BMC Psychology

RESEARCH

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Driving job satisfaction through inclusive knowledge management: a focus on learning and communication in diverse workplaces

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Abstract

Background This study examines the impact of knowledge management practices (KMP) on job satisfaction, focusing on the mediating roles of learning opportunities and communication quality. It aims to provide insights into how effectively KMP can enhance employee satisfaction in Pakistan's IT sector.

Method The research utilizes cross-sectional data collected from 345 IT sector employees in Pakistan. A survey method was employed, using a structured questionnaire to gather the necessary data. The data was then analyzed to determine the relationships between KMP, learning opportunities, communication quality, and job satisfaction.

Results The findings reveal that KMP has a significant positive impact on job satisfaction. Additionally, KMPs are found to positively influence learning opportunities and communication quality, which in turn significantly contribute to job satisfaction. The results demonstrate that learning opportunities and communication quality mediate the relationship between KMP and job satisfaction.

Discussion This study recommends that the IT sector in Pakistan can improve job satisfaction by developing effective KMP that supports learning and communication quality. These practices also enhance employee satisfaction and are compatible with the identified strategic objectives of a knowledge-based economy in Pakistan's framework. In addition, this research extends the theoretical literature on the relationship between KMP and job satisfaction, with learning opportunities and communication quality as mediating factors. It offers important implications for IT firms and presents a foundation for future studies to examine potential moderators and replicate these results in other industries and geographies.

Keywords Job Satisfaction, Learning Opportunities, Communication Quality, IT Sector

Introduction

Employee satisfaction is one of the most researched subjects in organizational behavior and human resource development and is essential for increasing efficiency. Thus, the key element that defines HR initiatives regarding employee development revolves around this aspect. Managers employ strategies to encourage and facilitate the employees' attainment of high job satisfaction levels, creating a competitive advantage for continued growth. Also, life satisfaction is defined by the extent of accomplishment people achieve in their working lives due to efforts. This is highly dependent on the support from

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fellow employees, the nature of the tasks, and the kind of jobs [6, 67].

The IT sector in Pakistan is widely expanding and is considered a key to building an information-based economy. Over the last few years, organizations in this sector have embraced KMP to cope with the global challenges that are present today [2]. KMP in Pakistan, particularly in the IT industry, mainly involves acquiring, sharing, and using knowledge vital for creating innovation and competent human resources. However, there are challenges that the adoption of KMP faces to this effect [1, 33]. These are a few constraints, such as inadequate knowledge-sharing structure, lack of integration, and employees' resistance to change. Most IT firms have weak systems for supporting learning and knowledge sharing, which are the keys to successfully managing knowledge as an organizational asset. For instance, lacking well-integrated KM platforms leads to inefficiencies and lost innovation opportunities. On the other hand, several organizations have implemented phenomenal KM initiatives. For example, some IT firms have created centralized knowledge databases and employ groupware to support information sharing and decision-making. Some have spent their resources on employee training, development, and mentorship to ensure that employees are always ready to learn. Such initiatives are not inconsistent with Pakistan's long-term goal of developing a knowledge-based economy, however, progress in KM implementation is still possible and appears to vary across the sector [7, 20].

The term KM sounds relatively straightforward, although it includes a range of definitions and practices [2]. Knowledge management is assessing the current and required knowledge resources in combination with procedures to improve the latter to achieve business objectives [52]. As recommended by the professionals, these systems' primary objective is to facilitate the efficient dissemination of knowledge. Often, KM systems are compared with document management systems [16]. Moreover, KM is defined as structuring unstructured information and is described as logical. With the help of knowledge management, companies can adapt to change, and the literature demonstrates how crucial knowledge is to maintaining a firm's strategic advantage [41].

Lam et al. [35] elaborate that organizational commitment measures a worker's satisfaction with the tasks s/he is assigned. Efficient organizational functioning directly depends on the levels of job satisfaction that need to be kept as high as possible. Studies show that KM is related to job satisfaction, supported by a wealth of literature. Thus, it is postulated that job satisfaction and knowledge management are reciprocal, where one affects the other [5, 11].

KM is a critical issue for all firms because previous research has focused on how organizations can apply it to enhance several business processes [1, 33]. Prior studies primarily concentrate on KM's effect on employees' work satisfaction [60]. The contingency factors used in this study include learning opportunities and communication quality. However, it is necessary to note that the given study aims to develop existing knowledge and provide a deeper insight into the strong positive relationship between KM and job satisfaction. This will be realized through the use of intervening variables, which include learning opportunities and communication quality. Firms can also enhance overall performance, motivate employees, and enhance levels of job satisfaction if knowledge is considered an asset and effective knowledge management practices are used. The research has found that applying knowledge-based management in integration with work satisfaction can result in a sustainable competitive advantage in today's knowledge-based economy. Hence, the main goals of this undertaking are to address two research inquiries: RQ1: What is the role of knowledge management to enhance job satisfaction? Moreover, RQ2: How do learning opportunities and communication quality mediate the relationship between knowledge management and job satisfaction?

This study addresses the aforementioned research questions to provide valuable insights and contributions to management and theory through a deeper understanding and perspectives on the relationship. The paper is divided into five sections: introduction, literature review and hypotheses development, methodology, results and discussion, and conclusion with ideas for future research directions.

Literature review and hypotheses development

Theoretical background

The knowledge-based view (KBV) [23] of the firm is a framework within organizational learning management that helps companies achieve competitive advantage by deeply involving employees in the creation and execution of strategic operational plans and the development of the organization's vision and mission. According to Grant [23], from this perspective, KBV is the critical method of learning within the organization because it is connected to the involvement of human capital in the staking structures and processes of the company. There is thus a need to ensure that firms are constantly updating their knowledge base and sharing new knowledge and ideas with others within the same business organization,this is in light of the global competition that is spearheaded by globalization, constant deregulation, and technological changes [3]. The theoretical framework for this research emanates from the KBV of the firm, asserting that knowledge is a

strategic organizational asset that fosters competitive advantage [23]. KMP, like knowledge acquisition, sharing, and use, promotes organizational learning and creativity. They foster a context that provides new learning experiences to the employees since it affords them a chance to accumulate, absorb, and apply new information, knowledge, and skills within the firm as supported by Nonaka's SECI model of knowledge creation [8, 19].

