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## Article

# Upholding knowledge sharing for organization innovation efficiency in Pakistan

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Article

# Upholding Knowledge Sharing for Organization Innovation Efficiency in Pakistan

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**Abstract:** The aim of this paper was to outline the factors that provoke the knowledge sharing intents of employees and contribute toward knowledge sharing processes that result in a better rate of innovation implementation by the organizations. This research follows a holistic approach to study ‘Knowledge Sharing’. Referring to the holistic approach, this study examined the relationship between knowledge sharing enablers, processes, and outcomes. Organizational level factors (Top Management Support, Organizational Rewards) and technology linked factors (Information and Communication Technology use) were studied to show their relationship to knowledge sharing processes (knowledge donating, knowledge collecting) and how knowledge sharing processes relate to innovation efficiency in organizations in Pakistan. Data were collected from employees of Lahore based organizations irrespective of their area of functioning and level of hierarchy in the organization. Structural equation modeling was employed to test the hypotheses using AMOS 20. The findings of the study indicate that top management support is very important in determining the knowledge sharing behavior of employees. However, organizational rewards and ICT use does not support employees in knowledge sharing activities. Finally, knowledge sharing processes are strongly related to organization innovation efficiency. This study provides guidelines to managers and organizations for establishing a knowledge sharing culture for innovative performance in the long run.



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**Keywords:** Knowledge Sharing (KS); Top Management Support (TMS); Organizational Rewards (OR); Information and Communication Technology (ICT); Organization Innovation Efficiency (OIE); Open Innovation (OI); Structural Equation Modeling (SEM); Analysis of Moment Structures (AMOS)

## 1. Introduction

Today’s competitive world has developed a never ending desire in organizations to be more efficient and productive in terms of resources to gain a competitive edge over their rivals [1]. ‘Knowledge’ has emerged as a principle resource within organizations as a result of the evolution of the factor-based economy into the knowledge-based economy [2]. Organizations have started to realize that the changing power lies within the brainpower of their employees. Thus, knowledge sharing has taken the lead in the organization’s strategic sphere and is regarded as an indispensable tool for gaining competitive advantage as well as superior organizational performance and innovation [3]. With the rising importance of knowledge sharing, researchers have carried out studies in order to demonstrate what provokes people to share their knowledge (i.e., knowledge sharing drivers and processes) [4,5]. Organizational level factors are observed among important drivers to persuade employees to share their knowledge and expertise in the workplace. Various studies have highlighted the significance of organizational level factors such as the presence of shared interaction culture [6–9], support from top management [5,10,11], and the provision of incentives/rewards [9,10,12,13]. In addition to this, the use of Information and Communication Technology (ICT) has also been focused on as an enabler and predictor of knowledge sharing for its ability to provide seamless access to knowledge for individuals to share [11,14,15].

Research in the past has promoted the role of knowledge sharing toward knowledge absorption capacity, innovation efficiency, and other capabilities, which lead toward a competitive edge [1,16–19]. In fact, it has been validated by previous studies that knowledge sharing is vital within organizations as it leads to innovation efficiency [1,16,17,19], which is the main ingredient for sustainable competitive advantages [1]. Innovation is considered as a necessary element for the growth of economies [19] and this necessity has enticed researchers from various fields to look for ways to improve innovation [20]. With the formidable importance of knowledge sharing for innovation, various studies that have been conducted in developed countries highlight the connection between knowledge sharing and innovation [1,17–19,21].

However, this area of research has not received anticipated consideration in Pakistan [22,23] like other developing countries [24]. Moreover, in Pakistan, sharing of knowledge openly is not appreciated, rather, it is perceived as a sharing of authority [25]. Furthermore, limited literature is available pertaining to knowledge sharing and innovation in Pakistan [26–28]. Past studies have explored the relationship of knowledge sharing with employee intention [28], motivation methods, employee perception and trust [22], cultural diversity [29], absorptive capacity [25], and collaborative culture [23]. However, none of these studies explored the link of knowledge sharing enablers and its impact on organizational innovation efficiency. Therefore, to fill this gap, this study followed a holistic approach to study the gist of knowledge sharing. Referring to the holistic approach, this study examined the relationship between knowledge sharing enablers, detailed processes, and potential outcomes. Knowledge sharing enablers include the methods that provoke knowledge sharing among individuals. Knowledge sharing processes cover knowledge donating and knowledge collecting, while knowledge sharing outcomes discuss organization innovation efficiency achieved through knowledge sharing.

The plan of this study is to have an explicit view of knowledge sharing enablers and the relationship of knowledge sharing processes to innovation efficiency.

