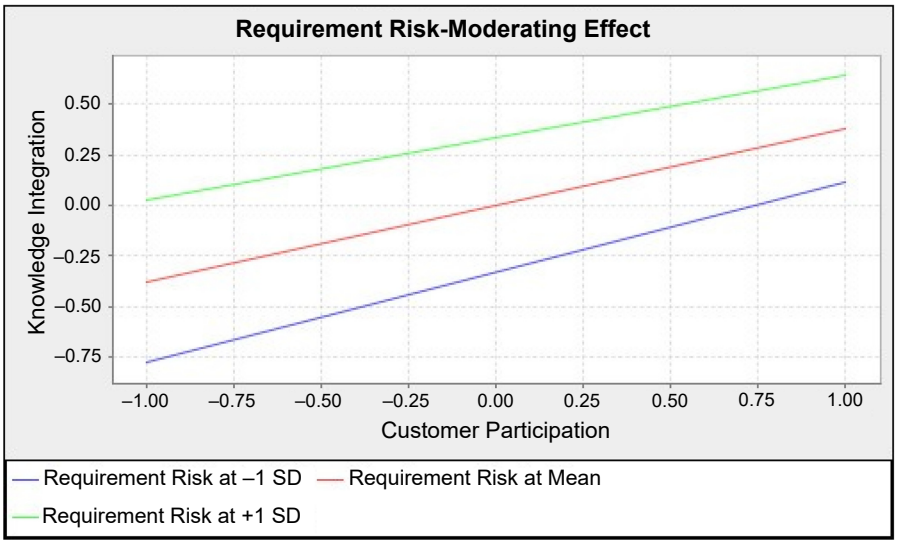
Source(s): Authors' own work

Figure 2.
Customer participation, requirement risk and knowledge integration

Hypotheses		Path coefficients	T-stats	*P*	Result
	Customer Participation → Knowledge Integration	0.375	4.152	0.000	
Hyp 3	Customer Participation * Requirement risk → Knowledge Integration	−0.070	2.445	0.015	Supported

Source(s): Authors' own work

Table 7.
Structural model



Source(s): Authors' own work

Figure 3.
Moderating role of requirement risk for customer participation and knowledge integration relationship

variable that can positively and negatively affect the knowledge integration process. There have been few empirical investigations of these variables, and those that have been undertaken have provided a fragmented picture of whether knowledge integration processes are stronger or weaker (Auh *et al.*, 2019; Wang *et al.*, 2020b).

We extended previous findings by formally testing and supporting requirement risk as a moderator between customer participation-knowledge integration. In particular, the relationship between customer participation –knowledge integration is stronger when requirement risk is low because risk creates uncertainty and ambiguity. So, the team members will try to cope with the risks involved in the requirements and they will utilize their resources to handle the ambiguities and uncertainties. This makes it evident that environmental conditions (e.g. COVID-19) also influence internal organizational processes.

5. General discussion

This work integrates theory from co-creation literature (Prahalad and Ramaswamy, 2004; Ramaswamy and Gouillart, 2010; Ramaswamy and Ozcan, 2018), RBV (Barney, 1991), KBV (Carter *et al.*, 1951) and project risk literature (Arnuphaptrairong, 2011; Keil *et al.*, 1998; Mentis, 2015) to understand the roles that customers, and knowledge integration process play in project success and organizational performance. Similarly, to understand the impact of requirement risks in the knowledge integration process, previous studies have noted that customer participation is associated with information sharing (Fang *et al.*, 2008), service quality (Ngo and O'cass, 2013), brand outcomes (Nardi *et al.*, 2020), new product development process (Auh *et al.*, 2019; Wang *et al.*, 2020b), customer satisfaction with sales performance (Eisingerich *et al.*, 2014) and high coordination efficiency (Fang *et al.*, 2008). Our study makes the following contributions.

First, we noticed that the literature on project environments has primarily focused on team or project-level characteristics, whereas we investigated organizational-level factors. The previous literature on customer participation has focused mostly on meso-level outcomes,

such as product performance-related outcomes. However, our analysis of the literature revealed a scarcity of empirical research that studied the outcomes at the macro-level (Auh *et al.*, 2019). Second, customer participation helps the organization in delivering a successful project to its customer. Delivering successful projects results in profit and customer satisfaction, which improves the organization's performance. As a result, our Study 1 contributes to the body of knowledge on consumer participation-based economic benefits for organizational performance.

Third, Study 1 also adds to the body of knowledge on customer co-creation (Ramaswamy and Ozcan, 2018) by empirically testing the relationship between customer participation, project success and organization performance. Fourth, outcomes such as organizational performance are frequently and commonly researched in the context of permanent organizations (Raziq *et al.*, 2018). We looked into organizational performance in project-based organizations in the IT and telecommunications industries. Our research also provides empirical evidence about knowledge integration as a "black box" by examining it as an underlying mechanism that link customer participation to project and organizational outcomes (Yu, 2017). Drawing on the resource integration concept in the co-creation literature, we provide evidence in relation to how customer knowledge through customer participation results in organizational performance value creation (Kleinaltenkamp *et al.*, 2012; Laud *et al.*, 2015).