Furthermore, KMP also improves the quality of the information being shared by addressing issues of flow and barriers to information sharing and encouraging the free flow of information within organizations [17]. As the self-determination theory suggests, this enhanced communication fosters collaboration and decision-making and is relevant to the three fundamental psychological needs of competence, autonomy, and relatedness. Through implementing these mechanisms, KMPs have a powerful impact on job satisfaction, where learning opportunities and communication quality act as the variables that moderate between the KM interventions and the positive outcomes among the employees [13].

Harb et al. [28] noted that those rooted in knowledge are the most valuable when considering the key elements for achieving and maintaining a competitive edge. Research indicates that many scholars recognize exceptional talent as the most crucial source of sustainable competitive advantage in top-tier organizations. Similarly, the existing literature on knowledge management connects optimal knowledge bases within organizational learning to superior business performance [7, 20]. Acquiring knowledge leads to knowledge transformation and drives innovative performance by enhancing the organization's intellectual capital. This intersection benefits both management and employees, as employees can perform their tasks more effectively through knowledge acquisition and transfer, increasing their job satisfaction and reducing their apprehension about the unknown aspects of their roles. Thus, the KBV is instrumental in explaining the observed variables of the research and supports the proposed model's connection between knowledge management and employee job performance [7, 42].

Knowledge management practices

Nawaz et al. [43] emphasized that the effectiveness of KM within an organization largely depends on its KM infrastructure and process capabilities. KM involves identifying and evaluating current and required knowledge assets, managing the related processes, and planning their growth to align with organizational goals. Knowledge management systems are among the fastest-growing areas in the corporate sector, highlighting the necessity for effective KM in response to the competitive dynamics of domestic and global markets. Studies depict KM as a sophisticated tool capable of generating significant outcomes, such as increased revenues, by leveraging existing knowledge and intellectual capital. It involves a series of actions that transform the current knowledge base and yield long-term, substantial results [38, 64].

KM encompasses acquiring, storing, searching, retrieving, sharing, and evaluating all business information resources, including databases, documents, policies, procedures, and tacit and explicit knowledge [17]. Organizations often distinguish themselves based on how they acquire and process this information. Research indicates that KM is crucial for achieving organizational performance, particularly in the banking industry. Patwary et al. [48] highlighted that knowledge significantly contributes to quality service performance, especially when banking products are perceived as homogeneous. Their study examined KM through four dimensions: knowledge acquisition, knowledge dissemination, knowledge application, and knowledge storage. KM practices encompass organizational activities to identify, create, share, and utilize knowledge to achieve business objectives. In this study, we focus on three specific KM practices:

Knowledge acquisition: Refers to the processes through which organizations identify and obtain knowledge from internal and external sources. This includes training programs, external collaborations, and market research [17].

Knowledge dissemination: Involves the structured sharing of knowledge across different departments and levels within the organization. Examples include knowledge-sharing platforms, workshops, and interdepartmental meetings [17].

Knowledge application: Pertains to effectively use acquired and disseminated knowledge in decision-making, problem-solving, and innovation processes [17].

Job satisfaction

In some research, the role of customer satisfaction in achieving organizational objectives was mentioned, and the importance of employee satisfaction can be said to be the same [48]. Zamiri and Esmaeili [65] claimed that it is important to satisfy the employees before focusing on the customers. Studies found that one of the most significant workers' overall job contentment is correlated to customer orientation. Job satisfaction is a worker's perception of job content in daily practices. Shehzad et al. [54] define job satisfaction as the extent to which people feel contented or discontented with his or her jobs. In the same vein, Zighan et al. [68] postulate that service

employees who directly interface with customers will be in trouble if they are discontented or dissatisfied, in some way, about their work. Furthermore, job (dis)satisfaction is usually defined as a balanced appraisal of a person's employment circumstances.

Job satisfaction is often defined as an employee's overall attitude toward various aspects of their job, including wages, working conditions, control measures, opportunities for promotion, relationships with colleagues, recognition of skills, and related factors. It also encompasses personal characteristics and interactions with others within and outside the work environment [8, 19]. Thus, job satisfaction represents a broad feeling about one's work. In the banking industry, where employees frequently interact with and serve customers, high levels of employee satisfaction are crucial for ensuring high customer satisfaction. Wang et al. [62] argued that job dissatisfaction is not simply the absence of job satisfaction but a distinct concept. Numerous studies have shown that employees are more likely to remain in a job that provides satisfaction and are more likely to leave if the job does not meet their satisfaction needs.

Learning opportunities

Organizational learning is the process of improving the employees' performance innovation and sustaining the competitive advantage within the organization. Organizational training can be defined as the learning activities carried out in an organization that are planned and systematic, as highlighted by Zhang et al., [66]. Employers who provide and follow through with effective training programs are likely to note increased employee satisfaction and performance levels, as noted by Noori [46]. Furthermore, the help of technology has influenced the training approaches by introducing e-learning platforms that provide individual training with flexible schedules. According to Gouëdard et al. [22], using technology in learning can be as effective as face-to-face when it is well-designed and used effectively. Hence, informal learning is also crucial in organizations' learning process. Wang et al. [62] identifies On Job Training as one of the key learning processes where learning is done through the normal working activities. Fütterer et al. [19] have stated that continuing learning involves informal learning activities like mentoring, coaching, and job rotation. The second mode of informal learning is social learning, specifically in the communities of practice. It should be noted that the idea put forward by Budur et al. [8] focuses on the importance of social relations and contextual learning processes in the sphere of work activity. Zighan et al. [68] have established that CoPs can promote better knowledge sharing, learning, and innovation.

Effective KMSs, which are knowledge management systems, support organizational knowledge sharing. Alzghoul et al. [3] have suggested that KMS assists in creating, codifying, and distributing knowledge, improving learning and work performance. Harb et al. [28] have confirmed that effective knowledge-sharing practices are related to higher organizational capabilities. Other methods of knowledge sharing include using intranets, wiki, and other social media platforms, which has even enhanced the practice of knowledge sharing. Gazi et al. [20] stated that using these technology-enabled practices increases innovation and problem-solving capabilities, while Budur et al. [7] agreed that these tools improve knowledge sharing. The promotion of learning opportunities is highly facilitated by leadership and organizational culture. Specifically, Nawaz et al. [42] have mentioned that transformational leaders successfully create a learning environment. Martínez-Falcó et al. [38] opine that organizational culture plays a significant role in the learning behaviors exhibited in organizations, with cultures that support experimentation and accepting mistakes being ideal for learning. Psychological safety is an organizational climate introduced by Nawaz et al. [42] as a state that facilitates risk-taking and idea-sharing within the workplace without putting employees at risk of punishment. This study by El-Kassem [17] reveals that psychological safety is a key component that enables the development of a learning climate.