## 2. Literature Review

### 2.1. Knowledge Sharing

Knowledge sharing is considered to be a source through which an organization gains access to its own as well as other organizations' knowledge [30]. It has emerged as a conspicuous area of research [12,31]. Knowledge sharing is defined as the connection/interaction between social actors, which result in the exchange of explicit and tacit knowledge [32–34]. However, it is appropriate to discuss here that knowledge sharing has never been an easy task due to the involvement of multiple actors from both the 'giving' and 'receiving' end of knowledge sharing process [35]. Van den Hooff and De Ridder [32] mentioned these processes as knowledge donation and knowledge collection in organizations. In the first part, knowledge is transferred from one individual to another (knowledge donating) and in the other part, knowledge is collected by the other person (knowledge collecting) [32]. Hence, sharing knowledge is considered to be a mutual relationship between two parties where one is willing to share knowledge and the other is willing to gain it [34]. Knowledge donating occurs on the basis of willingness and the intention of employees to share their intellectual experiences/knowledge-property with other co-workers [34]. Another study debated that employees, being the owner of their intellectual property/experiences, decide when, where, and why they share their knowledge with others [36]. On the other hand, knowledge collecting is based on the recipient's perspective. It can be said that knowledge collecting is the consultation of information seekers to obtain a response from the knowledge owners via interviews, observations, or other interactive mediums [32]. Kim et al. [37] argued that knowledge collection is highly dependent on the keenness of the recipient to seek, gain, and absorb the knowledge. Therefore, it is believed that both processes play an essential part in the organization's learning, which eventually, with the help of absorption capacity of the organization, fosters its development [38].

## 2.2. Organizational Factors for Knowledge Sharing

A significant number of studies conducted in the past, considered organizational factors as the most influential in boosting knowledge sharing among employees [11,39]. The literature recognizes numerous organizational factors like organizational culture, structure, and the management's role in creating a suitable environment for knowledge sharing [4,7,8,10,40–42]. A suitable cultural environment within an organization definitely paves the way for knowledge sharing [7,8,11,43]. Ismail Al-Alawi, Yousif Al-Marzooqi, and Fraidoon Mohammed [44] undertook a comprehensive study in Bahrain to explore the effects of various organizational culture related factors on knowledge sharing. The researchers indicated that relational trust, communication, extrinsic rewards, organizational structure, and information system improved knowledge sharing. MacNeil [31] studied the themes and suggestions regarding the importance of the supervisors' role in knowledge sharing. He added that managers or supervisors were required to play their part in knowledge sharing activities. However, this study did not provide any empirical evidence, but rather asserted the need to do so.

Sharma, Singh, and Neha [45] carried out a study to understand the barriers of knowledge sharing. They found that a deficiency in top management support and their lack of understanding regarding this concept were serious barriers in knowledge sharing. Similarly, Connelly and Kelloway [11] and Nesheim and Gressgard [39] empirically showed that top management support significantly impacted the knowledge sharing insights of employees. Lin [46] also highlighted that support from top management ensured knowledge sharing among employees.

Researchers like Rahab, Sulistyandari, and Sudjono [13] have indicated that in addition to top management support, extrinsic rewards are also an important determinant of the knowledge sharing processes. Similarly, Bartol and Srivastava [12] analyzed the role of organizational rewards on knowledge sharing intentions and reported a positive relationship. Kim and Lee [47] conducted a study on public and private sector organizations to study the impact of organizational settings on the knowledge sharing abilities of employees. They also found that organizational rewards significantly impact knowledge sharing. Likewise, Kulkarni, Ravindran, and Freeze [48] suggested that management support and organizational rewards directly or indirectly affects the quality of knowledge to be shared. Therefore, organizations are required to design reward systems with great wisdom in order to obtain success in knowledge sharing activities. Conversely, researchers like Bock et al. [9] and Lin [46] highlighted that extrinsic rewards did not motivate employees to share their knowledge and therefore, the complete reliance on extrinsic rewards must be avoided.

## 2.3. Technology Factors for Knowledge Sharing

Organizations that are focused on enhancing intra-organizational knowledge sharing tend to introduce data sharing platforms through which employees can exchange their ideas and information electronically, which are also accessible to other employees [14]. Connelly and Kelloway [11] pointed out that the use of technology was highly beneficial for shy employees who were not comfortable in face-to-face interactions and preferred some online tools to exchange their thoughts. The use of computer-mediated communication allows employees to keep pace with changing techniques and knowledge dynamism [32]. ICT enables employees to access information and communicates with other employees [49]. ICT techniques include intranet, groupware, online databases, online community portals, and various social media applications. With evolving trends in social networking, the use of multiple social media applications can also boost the knowledge sharing effectiveness between employees [50]. These techniques facilitate social networking by eliminating geographical barriers [51].