In addition, existing work has taken moderators like project complexity (Yu, 2017), customer expertise (Eisingerich *et al.*, 2014), development feedback (Auh *et al.*, 2019) and market and technology newness (Wang *et al.*, 2020b) for the knowledge integration process. Literature does not shed light on risks that can influence the knowledge integration processes. As a result, we looked at how requirement risks might act as a moderator between customer involvement and knowledge integration in our study. The findings in Study 2 indicate that customer knowledge integration is stronger when requirement risk is lower but becomes weaker when a requirement risk is higher. This understanding also provides support for the notion that resource integration within various service contexts is an embedded task (Caridà *et al.*, 2019).

Additionally, Study 2 empirically answered the question "what is the impact of COVID-19 on software projects". Although the COVID-19 crisis has had a global impact, the impacts of this pandemic on customers' participation and performance outcomes have not received sufficient attention. We found, in this context, that the direct effects of customer participation on knowledge integration were positive and significant before and during the corona pandemic. However, we also noted that requirement risk negatively moderated the direct relationship between customer participation and knowledge integration. These empirical findings before and after the pandemic are justifiable. We selected the IT and telecom sectors for Study 2 and these firms were switched to work from home mode. These firms have strong technologies and IT systems that support their employees to work from remote locations like virtual networks, cloud computing and different project management and meeting software. So, they can easily complete their project tasks from remote locations. Similarly, customers can be easily involved in the project development phases for knowledge integration.

The linkages between customer participation, project success and between customer participation and organization performance were examined more broadly and comprehensively in our Study 1. It also examined the connections between cumulative knowledge integration experiences and performance outcomes. Study 2 took a "magnifying glass" to the customer participation – knowledge integration relationship and looked at how it unfolded during the pandemic as moderated by requirement risk. Our understanding of customer participation is made more sophisticated and richer by the combination of these studies' distinctive advantages.

6. Contributions to theory

Singh (2022) suggested that knowledge integration impacts emotional commitment and career satisfaction. We draw on the RBV (Barney, 1991), KBV (Carter *et al.*, 1951) and the risk management literature for project-based organizations. We went above and beyond what each of these literature studies could provide on their own by demonstrating how knowledge integration and risk management are essential for project-based organizations to achieve their strategic goals. Our study makes a substantial contribution to the body of knowledge in the management literature about the RBV and KBV of enterprises. A thorough overview of the effects of customer participation on organizational outcomes is provided by our research.

In Study 1, knowledge integration was empirically investigated as a mechanism to explain how this crucial resource—the customer—contributes to the success of projects and organizational performance. Based on the co-creation literature (Kleinaltenkamp *et al.*, 2012), it is recognized that customers are significant external, tangible resources and a key source of project success and organizational performance (Tomer, 1987). Additionally, it is widely acknowledged that knowledge is a crucial intangible resource that can give a business a competitive advantage (Kogut and Zander, 1992; Nickerson and Zenger, 2004).

Our findings are aligned with the firm's RBV, which suggests that customers provide an organization with a competitive advantage. It also supports the firm's KBV, implying that knowledge can provide a competitive advantage. The important findings that contribute to the resource-based and knowledge-based views of firms are the mechanism through which these organizational benefits are achieved. We contribute to both of these views of the firm by identifying knowledge integration as a mechanism through which such competitive advantages are achieved (Singh, 2022). Similarly, our findings also contribute to the co-creation literature, emphasizing that customer and knowledge both create values for organizations thus improving the organization's financial and operational performance (Abusa and Gibson, 2013; Auh *et al.*, 2019; Cai, 2009).

Study 2 extends the literature on requirement risk in a project environment. The boundary criteria that determine when customer knowledge integration is more successful are expanded by requirement risks. From a risk management standpoint, we hypothesized and discovered that there were more pronounced effects in terms of the overall and direct positive benefits of customer participation on knowledge integration when requirement risk was high. The findings for low requirement risk indicate that project teams working with simple client requirements do not experience the same effects of requirement risk as a result of customer participation.

These findings contributes to project management literature because project literature has always viewed project risks as a constant, despite the likelihood that project risks will vary according to the context (Luciano *et al.*, 2018). Our findings show that requirement risks need to be given more attention in theoretical and empirical models of project-based organizations because they moderate the effects of customer participation on knowledge integration. By offering a more comprehensive, holistic view of the factors affecting the knowledge integration process, Study 2 investigation of requirement risk as a moderator expands the literature on knowledge management.

Our findings also contribute to the firm's KBV, implying that requirement risk as a contingency factor that can affect the knowledge integration process. Our study also makes contextual contribution by investigating the relationship between customer participation and performance outcomes for project-based organizations.

7. Contributions to practice and policy

Rewarding and encouraging customer participation is more under the power of organization management; the practical implementations of our research are potentially valuable to

management. To encourage and support customer participation, project managers should explicitly develop and implement rules and regulations. Firms should restructure their policies to encourage a culture of customer participation among project team members.