Communication quality

Communication plays an important role in any organization as it helps in the proper organization of activities, sharing of information, as well as in the development of relations [31]. Effective communication is an effective tool that improves organizational productivity, promotes a healthy workplace culture, and aligns with the organization's objectives. First of all, official and unofficial communication networks are considered vital since they help exchange information and coordinate actions [13]. Organizational communication is formal because it adheres to official and documented norms and practices, as Sonmez Cakir et al. [55] suggested in official meetings, reports, and emails. These include communication that occurs during casual conversations or through word of mouth or social interactions and leads to the sharing of knowledge and quick problem-solving and thus produces innovation, as observed by Arduini et al. [4]. The emergence of technology in the communication system, like instant messaging, video conferencing, and collaborative tools, has also changed organizational communication. According to Capolupo et al. [9], these tools increase connection and cooperation across the geographical space, while Yang et al. [63] state that information

overload and decreased direct contact may result from the overuse of digital communication.

The perception and attitude of the people in an organization towards communication practice generally called the communication climate that affects communication quality, is vital. Budur et al. [8] have established that a positive communication climate that entails openness and supportiveness by the participants improves the quality of communication. On the other hand, the adverse communication climate includes issues such as secrecy, criticism, and fear, reducing communication and cooperation [68]. Lack of awareness about internal communication departments as an organization's internal factor is another significant issue. Internal communication departments are central to creating and sustaining the communication climate. According to Ramirez-Lozano et al. [50], these departments formulate communication plans, information processing, and value support.

Hypotheses development

Knowledge management is a set of activities to capture, develop, and transfer knowledge within and between organizations. According to the KBV theory [23], the specific processes can be acquired by the organizations that are engaged in these processes and can accumulate special knowledge, experience, and capabilities. Those employees who receive such knowledge are well-positioned to work effectively and creatively [37]. As postulated by the KBV theory, knowledge is one of the many sources of sustainable competitive advantage. Organizations that use knowledge management efficiently build up competitive advantage because they encourage a learning environment, enhance their business processes, and anticipate changes in the industry. This advantage is manifested in enhanced job performance since employees have the latest information and relevant tools [17].

Yuan and Xiang [64] discovered that personal knowledge, job procedures, and technological literacy are key components of KMS that positively impact employee performance. Similarly, Wang et al. [61] investigated the relationship between knowledge management and work performance. Their findings indicated that the processes and strategies of knowledge management within organizations significantly correlate with job satisfaction and work performance. Additionally, Ayatollahi and Zeraatkar [6] explored the influence of knowledge management activities and dynamic capabilities on employee performance in the banking sector. Hence, the following hypothesis is proposed:

> H1: Knowledge management practices have a significant impact on job satisfaction.

KM provides better learning in organizations through capturing, indexing, disseminating, and applying knowledge more systematically to increase organizational performance and innovation [67]. The KM practice is thus characterized by documenting codified and non-codified information through knowledge management repositories and records. It is important for knowledge acquisition and generation as it helps leverage collaborative technologies and work groups [10]. Also, using knowledge in activities that take place in organizations directly enhances decision-making and organizational performance [41]. KM systems facilitate different learning activities, which assist the employees in learning from past experiences and existing knowledge. Nonaka's SECI model shows how the processes involved in knowledge creation and conversion improve learning in organizations by converting between tacit and explicit knowledge [57]. A sound KM system creates a learning culture through which employees are motivated to acquire knowledge and, more importantly, share the knowledge acquired. In addition, KM practices are strongly associated with innovation processes, which help organizations innovate as often as possible and gain competitive advantage through higher efficiency, innovation, and flexibility [11]. However, there is always a potential for knowledge sharing to be hindered by barriers like organizational silos, lack of trust, and proper communication channels hence the need to integrate and encourage proper KM systems. There is an opportunity to use such technologies to develop KM systems to improve the learning process and achieve more profound and predictive results [41]. Hence, the following hypothesis is proposed:

> H2: Knowledge management practices have a significant impact on learning opportunities.

Training received within organizations plays a massive role in job satisfaction as it improves the self, develops and improves skills, and fulfills the employees [48]. Training and development for the employees provide new knowledge, skills, and expertise expected of the organization and the required changes, improving performance and job security. This enhancement of skills leads to the positive outcomes of increasing the self-efficacy of the employees as well as job satisfaction [65]. Moreover, LBP is associated with promotion, a defined career ladder, and mobility from one level to another, improving employees' satisfaction because they view learning as a preparation for the next step in their career. Need satisfaction, knowledge, and growth are also significantly improved through learning, meeting the employees' need for competence, autonomy, and relatedness to be satisfied with their jobs [7, 68]. Companies that support the promotion

of a learning culture and show concern in their employees' training show improved organizational commitment and reduced turnover, thus improving job satisfaction. Several challenges must be addressed in an organization, including cultural and structural barriers and lack of trust. In order to overcome them, structural changes are needed, as well as the introduction of proper KM systems [19]. In conclusion, the literature calls for the importance and centrality of learning opportunities in job satisfaction management in organizations and the need to develop proper learning and development practices in organizations. Hence, the following hypothesis is proposed:

> H3: Learning opportunities have a significant impact on job satisfaction.

KM significantly affects organizational communication by increasing the effectiveness of information sharing, promoting teamwork, and eradicating the knowledge divide [58]. Standardized documented knowledge management databases and documented best practices ensure that all the relevant information can be quickly and easily retrieved, thus improving the quality and consistency of the information being communicated [32]. This has made it possible to share knowledge in real-time and work in groups through tools such as an intranet, wikis, and others, increasing efficiency in sharing and disseminating information. KM practices also prevent the development of knowledge silos because it is difficult to hide information in such cases, and the information is easily shared among the departments and hierarchical levels [34]. Hence, integrating knowledge flow and support of organizational learning contributes to improvement and strategy in decision-making processes by using feedback and furthering the quality of knowledge communication. Moreover, organizations that adopt sound KM systems foster a favorable environment for transparent, collaborative, and informed communication, enhancing organizational performance and employee satisfaction [59]. Hence, the following hypothesis is proposed:

> H4: Knowledge management practices have a significant impact on communication quality.

Quality of communication in organizations remains one of the most critical factors that affect employees' job satisfaction through different means. Information communication ensures that the employees understand what is required, alleviating confusion and boosting confidence [30, 44]. The provision of accurate and timely information enables the employee to be in a position to make the right decisions that are in line with the organizational goals and objectives, hence improving their levels of satisfaction. Besides, open communication leads to developing good relationships at the workplace, and the employees are respected and appreciated by their co-workers [50]. By implementing open communication practices and leadership communication, workplace transparency positively impacts overall job satisfaction because it decreases uncertainty and increases perceptions of justice and equality. Organizations that give attention to communication quality foster a favorable working climate for effective teamwork, creativity, and employee health, which results in increased satisfaction levels and organizational performance [68]. Hence, the following hypothesis is proposed:

> H5: Communication quality has a significant impact on job satisfaction.

Organizational KM systems affect job satisfaction by mediating learning options, as the best practices in KM promote the acquisition, exchange, and utilization of knowledge in organizations [66]. They allow the employees to acquire relevant knowledge and skills from other employees, encouraging the process of learning and skills updates. Training and development activities make it possible for employees to get better at their place of work and get promotions, thus making them more productive and satisfied with their jobs [46]. Sustainability is achieved when employees feel that their organization cares for their welfare, which positively affects the employees' self-actualization and self-esteem [22]. Furthermore, it establishes a connection between KM and job satisfaction by showing that the employees who gained learning from the KM-driven opportunities will express higher job satisfaction. The previous discussion shows that KM practices promote organizational learning and development, improving organizational commitment and job satisfaction. Furthermore, companies that focus on the development of KM and provide increased attention to the processes of constant learning will receive better outcomes and higher levels of employee satisfaction [62]. Hence, the following hypothesis is proposed:

> H6: Learning opportunities positively mediate the relationship between knowledge management practices and job satisfaction.

The interaction between the extent of KM implementation and job satisfaction via communication quality significantly improves the organization's effectiveness [31]. When KM practices are implemented effectively, these enhance the dissemination of information and the communication climate, increasing the quality of communications in organizations [13]. Effective communication entails clear, transparent, open communication, likely promoting trust and a healthy organizational climate. These increase job satisfaction because there are fewer uncertainties and people are fairly treated. According

to Zighan et al. [68], the workers who receive adequate information and knowledge through effective communication through proper KM systems enjoy their duties and the company's policies since there is basic understanding of duties, involvement, and support. It is also important to note that organizations that incorporate KM with effective communication practices not only enhance the satisfaction of their workforce but equally show the corporation's dedication towards employee loyalty and engagement as they foster an organizational culture that supports the achievement of organizational goals [59]. Hence, the following hypothesis is proposed:

> H7: Communication quality positively mediates the relationship between knowledge management practices and job satisfaction.

Figure 1 shows the conceptual framework and the relationships between the variables:

Research methodology

Research design

This study employed a cross-sectional research design to investigate the relationships between knowledge management, learning opportunities, communication quality, and job satisfaction among Pakistan's IT sector employees. The cross-sectional approach was chosen to collect data, allowing for an efficient snapshot of the current state of these variables within the target population.

Population and sampling

Data were collected from employees in the IT sector in Pakistan. The IT sector was chosen as the target due to its high growth rate and importance for the country's digital transformation process. Due to the constantly changing environment and focus on knowledge as the key resource, the sector is suitable for investigating the effects of knowledge management and related factors on job satisfaction. To be included in the survey, the respondents had to be employees of their current firms for over three years. This criterion was adopted to help screen out the respondents with little experience or a relatively low understanding of their organization's KMP and communication quality. The study employed a stratified sampling approach to represent the IT sector comprehensively. Participants were drawn from a variety of IT companies, categorized into small (fewer than 50 employees), medium (50–250 employees), and large enterprises (more than 250 employees). The final sample included 40% from small companies, 35% from medium-sized firms, and 25% from large enterprises, reflecting Pakistan's general distribution of IT companies. Additionally, the sample encompassed different types of IT firms, including software development companies (45%), IT consulting services (30%), and IT support and infrastructure providers (25%). This diversity ensured the findings captured a broad spectrum of organizational practices and contexts within the sector.

Data collection process

The survey method was utilized for data collection, leveraging a structured questionnaire to gather responses from participants. The questionnaire was designed to measure the key constructs of the study, ensuring a comprehensive assessment of the variables of interest. A Google Form was created to facilitate the survey, and the link to the form was distributed to potential participants via email. The email included a cover letter that explained the purpose of the study, emphasized its academic nature, and assured respondents that their responses would be kept confidential. The cover letter aimed to increase response rates by addressing any concerns about privacy and the use of the data. Hair et al., [24] recommended

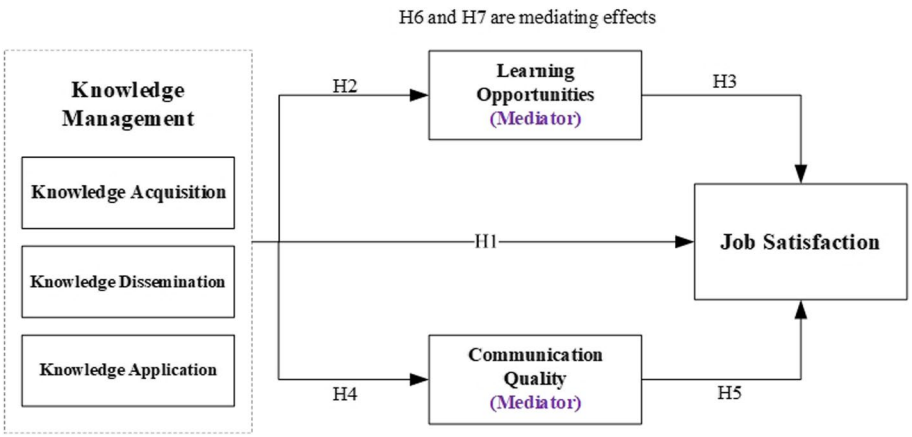

Fig. 1 Conceptual framework

ten responses per item for sample size, as this study used thirty items to measure the model, so a three-hundred sample size is recommended. Of the 535 questionnaires sent using Google Forms, 365 responses were received, resulting in an initial response rate of 68.22%. After a strict evaluation of the received responses, it was found that some were incomplete, contained missing items, or had double-ticked items. These responses were excluded from the survey, leaving 345 complete and usable responses for the final analysis, yielding a valid response rate of 64.48%. The final sample size is more than the recommended sample size.