The analysis stage of a project's life cycle is critical since it allows for an analysis of end-user requirements as well as the conversion of project objectives into the stated functional requirements. During this stage, the team leader must ensure that customers correctly communicate their requirements and that necessary knowledge is shared with team members. In circumstances of significant requirement risks, a proper two-way communication channel at the project level should be built so that both customers and team members can use their resources to deal with the requirement risks. Project managers must put in place practices and procedures that limit requirements risks. If project team members are exposed to such risks suitable measures should be taken to mitigate their effects.

During the problem-solving phase, all parties (customers and team members) should foster an environment of mutual understanding in order to establish an agreement. Team leaders should endeavor to overcome conflicts since disagreements prevent both parties from adequately sharing knowledge. Our study gives managers the assurance they need to employ customer participation to boost departmental and organizational performance. And similarly, knowledge integration in all phases of project life cycle should be implemented by managers as a strategic focus for financial performance.

8. Limitations of the study and future research directions

Despite their strengths, our studies have limitations that future research could address. Data were acquired from the IT and telecom sectors; hence, future research may collect data from other industries so that the findings can be generalized to other industries. Our research only looks at knowledge integration as a mediating process. Other mediators, such as technology learning and learning behaviors, may be considered in future studies (Yu, 2017). Our study takes requirement risk as a moderator, but future studies may consider other types of risks involved in the projects like user risk. Our study focuses only on requirement risk, and the effects of multiple coexisting risks are not considered. Individual requirement risk in a project maintains the simplicity of our conceptual framework. Future studies could explore the influence of multiple parallel risks.

This study only looks at the positive aspects of customer participation and ignores the negative aspects of customer participation. Customer participation, according to (Blut *et al.*, 2020), can result in role stress, which includes role overload, role ambiguity and role conflict. As a result, future research may empirically test this viewpoint for knowledge integration and project success.

Our study does not focus on the specific phase for knowledge integration and risks. Thus, future studies could also investigate knowledge integration process and the effects of different risks at different project development life cycle, i.e. analysis, design, implementation and testing etc. Lastly, future studies may also focus on qualitative methods for gaining an in-depth understanding for the phenomena of customer participation and knowledge integration.

9. Conclusion

This study is a crucial step towards better understanding customer participation and knowledge integration. According to the findings of Study 1, integrating customer knowledge has a significant impact on organizational performance and project success in project-based organizations. The notion that customer participation is always better for the

organizational processes does not generalize when the customers become the source of external risks. Study 2 confirmed that external risks in the form of requirement risks restrict customer knowledge integration during the project development life cycle. Such unforeseeable circumstances shift project team members' focus away from knowledge integration and onto requirement risk management. Our Study 2 further demonstrates that the environmental constraint such as the COVID-19 epidemic has no effect on the process of knowledge integration when proper management practices are followed. To improve the knowledge integration process form customers, organizations must create a culture in which requirement risks and environmental contingencies are managed.

Note

1. Here it is important to acknowledge that Study 1 was not conducted assuming a pandemic may arise in the coming years; however, issues relevant to this situation were included in the latter Study 2.

References

AbdelAziz, K., Md Saad, N.H. and Thurasamy, R. (2023), "Analysing the factors influencing customer engagement and value co-creation during COVID-19 pandemic: the case of online modest fashion SMEs in Egypt", *Journal of Islamic Marketing*, Vol. 14 No. 1, pp. 146-173.

Abusa, F.M. and Gibson, P. (2013), "TQM implementation in developing countries: a case study of the Libyan industrial sector", *Benchmarking: An International Journal*, Vol. 20 No. 5, pp. 693-711.

Akumba, B.O., Otor, S.U., Agaji, I. and Akumba, B.T. (2020), "A predictive risk model for software projects' requirement gathering phase", *International Journal of Innovative Science and Research Technology*, Vol. 5 No. 6, pp. 231-236.

Alani, E. (2019), "A model of the relationship between strategic orientation and product innovation under the mediating effect of customer knowledge management", *Journal of International Studies*, Vol. 12 No. 3, pp. 232-242.

Al-Athari, A. and Zairi, M. (2001), "Building benchmarking competence through knowledge management capability-An empirical study of the Kuwaiti context", *Benchmarking: An International Journal*, Vol. 8 No. 1, pp. 70-80.

Arnaut, B.M., Ferrari, D.B. and Souza, M. L.D.O. (2016), "A requirements engineering and management process in concept phase of complex systems", *Paper Presented at the 2016 IEEE International Symposium on Systems Engineering (ISSE)*.

Arnuphaptrairong, T. (2011), "Top ten lists of software project risks: evidence from the literature survey", *Paper Presented at the Proceedings of the International MultiConference of Engineers and Computer Scientists*.

Asif, M. and Ahmed, J. (2014), "Mining frequent patterns in software risk mitigation factors: frequent pattern-tree algorithm tracing", *Paper Presented at the International Conference on Machine Learning and Data Analysis (ICMLDA), World Congress on Engineering and Computer Science (WCECS)*, San Francisco.

Auh, S. and Menguc, B. (2013), "Knowledge sharing behaviors of industrial salespeople: an integration of economic, social psychological, and sociological perspectives", *European Journal of Marketing*, Vol. 47 No. 8, pp. 1333-1355.