Questionnaire and measurement

The questionnaire utilized in this study comprised thirty items designed to measure four key constructs: knowledge management practices, learning opportunities, communication quality, and job satisfaction. Responses were recorded on a five-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree). Knowledge management practices were assessed with eighteen items covering three dimensions: knowledge acquisition, knowledge dissemination, and knowledge application, which were adopted from Darroch's [15] study. Learning opportunities were measured with four items adapted from the work of Maurer and Tarulli [39], evaluating employees' perceptions of available learning and development opportunities within their organization. Communication quality was assessed using four items from Men and Stacks [40], focusing on the organization's effectiveness, clarity, and openness of communication. Finally, job satisfaction was measured with four items derived from Lester's [36] study, examining employees' overall satisfaction with their jobs, including aspects such as work conditions, recognition, and job fulfillment. This comprehensive questionnaire ensured a robust assessment of the constructs pertinent to the study's objectives.

Demographic characteristics of the respondents

Table 1 presents the demographic details of the respondents. According to the table, the majority of the respondents, i.e., 51.59%, were male, and 24.35% were between the age group of 41–45. The table shows that 29.56% of respondents have a bachelor's degree, and 31.58% have 5–10 years of job experience.

Data analysis

The conceptual research model was evaluated using the partial least square structural equation modeling, commonly known as the PLS-SEM approach. This technique outperforms regression in discovering mediation [49]. It also accounts for measurement inaccuracies and provides reliable estimates of the mediating effect. Moreover,

Table 1 Demographic characteristics of the respondents

Characteristics	*Range*	*Frequency*	*Percentage*
Gender	Male	178	51.59
	Female	167	48.41
	Total	**345**	**100.00**
Age	< 30 years	65	18.84
	31–35 years	78	22.60
	36–40 years	71	20.58
	41–45 years	84	24.35
	> 45 years	47	13.63
	Total	**345**	**100.00**
Qualification	Bachelor	102	29.56
	Masters	92	26.67
	Post-Graduate	88	25.50
	Others	63	18.27
	Total	**345**	**100.00**
Job Experience	< 3 years	88	25.50
	3–5 years	96	27.82
	5–10 years	109	31.58
	> 10 years	52	15.10
	Total	**345**	**100**

Smart-PLS [26] is a recognized methodology in human resource management. It includes fundamental and complex theoretical models, and the normality of the data is not a prerequisite. PLS-SEM encompasses both structural and measurement models. The measuring approach highlighted by Hair et al. [24] entails the assessment of validity, paying especially attention to convergent and discriminant validity. Convergent validity is the degree of accuracy with which the items used to assess a given construct fairly reflect that variable. Analyzing the factor loadings of the questions, composite reliability (CR), and average values of variance extracted (AVE) helps one to evaluate the assessments of the constructs [27]. Based on Hair et al. [24], the measures of construct validity include the alpha, AVE, and CR that should be greater than 0. 70, 0. 50, and 0. 60, respectively.

Cronbach's alpha must surpass the acceptable threshold of 0.70, as indicated by Nunnally [47]. The AVE, CR, and Cronbach's alpha surpassed the requisite thresholds, as demonstrated by the data in Table 2. Discriminant validity is employed to evaluate the statistical variation between two variables. A square root method is first utilized to compute AVE, followed by generating correlations to construct connections. As specified by Fornell and Larcker [18], all the values on the upper diagonal must be higher than their corresponding values on the lower diagonal of all the constructs.

Table 3 presents the HTMT ratios for first and second-order constructions. These constructs exhibit varying

Table 2 Reliability and validity analysis

First Order Constructs	Second Order Constructs	Items	Loadings	α	CR	AVE
Knowledge Acquisition		KA1	0.811	0.839	0.833	0.677
		KA2	0.841			
		KA3	0.806			
		KA4	0.791			
		KA5	0.771			
		KA6	0.793			
Knowledge Dissemination		KD1	0.812	0.829	0.866	0.631
		KD2	0.823			
		KD3	0.812			
		KD4	0.744			
		KD5	0.822			
		KD6	0.795			
Knowledge Application		KAP1	0.794	0.838	0.883	0.683
		KAP2	0.841			
		KAP3	0.855			
		KAP4	0.788			
		KAP5	0.808			
		KAP6	0.785			
	Knowledge Management Practices	KA	0.836	0.772	0.858	0.682
		KD	0.833			
		KAP	0.818			
Learning Opportunities		LO1	0.856	0.879	0.922	0.737
		LO2	0.824			
		LO3	0.887			
		LO4	0.870			
Communication Quality		CQ1	0.822	0.789	0.879	0.709
		CQ2	0.848			
		CQ3	0.859			
		CQ4	0.785			
Job Satisfaction		JS1	0.888	0.862	0.898	0.697
		JS2	0.802			
		JS3	0.839			
		JS4	0.822			

degrees of relatedness; the HTMT ratio was employed to establish discriminant validity. The Heterotrait-Monotrait Ratio is primarily characterized by stipulating that it should not exceed 0.85 or 0.90 [29, 53]. This level of values indicates strong discriminant validity among the constructs, signifying that they are distinctly different. The aforementioned table indicates that all HTMT ratios fall below this threshold. This indicates that the constructs possess sufficient discriminant validity.

Multicollinearity is evaluated using variance inflation factors (VIF). In the research model, multicollinearity is not a concern, as the VIF scores are well below the required threshold. Specifically, a VIF value below 5 is necessary to confirm the absence of multicollinearity, assuming a tolerance value above 0.20 [24].

Predictive relevance

In evaluating the predictive significance of a model, criteria like Q^2, cross-validated redundancy, and R^2, the coefficient of determination is applied. The extent to which external structures may fully capture the constructs within a research study is expressed as R^2. Based on the above analysis, it can be concluded that KMP is responsible for 44.8% of LO and 53.9% of CQ. Moreover, the impact of the exogenous constructs; KMP, LO, and CQ, is 51.1% of JS. As shown in Table 4, all the exogenous

Table 3 Discriminant validity

Constructs	KMP	LO	CQ	JS
Fornell larcker criteria				
KMP	0.841			
LO	0.671	0.811		
CQ	0.645	0.768	0.912	
JS	0.735	0.711	0.726	0.809
Heterotrait-Monotrait Ratio				
	KMP	LO	CQ	JS
KMP				
LO	0.859			
CQ	0.789	0.805		
JS	0.771	0.785	0.792	

Table 4 Predictive relevance

	VIF			R^2	Q^2
Construct	KMP	CQ	JS	Endogenous Construct	
KMP	1.000	1.000	2.698		
LO			3.191	0.448	0.371
CQ			3.315	0.539	0.327
JS				0.511	0.314

constructs' R^2 value is almost equal to or greater than 0.5, indicating that the model is strong [27]. The blindfolding approach is also applied using Smart-PLS 4.1 to establish the effectiveness of the research model in the prediction. Geisser [21] and Stone [56] developed the predictive relevance method. This method entails eliminating specific data with the help of a blindfolding from parameter estimations for certain indicators. This is followed by estimating the excluded data with the help of a parameter computed by the method. Therefore, it can be understood that Q2 should not be equal to zero [12]. From Table 4, Q2 values of all three endogenous constructs are greater than zero; hence, they are significant, LO = 0. 371, CQ = 0. 327, JS = 0. 314. Consequently, this research meets the criteria of the model, specifically its predictive relevance.

Effect size (f^2)

Hair et al. [25] and Ringle et al. [51] advocate using Cohen's f^2 to estimate the effect size (f^2) of each path within the inner model, as well as calculating the coefficient of determination (R^2) for the endogenous constructs. According to Cohen [14], f^2 values between 0.02 and 0.15 suggest a minor degree of influence, whereas values between 0.15 and 0.35 indicate a significant impact. Additionally, f^2 values greater than 0.35 indicate a significant degree of effect. The model's stability is supported by the fact that the variables' f^2 values span from low to high, as seen in the current analysis. This statement refers to the amount to which an independent variable has a statistically significant effect on the dependent variable.

Hypotheses testing

Besides the mandatory examination of the measuring model, the second step included evaluating the structural model test. The hypotheses were tested in the order stated in the literature section. First, we examined the direct relationships between the constructs. Then, the effect of KMP on JS was examined through the mediating function of LO and CQ. Finally, the Bootstrap resampling approach with 5000 resamples [51] was used to assess the significance of direct pathways. The current study evaluated and presented the structural model using the general criteria of Hair et al. [24]. In addition, the recommendations of Nitzl et al. [45] and Preacher and Hayes [49] were incorporated for mediation analysis. Table 5 summarizes the test results for hypotheses with direct and mediated effects.

In support of H1, Table 5 and Fig. 2 demonstrate that KMP substantially affects JS ($\beta = 0.292$, $p = 0.001$, $t = 3.493$). KMP significantly influences LO (H2) ($\beta = 0.685$, $p < 0.001$, $t = 22.691$) and LO affects JS (H3) ($\beta = 0.209$, $p < 0.001$, $t = 2.189$). Additionally, KMP on CQ (H4) has a substantial correlation ($\beta = 0.690$, $p = 0.001$, $t = 23.510$), as does CQ on JS ($\beta = 0.213$, $p = 0.003$, $t = 2.489$). This indicates support for H5 and H6 as well. H6 subsequently examines whether LO mediates the relationship between KMP and JS. With $\beta = 0.158$, $p = 0.018$, and $t = 2.204$, the findings indicate that LO significantly mediates the connection between KMP and JS. H6 was consequently supported. The H7 investigation confirmed the anticipated notion, demonstrating that CQ mediates the relationship between KMP and JS ($\beta = 0.167$, $p = 0.021$, $t = 2.509$). Consequently, H7 received similar support.

Discussion

The findings of this study provide valuable insights into the role of KMP in enhancing job satisfaction through learning opportunities and communication quality. However, it is essential to recognize the contextual limitations of the research. This study was conducted within the IT sector in Pakistan, a context characterized by rapid technological advancements and a growing emphasis on knowledge-driven practices. These contextual factors influence the generalizability of the findings to other sectors or regions. For instance, industries relying less

Table 5 Hypotheses results

Hypotheses	Relationships			β [*P* Values]	*T*-values	f^2	BCI-LL	BCI-UL	Supported
	IV	M	DV						
Direct Effects									
H1	KMP	→	JS	0.292 [0.000]	3.393	0.091	0.206	0.523	Yes
H2	KMP	→	LO	0.685 [0.003]	22.691	1.309	0.712	0.824	Yes
H3	LO	→	JS	0.209 [0.019]	2.188	0.019	0.031	0.364	Yes
H4	KMP	→	CQ	0.690 [0.001]	23.510	1.410	0.713	0.797	Yes
H5	CQ	→	JS	0.213 [0.003]	2.489	0.031	0.052	0.408	Yes
Mediating Effects									
H6	KMP →	LO →	JS	0.158 [0.018]	2.204		0.022	0.314	Yes
H7	KMP →	CQ →	JS	0.167 [0.021]	2.519		0.043	0.307	Yes

KMP Knowledge management practices, *JS*Job satisfaction, *BCI*Bias−corrected confidence interval, *LL*Lower level, *UL*Upper Level, *LO*Learning Opportunities, *CQ*Communication Quality