Auh, S., Menguc, B., Katsikeas, C.S. and Jung, Y.S. (2019), "When does customer participation matter? An empirical investigation of the role of customer empowerment in the customer participation–performance link", *Journal of Marketing Research*, Vol. 56 No. 6, pp. 1012-1033.

Bagheri, S., Kusters, R.J. and Trienekens, J.J. (2019), "Customer knowledge transfer challenges in a co-creation value network: toward a reference model", *International Journal of Information Management*, Vol. 47, pp. 198-214.

Baima, G., Santoro, G., Pellicelli, A.C. and Mitręga, M. (2022), "Testing the antecedents of customer knowledge sharing on social media: a quantitative analysis on Italian consumers", *International Marketing Review*.

Barari, M., Ross, M., Thaichon, S. and Surachartkumtonkun, J. (2021), "A meta-analysis of customer engagement behaviour", *International Journal of Consumer Studies*, Vol. 45 No. 4, pp. 457-477.

Barney, J. (1991), "Firm resources and sustained competitive advantage", *Journal of Management*, Vol. 17 No. 1, pp. 99-120.

Becker, J.U., Greve, G. and Albers, S. (2009), "The impact of technological and organizational implementation of CRM on customer acquisition, maintenance, and retention", *International Journal of Research in Marketing*, Vol. 26 No. 3, pp. 207-215.

Bischoff, A. (2020), "Creating surveys", available at: https://delighted.com/blog/how-to-reduce-nonresponse-bias

Biyik, C.A. (2017), "Services marketing within business-to-business context: a content analysis of 1996-2014 period", *Eurasian Journal of Business and Management*, Vol. 5 No. 2, pp. 49-59.

Blut, M., Heirati, N. and Schoefer, K. (2020), "The dark side of customer participation: when customer participation in service co-development leads to role stress", *Journal of Service Research*, Vol. 23 No. 2, pp. 156-173.

Bogers, M., Afuah, A. and Bastian, B. (2010), "Users as innovators: a review, critique, and future research directions", *Journal of Management*, Vol. 36 No. 4, pp. 857-875.

Boubaker, S., Dumondelle, S. and Dolatineghabadi, P. (2021), "An approach to assess risks related to information system in supply chain", *Paper Presented at the IFIP International Conference on Advances in Production Management Systems*.

Butler, C.W., Vijayasarathy, L.R. and Roberts, N. (2020), "Managing software development projects for success: aligning plan-and agility-based approaches to project complexity and project dynamism", *Project Management Journal*, Vol. 51 No. 3, pp. 262-277.

Cai, S. (2009), "The importance of customer focus for organizational performance: a study of Chinese companies", *International Journal of Quality and Reliability Management*, Vol. 26 No. 4, pp. 369-379.

Caridà, A., Edvardsson, B. and Colurcio, M. (2019), "Conceptualizing resource integration as an embedded process: matching, resourcing and valuing", *Marketing Theory*, Vol. 19 No. 1, pp. 65-84.

Carter, L., Haythorn, W., Shriver, B. and Lanzetta, J. (1951), "The behavior of leaders and other group members", *The Journal of Abnormal and Social Psychology*, Vol. 46 No. 4, 589.

Castro, M.S., Bahli, B., Barcaui, A. and Figueiredo, R. (2021), "Does one project success measure fit all? An empirical investigation of Brazilian projects", *International Journal of Managing Projects in Business*, Vol. 14 No. 3, pp. 788-805.

Chaithanapat, P. and Rakthin, S. (2021), "Customer knowledge management in SMEs: review and research agenda", *Knowledge and Process Management*, Vol. 28 No. 1, pp. 71-89.

Chan, K.W., Yim, C.K. and Lam, S.S. (2010), "Is customer participation in value creation a double-edged sword? Evidence from professional financial services across cultures", *Journal of Marketing*, Vol. 74 No. 3, pp. 48-64.

Chang, W. and Taylor, S.A. (2016), "The effectiveness of customer participation in new product development: a meta-analysis", *Journal of Marketing*, Vol. 80 No. 1, pp. 47-64.

Change, S., Witteloostuijn, A. and Eden, L. (2010), "From the editors: common method variance in international research", *Journal of International Business Studies*, Vol. 41 No. 2, pp. 178-184.

Chavan, G.D., Chaudhuri, R. and Johnston, W.J. (2018), "Industrial-buying research 1965-2015: review and analysis", *Journal of Business and Industrial Marketing*, Vol. 34 No. 1, pp. 205-229.

Chavan, G.D., Chaudhuri, R. and Johnston, W.J. (2019), "Industrial-buying research 1965-2015: review and analysis", *Journal of Business and Industrial Marketing*, Vol. 34 No. 1, pp. 205-229.

Chen, X. and Deng, Y. (2022), "An evidential software risk evaluation model", *Mathematics*, Vol. 10 No. 13, 2325.

Collins, C.J. and Smith, K.G. (2006), "Knowledge exchange and combination: the role of human resource practices in the performance of high-technology firms", *Academy of Management Journal*, Vol. 49 No. 3, pp. 544-560.