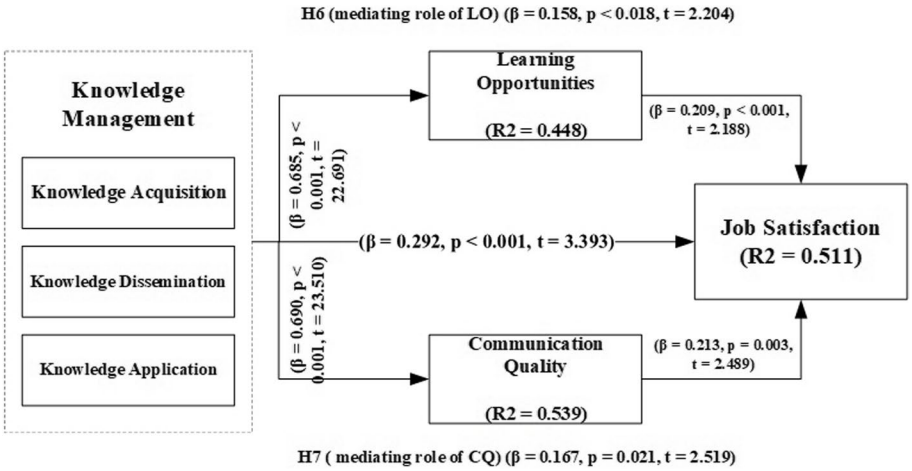

Fig. 2 Structural model

on knowledge-intensive practices or operating in economies with different technological or cultural frameworks may experience varying outcomes. Future research could explore these relationships in different industries, such as manufacturing or healthcare, with distinct knowledge management needs and organizational dynamics. Additionally, cross-regional comparisons between developed and developing economies could provide a broader understanding of the interplay between KMP, learning opportunities, communication quality, and job satisfaction. Such studies would offer a deeper exploration of how sectoral and regional differences affect the efficacy of KMP.

First, this study found that KMP positively and significantly affects job satisfaction, supporting H1. This positive relationship shows that effective KMP significantly enhances job satisfaction. Ayatollahi and Zeraatkar [6] also demonstrated similar findings that robust KM infrastructure and processes lead to improved employee engagement and satisfaction by fostering a culture of continuous learning and knowledge sharing. Zhao et al. [67] also found that KMP facilitates better decision-making and innovation, contributing to higher job satisfaction as employees feel more competent and valued. However, some studies suggest that the impact of KMP on job satisfaction may not be universally positive. For example, Sapta et al. [52] argued that implementing KM systems can sometimes lead to information overload and increased employee stress, potentially diminishing job satisfaction. Furthermore, if KM practices are poorly executed or inadequately supported by organizational culture, they may fail to produce the desired positive effects on job satisfaction [41].

Second, this study found that KMP positively influences the learning opportunities of employees, and these learning opportunities positively affect job satisfaction. Therefore, these findings support H2 and H3. These findings align with the prior study of Zighan et al. [68], who

found that effective KMP creates an environment conducive to continuous learning by facilitating the acquisition and dissemination of knowledge within the organization. This environment not only increases the potential for learning by each learner but also fosters learning and knowledge sharing by all. Similarly, Darroch [15] established that organizations with strong KM systems are better positioned to support their employees with tools and chances for continuous learning and growth. Besides, there is ample literature on the effectiveness of learning opportunities to enhance job satisfaction. Maurer and Tarulli [39] established that the perceived opportunities for training and development in an organization were positively related to self-reported job satisfaction. This is the case because such opportunities enable the employees to build their capacity, acquire personal and career accomplishments, and gain a sense of competence and significance in their positions. In addition, what an employee learns may mean more involvement and motivation at the workplace, which is a primary factor in job satisfaction [54]. On the other hand, some prior studies suggest that the relationship between KM practices, learning opportunities, and job satisfaction may not always be straightforward. For instance, Patwary et al. [48] pointed out that if KM systems are too complex or not user-friendly, they can hinder rather than help learning, leading to employee frustration. Additionally, while learning opportunities generally boost job satisfaction, they can sometimes lead to increased pressure and stress if employees feel overwhelmed by the expectation to constantly acquire new skills [65].

Third, this study confirms the positive impact of KM practices on communication quality and the positive impact of communication quality on job satisfaction; these findings support H4 and H5. Sonmez Cakir et al. [55] found similar relationships that effective KM practices streamline information flow within organizations, facilitating more transparent and more efficient communication. This is supported by studies like those of Nguyen and Ha [44], who showed that robust KM infrastructure and processes help ensure that relevant information is easily accessible, reducing misunderstandings and improving overall communication quality. Furthermore, high-quality communication has been shown to influence job satisfaction positively. Men and Stacks [40] argued that effective communication fosters a transparent and supportive work environment, which increases employee trust and satisfaction. Similarly, Yang et al. [63] found that clear and open communication leads to better employee engagement and morale, directly contributing to higher job satisfaction. However, some counterarguments highlight potential complexities in these relationships. For instance, while KM practices can improve communication, they can also create information overload if not managed properly, which may overwhelm employees and hinder effective communication [8]. Additionally, although high-quality communication generally boosts job satisfaction, it can also raise expectations for continuous feedback and interaction, which may not always be feasible and could lead to frustration [9].

Fourthly, this study found the significant mediating roles of learning opportunities and communication quality in the relationship between KMP and job satisfaction, and these findings support H6 and H7. According to the findings, learning opportunities created through effective KM enhance employees' skills and professional growth, leading to higher job satisfaction. This finding parallels the study of Fütterer et al. [19], who also showed that when employees perceive ample learning opportunities, they feel more competent and valued, enhancing their job satisfaction. Additionally, KMPs that facilitate knowledge acquisition and dissemination ensure continuous learning, making employees feel more engaged and satisfied [62]. Similarly, communication quality is a crucial mediator between KMP and job satisfaction. Effective KM systems improve communication by ensuring that relevant information is easily accessible and shared within the organization, fostering a transparent and supportive work environment. Men and Stacks [40] also found that improved communication quality enhances employee trust and morale, leading to higher job satisfaction. Zamiri and Esmaeili [65] also showed that streamlined information flow through KMP reduces misunderstandings and enhances overall communication quality, contributing to greater job satisfaction. However, some counterarguments highlight potential challenges. While learning opportunities generally mediate the relationship positively, they can also increase pressure on employees to constantly update their skills, potentially causing stress and reducing job satisfaction [46]. Similarly, although improved communication quality typically enhances job satisfaction, it can create information overload if not managed properly, which may overwhelm employees and hinder effective communication [66].