Cortez, R.M. and Johnston, W.J. (2017), "The future of B2B marketing theory: a historical and prospective analysis", *Industrial Marketing Management*, Vol. 66, pp. 90-102.

da Luz Siqueira, D., Fontoura, L.M., Bordini, R.H. and Silva, L.A. (2017), "Argumentation schemes for collaborative debate of requirement risks in software projects", *International Journal of Software Engineering and Knowledge Engineering*, Vol. 27 No. 10, pp. 1613-1635.

de Oliveira Santini, F., Ladeira, W.J., Pinto, D.C., Herter, M.M., Sampaio, C.H. and Babin, B.J. (2020), "Customer engagement in social media: a framework and meta-analysis", *Journal of the Academy of Marketing Science*, Vol. 48, pp. 1211-1228.

Dong, B. and Sivakumar, K. (2017), "Customer participation in services: domain, scope, and boundaries", *Journal of the Academy of Marketing Science*, Vol. 45 No. 6, pp. 944-965.

Drljevic, N., Aranda, D.A. and Stantchev, V. (2020), "Perspectives on risks and standards that affect the requirements engineering of blockchain technology", *Computer Standards and Interfaces*, Vol. 69, 103409.

Edition, P.S. (2018), *A Guide to the Project Management Body of Knowledge*, Project Management Institute, Pensylvania.

Eisingerich, A.B., Auh, S. and Merlo, O. (2014), "Acta non verba? The role of customer participation and word of mouth in the relationship between service firms' customer satisfaction and sales performance", *Journal of Service Research*, Vol. 17 No. 1, pp. 40-53.

Evans, J.R. (1996), "Leading practices for achieving quality and high performance", *Benchmarking for Quality Management and Technology*, Vol. 3 No. 4, pp. 43-58.

Fang, E., Palmatier, R.W. and Evans, K.R. (2008), "Influence of customer participation on creating and sharing of new product value", *Journal of the Academy of Marketing Science*, Vol. 36 No. 3, pp. 322-336.

Fawcett, S.E., Waller, M.A., Miller, J.W., Schwieterman, M.A., Hazen, B.T. and Overstreet, R.E. (2014), *A Trail Guide to Publishing Success: Tips on Writing Influential Conceptual, Qualitative, and Survey Research*, Wiley Online Library, Vol. 35, pp. 1-16.

Fidel, P., Schlesinger, W. and Emilo, E. (2018), "Effects of customer knowledge management and customer orientation on innovation capacity and marketing results in SMES: the mediating role of innovation orientation", *International Journal of Innovation Management*, Vol. 22 No. 07, 1850055.

Fornell, C. and Larcker, D.F. (1981), "Evaluating structural equation models with unobservable variables and measurement error", *Journal of Marketing Research*, Vol. 18 No. 1, pp. 39-50.

Gaetjens, A., Corsi, A.M. and Plewa, C. (2023), "Customer engagement in domestic wine tourism: the role of motivations", *Journal of Destination Marketing and Management*, Vol. 27, 100761.

Gallati, R.R. (2022), *Risk Management and Capital Adequacy*, McGraw-Hill.

Gebert, H., Geib, M., Kolbe, L. and Brenner, W. (2003), "Knowledge-enabled customer relationship management: integrating customer relationship management and knowledge management concepts", *Journal of Knowledge Management*, Vol. 7 No. 5, pp. 107-123.

Ghazali, N., Fauzi, S., Gining, R.J., Sobri, W. and Suali, A. (2020), "Visualizing software risks in software engineering projects using risk sensitivity analysis approach", *Paper Presented at the Journal of Physics: Conference Series*.

Gibbert, M., Leibold, M. and Probst, G. (2002), "Five styles of customer knowledge management, and how smart companies use them to create value", *European Management Journal*, Vol. 20 No. 5, pp. 459-469.

Goyal, S., Ahuja, M. and Kankanhalli, A. (2020), "Does the source of external knowledge matter? Examining the role of customer co-creation and partner sourcing in knowledge creation and innovation", *Information and Management*, Vol. 57 No. 6, 103325.

Gray, P.H. and Meister, D.B. (2006), "Knowledge sourcing methods", *Information and Management*, Vol. 43 No. 2, pp. 142-156.

Gupta, C. and Chandani, P. (2021), *SERIES: A Software Risk Estimator Tool Support for Requirement Risk Assessment Advancements in Model-Driven Architecture in Software Engineering*, IGI Global, Hershey, Pennsylvania, pp. 238-252.

Hair, J.F., Jr., Hult, G.T.M., Ringle, C. and Sarstedt, M. (2016), *A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM)*, Sage Publications, Newcastle upon Tyne.

Hair, J.F., Risher, J.J., Sarstedt, M. and Ringle, C.M. (2019), "When to use and how to report the results of PLS-SEM", *European Business Review*, Vol. 31 No. 1, pp. 2-24.

Hassan, A.P. (2019), "Enhancing supply chain risk management by applying machine learning to identify risks", *Paper Presented at the International Conference on Business Information Systems*.

Haynes, L. (2020), *The Proposal's Forgotten Effect on Project Risk and Performance*, The University of North Carolina, Charlotte, North Carolina.

He, W., Zhang, W., Tian, X., Tao, R. and Akula, V. (2018), "Identifying customer knowledge on social media through data analytics", *Journal of Enterprise Information Management*, Vol. 32 No. 1, pp. 152-169.

He, W., Zhang, W., Tian, X., Tao, R. and Akula, V. (2019), "Identifying customer knowledge on social media through data analytics", *Journal of Enterprise Information Management*, Vol. 32 No. 1, pp. 152-169.

Heredia Rojas, B., Liu, L. and Lu, D. (2018), "Moderated effect of value co-creation on project performance", *International Journal of Managing Projects in Business*, Vol. 11 No. 4, pp. 854-872.

Hock-Doepgen, M., Clauss, T., Kraus, S. and Cheng, C.-F. (2021), "Knowledge management capabilities and organizational risk-taking for business model innovation in SMEs", *Journal of Business Research*, Vol. 130, pp. 683-697.

Hurtak, S., Kashyap, V. and Ehret, M. (2022), "Lightning the dark side of customer participation–The mitigating role of relationship performance in business-to-business project contexts", *Journal of Business Research*, Vol. 140, pp. 220-231.

Ika, L.A. and Pinto, J.K. (2023), "29. Nothing succeeds like success, but what is it anyway? Reconceptualizing project success", in *Research Handbook on Complex Project Organizing*, 293.

Ikram, N., Usman, M., Samad, J. and Basit, A. (2010), *Managing Requirements Risks: A Value-Based Process Advances in Risk Management*, IntechOpen, London.

Ismail, I.J. (2023), "Speaking to the hearts of the customers! The mediating effect of customer loyalty on customer orientation, technology orientation and business performance", *Technological Sustainability*, Vol. 2 No. 1, pp. 44-66.

Jaakkola, E. and Alexander, M. (2014), "The role of customer engagement behavior in value Co-creation", *Journal of Service Research*, Vol. 17 No. 3, pp. 247-261, doi: 10.1177/1094670514529187.

Japutra, A., Molinillo, S., Utami, A.F. and Ekaputra, I.A. (2022), "Exploring the effect of relative advantage and challenge on customer engagement behavior with mobile commerce applications", *Telematics and Informatics*, Vol. 72, 101841.

Keil, M., Cule, P.E., Lyytinen, K. and Schmidt, R.C. (1998), "A framework for identifying software project risks", *Communications of the ACM*, Vol. 41 No. 11, pp. 76-83.

Keil, M., Rai, A. and Liu, S. (2013), "How user risk and requirements risk moderate the effects of formal and informal control on the process performance of IT projects", *European Journal of Information Systems*, Vol. 22 No. 6, pp. 650-672.

Kennedy, E. (2017), "I create, you create, we all create–for whom?", *Journal of Product and Brand Management*, Vol. 26 No. 1, pp. 68-79.

Khan, K. and Hussain, S.K. (2017), "Dimensions of customer value Co-creation behavior in a service setting", *Journal of Managerial Sciences*, Vol. 11 No. 3, pp. 83-96.

Khan, K. and Hussainy, S.K. (2017), "Dimensions of customer value Co-creation behavior in a service setting", *Journal of Managerial Sciences*, Vol. 11 No. 3, pp. 83-96.

Khan, I., Hollebeek, L.D., Fatma, M., Islam, J.U., Rather, R.A., Shahid, S. and Sigurdsson, V. (2023), "Mobile app vs desktop browser platforms: the relationships among customer engagement, experience, relationship quality and loyalty intention", *Journal of Marketing Management*, Vol. 39 Nos 3-4, pp. 275-297.

Khosravi, A. and Nilashi, M. (2018), "Toward software quality enhancement by Customer Knowledge Management in software companies", *Telematics and Informatics*, Vol. 35 No. 1, pp. 18-37.

Kleinaltenkamp, M., Brodie, R.J., Frow, P., Hughes, T., Peters, L.D. and Woratschek, H. (2012), "Resource integration", *Marketing Theory*, Vol. 12 No. 2, pp. 201-205.

Kogut, B. and Zander, U. (1992), "Knowledge of the firm, combinative capabilities, and the replication of technology", *Organization Science*, Vol. 3 No. 3, pp. 383-397.

Krancher, O. (2020), "Agile software development practices and success in outsourced projects: the moderating role of requirements risk", *Paper Presented at the International Conference on Agile Software Development*.

Kumar, A., Singh, R.K. and Modgil, S. (2023), "Influence of data-driven supply chain quality management on organizational performance: evidences from retail industry", *The TQM Journal*, Vol. 35 No. 1, pp. 24-50.

Laud, G., Karpen, I.O., Mulye, R. and Rahman, K. (2015), "The role of embeddedness for resource integration: complementing SD logic research through a social capital perspective", *Marketing Theory*, Vol. 15 No. 4, pp. 509-543.

Leung, S.H., Chan, J.W. and Lee, W.B. (2004), "Benchmarking the role-modification process for successful knowledge transfer", *Benchmarking: An International Journal*, Vol. 11 No. 6, pp. 601-609.

Lim, W.M., Rasul, T., Kumar, S. and Ala, M. (2022), "Past, present, and future of customer engagement", *Journal of Business Research*, Vol. 140, pp. 439-458.