Implications

Theoretical implications

This study makes significant contributions to the existing body of literature by empirically testing and confirming several original relationships that had not been thoroughly explored before. Firstly, it provides strong evidence for the significant impact of KMP on job satisfaction, extending the understanding of how KMP influences employee outcomes. The connection of KMP to job satisfaction is recognized in the theory but has not been proved empirically. This study fills that gap by

providing evidence that supports the positive relationship between the application of KMP and job satisfaction, and this serves to underscore the importance of KMP in organizations. Furthermore, this research also examines the impact of KMP on learning and communication, which act as moderators between Knowledge Management practices and job satisfaction. Previous research has examined these aspects separately, but this paper synthesizes them into one model that indicates how KMP influences job satisfaction, learning,g, and communication [7, 43]. These findings are crucial for advancing theoretical models of KM and employee satisfaction, offering a more comprehensive understanding of the mechanisms at play.

By grounding the study in the KBV [23], the research expands the theoretical debate on managing knowledge as a strategic resource in organizations. It builds upon the KBV model by showing that learning and communication benefit from KMP, and job satisfaction results from KM interventions. This theoretical contribution highlights the need to consider knowledge as a critical resource defining employee experiences and organizational consequences. Thus, the results of the present investigation align with and extend the principles of KBV by illustrating how the application of KMP affects job satisfaction. To increase the theoretical rigor of KBV in human resource management, this research synthesizes KBV with empirical findings on KMP, learning, communication, and job satisfaction. It helps to understand better how knowledge, as one of the primary strategic resources, can be utilized to improve performance, as well as the quality of life of workers [48].

This study's practical and theoretical contributions are derived from focusing on the specific relations tested. First, by supporting the direct effect of KMP on job satisfaction, as well as the roles of learning opportunity and communication quality as mediating factors, this research establishes the importance of these paths. This confirmation is helpful for practitioners and researchers who want to know the direct and indirect impact of the KMP on job satisfaction and to apply this model for future research and practice. The study also contributes to the literature by extending the understanding of the mediating roles of learning opportunity and communication quality. By creating these mediating roles, the mechanism of how KMP enhances job satisfaction unfolds [50]. This knowledge is beneficial for the development of organizational interventions targeting the improvement of the KM and the subsequent increase in employee motivation and job satisfaction: specific recommendations for the organizations are to pay attention to the creation of the learning culture and the improvement of the communication in the framework of the KM initiatives.

Practical implications

This study provides significant practical contributions to the IT sector, particularly in enhancing learning opportunities and improving communication quality. By identifying these factors as critical mediators between KM practices and job satisfaction, the research offers actionable insights for IT organizations operating in a rapidly evolving technological landscape. This study also finds that implementing several of the best KMPs, including the proper structure for acquiring and sharing knowledge, can lead to building a constant learning culture. This assists the workers to always be in touch with the new technology, resulting in improved skills and competency and thus increased organizational commitment. Furthermore, the research stresses the benefits of centralized information storage and communication systems, which help to enhance the information flow, minimize confusion, and enhance organizational coherence and teamwork, improving employee motivation and morale.

Moreover, the research supports the centrality of KMP as a driver of job satisfaction and establishes KMP as an essential element of organizational strategy instead of simply supporting activities. In the case of IT companies in Pakistan, it can be suggested that KM can be a strategic tool in the hands of the management to achieve competitive advantage and, more importantly, to ensure that the employees are engaged and committed to the organizational goals and objectives. This alignment is essential in the case of Pakistan, which is building up the technology sector and a knowledge economy. By focusing on the specific set of KM practices that strengthen learning and communication effectiveness, IT organizations may build up their organizational performance and advance the overall economic and social development goals, aligning with the country's vision to become a technology powerhouse.

Limitations and future research recommendations

This study provides valuable insights into the relationship between knowledge management practices, learning opportunities, communication quality, and job satisfaction in the IT sector of Pakistan. However, it is important to acknowledge several limitations. First, using cross-sectional data limits the ability to establish causal relationships between variables. While the findings indicate significant associations, these relationships' directionality and temporal dynamics cannot be confirmed. Future studies using longitudinal research design would help determine the mediating and temporal relationships between knowledge management practices and job satisfaction. Second, potential confounding factors were not excluded from this study, although the authors could have tried to minimize

them. For example, openness to experience and conscientiousness predispose employees to specific ways of perceiving learning and communication quality. As is with any other research, leadership style and team dynamics within organizations, which are part of the organizational culture, could also mediate or moderate the observed relationships in this study. Such factors may bring about variations that influence the reliability and validity of the findings. Subsequent research needs to include these variables to develop a more accurate portrayal of how the practices in knowledge management operate to yield the observed effects. Last, the study is restricted to the IT sector only in Pakistan. Although this sector offers a suitable and current context within which to study the role of knowledge management, the results cannot be easily transferred to other sectors or countries with different economic, cultural, or organizational environments. Further, the same kind of research across industries and in different geographical locations is suggested to confirm these conclusions.

Building on the limitations outlined above, future research should employ longitudinal designs to establish causal relationships and capture the temporal dynamics of the examined variables. Additionally, incorporating potential confounding factors such as employee personality traits, organizational culture, and leadership styles can offer deeper insights into the variability and effectiveness of knowledge management practices. Comparative studies across different sectors and cultural contexts are essential to understand the broader applicability of these findings. Further, future research could explore additional mediators and moderators, including technological advancements and employee engagement, to uncover new mechanisms influencing job satisfaction. Testing practical interventions in real-world organizational settings through experimental or action research designs could also provide actionable insights for enhancing knowledge management practices and their impact on job satisfaction.

Authors' contributions

SN and MM conceived the idea of research and finalized the design. KJ contributed to developing the theoretical framework, data analysis & ethical approval. MM and SN organization, and overall writing and editing of the manuscript. All authors read and approved the final manuscript.

Funding

Not applicable.

Data availability

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate

The research reported in this article was conducted following the ethical guidelines of the College of Economics and Management, Beijing University of Technology. Ethical approval was obtained from the Institutional Review Board (IRB) of the College of Economics and Management, Beijing University of Technology, though no specific approval number was issued. All procedures adhered to the ethical standards outlined in the 1964 Declaration of Helsinki and its later amendments or comparable ethical standards. Informed consent to participate was obtained from all participants in the study, ensuring their understanding of the research purpose, procedures, and rights.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

Received: 8 October 2024 Accepted: 20 January 2025
Published online: 27 January 2025

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