Luciano, M.M., DeChurch, L.A. and Mathieu, J.E. (2018), "Multiteam systems: a structural framework and meso-theory of system functioning", *Journal of Management*, Vol. 44 No. 3, pp. 1065-1096.

MacKenzie, S.B. and Podsakoff, P.M. (2012), "Common method bias in marketing: causes, mechanisms, and procedural remedies", *Journal of Retailing*, Vol. 88 No. 4, pp. 542-555.

Maqsoom, A., Hamad, M., Ashraf, H., Thaheem, M.J. and Umer, M. (2020), "Managerial control mechanisms and their influence on project performance: an investigation of the moderating role of complexity risk", *Engineering, Construction and Architectural Management*, Vol. 27 No. 9, pp. 2451-2475.

Matuszak-Flejszman, A. and Paliwod, B. (2022), "Risks and opportunities related to the internal and external context of organizations", *Proceedings of the 37th International Business Information Management Association (IBIMA)*.

Menguc, B., Auh, S. and Uslu, A. (2013), "Customer knowledge creation capability and performance in sales teams", *Journal of the Academy of Marketing Science*, Vol. 41 No. 1, pp. 19-39.

Mentis, M. (2015), "Managing project risks and uncertainties", *Forest Ecosystems*, Vol. 2 No. 1, pp. 1-14.

Nardi, V.A.M., Jardim, W.C., Ladeira, W.J. and Santini, F. (2020), "A meta-analysis of the relationship between customer participation and brand outcomes", *Journal of Business Research*, Vol. 117, pp. 450-460.

Ngo, L.V. and O'cass, A. (2013), "Innovation and business success: the mediating role of customer participation", *Journal of Business Research*, Vol. 66 No. 8, pp. 1134-1142.

Nickerson, J.A. and Zenger, T.R. (2004), "A knowledge-based theory of the firm—the problem-solving perspective", *Organization Science*, Vol. 15 No. 6, pp. 617-632.

Nishikawa, H., Schreier, M. and Ogawa, S. (2013), "User-generated versus designer-generated products: a performance assessment at Muji", *International Journal of Research in Marketing*, Vol. 30 No. 2, pp. 160-167.

O'Dell, C., Wiig, K. and Odem, P. (1999), "Benchmarking unveils emerging knowledge management strategies", *Benchmarking: An International Journal*, Vol. 6 No. 3, pp. 202-211.

Plé, L. (2016), "Studying customers' resource integration by service employees in interactional value co-creation", *Journal of Services Marketing*, Vol. 30 No. 2, pp. 152-164.

Prahalad, C.K. and Ramaswamy, V. (2004), *The Future of Competition: Co-creating Unique Value with Customers*, Harvard Business Press.

Preacher, K.J. and Hayes, A.F. (2008), "Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models", *Behavior Research Methods*, Vol. 40 No. 3, pp. 879-891.

Ramaswamy, V. and Gouillart, F.J. (2010), *The Power of Co-creation: Build it with Them to Boost Growth, Productivity, and Profits*, Simon and Schuster, New York.

Ramaswamy, V. and Ozcan, K. (2018), "What is co-creation? An interactional creation framework and its implications for value creation", *Journal of Business Research*, Vol. 84, pp. 196-205.

Ramesh, B., Cao, L. and Baskerville, R. (2010), "Agile requirements engineering practices and challenges: an empirical study", *Information Systems Journal*, Vol. 20 No. 5, pp. 449-480.

Ranjan, K.R. and Read, S. (2016), "Value co-creation: concept and measurement", *Journal of the Academy of Marketing Science*, Vol. 44 No. 3, pp. 290-315.

Rauniar, R., Rawski, G., Morgan, S. and Mishra, S. (2019), "Knowledge integration in IPPD project: role of shared project mission, mutual trust, and mutual influence", *International Journal of Project Management*, Vol. 37 No. 2, pp. 239-258.

Raziq, M.M., Borini, F.M., Malik, O.F., Ahmad, M. and Shabaz, M. (2018), "Leadership styles, goal clarity, and project success: evidence from project-based organizations in Pakistan", *Leadership and Organization Development Journal*, Vol. 39 No. 2, pp. 309-323.

Raziq, M.M., Ahmad, M., Iqbal, M.Z., Ikramullah, M. and David, M. (2020), "Organisational structure and project success: the mediating role of knowledge sharing", *Journal of Information and Knowledge Management*, Vol. 19 No. 02, 2050007.

Ruoslahti, H. (2020), "Complexity in project co-creation of knowledge for innovation", *Journal of Innovation and Knowledge*, Vol. 5 No. 4, pp. 228-235.

Salunke, S., Weerawardena, J. and McColl-Kennedy, J.R. (2019), "The central role of knowledge integration capability in service innovation-based competitive strategy", *Industrial Marketing Management*, Vol. 76, pp. 144-156.

Sanayei, A. and Sadidi, M. (2011), "Investigation of customer knowledge management (CKM) dimensions: a survey research", *International Journal of Business and Management*, Vol. 6 No. 11, 234.

Santoro, G., Vrontis, D., Thrassou, A. and Dezi, L. (2018), "The Internet of Things: building a knowledge management system for open innovation and knowledge management capacity", *Technological Forecasting and Social Change*, Vol. 136, pp. 347-354.

Saunders, M.A. and Lewis, P. (2019), *Research Methods for Business Students Eights Edition Research Methods for Business Students*, Research Methods for Business Students, London, 833.

Shen, X., Tan, K. and Xie, M. (2000), "Benchmarking in QFD for quality improvement", *Benchmarking: An International Journal*, Vol. 7 No. 4, pp. 282-291.

Singh, A. (2022), "Work engagement, affective commitment, and career satisfaction: the mediating role of knowledge sharing in context of SIEs", *Benchmarking: An International Journal*, Vol. 29 No. 10, pp. 3302-3332.

Smith, H.A. and McKeen, J.D. (2005), "Developments in practice XVIII-customer knowledge management: adding value for our customers", *Communications of the Association for Information Systems*, Vol. 16 No. 1, 36.

Smyth, H., Lecoeuvre, L. and Vaesken, P. (2018), "Co-creation of value and the project context: towards application on the case of Hinkley Point C Nuclear Power Station", *International Journal of Project Management*, Vol. 36 No. 1, pp. 170-183.

Taghizadeh, S.K., Jayaraman, K., Ismail, I. and Rahman, S.A. (2016), "Scale development and validation for DART model of value co-creation process on innovation strategy", *Journal of Business and Industrial Marketing*.

Tang, Y.E. and Marinova, D. (2020), "When less is more: the downside of customer knowledge sharing in new product development teams", *Journal of the Academy of Marketing Science*, Vol. 48 No. 2, pp. 288-307.

Tomer, J.F. (1987), "Organizational capital: the path to higher productivity and well-being praeger", *Journal of Economic Behavior and Organization*, Vol. 11, pp. 453-455.

Tuan, N.M. (2022), "Customer readiness–customer participation link in e-services", *The Service Industries Journal*, Vol. 42 Nos 9-10, pp. 738-769.

Valeri, M. (2023), "Trends in knowledge management research in small businesses", *European Business Review*, (ahead-of-print).

Vargo, S.L. and Lusch, R.F. (2012), "The nature and understanding of value: a service-dominant logic perspective", *Review of Marketing Research*, Vol. 9 No. 1, pp. 1-12.

Wallace, L. and Keil, M. (2004), "Software project risks and their effect on outcomes", *Communications of the ACM*, Vol. 47 No. 4, pp. 68-73.

Wang, H.-H., Charoenmuang, M., Knobloch, N.A. and Tormoehlen, R.L. (2020a), "Defining interdisciplinary collaboration based on high school teachers' beliefs and practices of STEM integration using a complex designed system", *International Journal of STEM Education*, Vol. 7 No. 1, pp. 1-17.

Wang, L., Jin, J.L., Zhou, K.Z., Li, C.B. and Yin, E. (2020b), "Does customer participation hurt new product development performance? Customer role, product newness, and conflict", *Journal of Business Research*, Vol. 109, pp. 246-259.

Whinston, A.B. and Geng, X. (2004), "Operationalizing the essential role of the information technology artifact in information systems research: Gray area, pitfalls, and the importance of strategic ambiguity", *MIS Quarterly*, pp. 149-159.

Wilde, S. (2011), *Customer Knowledge Management: Improving Customer Relationship through Knowledge Application*, Springer Science and Business Media.

Wisner, J.D. and Corney, W.J. (2001), "Comparing practices for capturing bank customer feedback-Internet versus traditional banking", *Benchmarking: An International Journal*, Vol. 8 No. 3, pp. 240-250.

Xie, X., Zou, H. and Qi, G. (2018), "Knowledge absorptive capacity and innovation performance in high-tech companies: a multi-mediating analysis", *Journal of Business Research*, Vol. 88, pp. 289-297.

Xie, L., Guan, X., Cheng, Q. and Huan, T.-C.T. (2020), "Using customer knowledge for service innovation in travel agency industry", *Journal of Hospitality and Tourism Management*, Vol. 45, pp. 113-123.

Yeng, P.K., Wolthusen, S.D. and Yang, B. (2020), "Comparative analysis of software development methodologies for security requirement analysis: towards healthcare security practice", *Information Systems (Sofia)*.

Yoo, Y., Henfridsson, O. and Lyytinen, K. (2010), "Research commentary—the new organizing logic of digital innovation: an agenda for information systems research", *Information Systems Research*, Vol. 21 No. 4, pp. 724-735.

Yu, M.-C. (2017), "Customer participation and project performance: a moderated-mediation examination", *Project Management Journal*, Vol. 48 No. 4, pp. 8-21.

Yun, W. and Hanson, N. (2020), "Weathering consumer pricing sensitivity: the importance of customer contact and personalized services in the financial services industry", *Journal of Retailing and Consumer Services*, Vol. 55, 102085.

Zhan, Y., Tan, K.H. and Huo, B. (2019), "Bridging customer knowledge to innovative product development: a data mining approach", *International Journal of Production Research*, Vol. 57 No. 20, pp. 6335-6350.

Corresponding author
Muhammad Mustafa Raziq can be contacted at: mustafa.raziq@yahoo.com