Naeem [14] reported a significant relationship between technology and knowledge sharing and also found that perceived advantage and compatibility for knowledge sharing could be increased with the help of technology. Similarly, Bock and Kim [52] reported a

positive association between technology usage and employee intention to share knowledge. In addition, Kanaan and Gharibeh [53] noted that ICT use could be effective in the dissemination of knowledge. Organizations should develop their online portals and databases to encourage information and query exchange between employees as these communication platforms are the enablers of knowledge sharing [54]. It can be further argued that the use of ICT makes the flow of information easy both vertically and horizontally within the organization [49,55]. Similarly, a recent study conducted by Ahmed et al. [56] highlighted that technology based system infrastructure is helpful in engaging employees in knowledge sharing. Therefore, enterprises are required to acquire developed technology infrastructure that is substantial for knowledge flow in organizations [55].

However, studies in the past have also indicated that the use of technology has nothing to do with the knowledge sharing intents of employees. Lin and Lee [46] noted that technology related factors must not be considered as key drivers of knowledge sharing as full reliance on these factors will not promote knowledge sharing among employees. Similarly, Lin [57], in an empirical study, explored the relationship between technology aided facilities and knowledge sharing processes. The results revealed a positive correlation between ICT use and knowledge collecting, but no association was found between ICT use and knowledge donating. However, Yeh et al. [58] and Kucharska and Erickson [15] emphasized technology as a driver of knowledge sharing and further added that the digitalization of documents and the fast exploration of knowledge for its re-use are important in this regard.

#### 2.4. Knowledge Sharing and Innovation

Drucker [59] pioneered the idea of innovation efficiency for organizations. Innovation efficiency can be defined as a collection of all activities by the organization that promote or facilitate innovation efficiency [60]. Most of the literature seems to focus on finding answers for the question, 'how to innovate?' [61]. In the quest of innovation, a popular model of innovation has evolved, which is based on the prerequisites for companies to open up their innovation processes and combine both internally and externally established ideas to generate business value. This novel idea was termed as 'open innovation' by Chesbrough [62], who defined open innovation as "*a paradigm that assumes that firms can and should use external ideas as well as internal ideas*". Therefore, the very idea of open innovation uses knowledge, either generated inside or outside the firm, to develop and sustain innovation. Along similar lines, Alvarez et al. [61] debated that as more and more employees are switching jobs more frequently, moving from one organization to another, therefore, the knowledge also floats in a similar pattern.

Hargadon and Sutton [63] claimed that effective knowledge sharing facilitates innovation processes. They further stated that when individuals interact with one another and share their ideas, these ideas appear new for others and vice-versa, which results in new products and process development. When knowledge is shared among workers, then collective learning takes place, which in turn develops the knowledge stock residing in the organization [64]. This is how innovation occurs when employees share their tacit knowledge, along changing it into explicit knowledge for creating novel products and services [20]. Recently, it was claimed in a comprehensive literature study carried out by Castaneda and Cuellar [64] that these two terms (knowledge sharing and innovation) appeared together for the first time in 1973. Post 2000, these terms have received their much deserved hype from researchers, which continues to grow. Researchers have continued with the notion that innovation cannot happen in the absence of knowledge sharing [20]. Song, Fan, and Chen [18] explored the relationship between knowledge sharing and innovation through an integrated model and the analysis revealed that knowledge sharing impacts innovation efficiency significantly in China. Sliat and Alnsour [19], by conducting a study on Jordanian telecommunication sector, also found that innovation efficiency was positively affected by knowledge sharing enablers. Similarly, Jantunen [65] and Lin [57] noted that the introduction of new ideas, products, processes, and services results through



knowledge sharing, which is the essence of innovation efficiency. The latest research of Ode and Ayavoo [66] confirmed the significant relationship of knowledge sharing and firm innovation. Mardani et al. [67] and Hamdoun et al. [68] also claimed effective knowledge sharing and application of that knowledge resulted in new product development and process innovation. Belso and Diez [69] reinforced the fact that the organizations that put significant efforts in developing their knowledge networks tended to improve their innovation efficiency. The same results were established by Podrug, Filipovic, and Kovac [17] in Croatian organizations, where knowledge sharing significantly ramped up the innovation capability. Therefore, it can be said that organizations are increasingly tapping into knowledge sharing efforts to rejuvenate their innovation efficiency and boost their innovative performance [70]. Indeed, knowledge sharing not only enhances innovation, but also augments open innovation [71]. They further added that organizations with strong knowledge sharing culture tended to chase open innovation more efficiently. Open innovation centers in the utilization of internal and external knowledge, which only happens when organizations take knowledge sharing culture seriously [72]. Open innovation is characterized as inbound and outbound. Under the pattern of knowledge sharing, the firms can benefit more with inbound open innovation as it is associated with the exploitation of knowledge gathered from outside the organization [73].

There is no significant evidence in the literature available in Pakistan regarding knowledge sharing. Particularly, knowledge sharing through the holistic perspective has never been prioritized by researchers. Zubair and Nawaz [22] revealed that inspiration method, employee perception, and trust in knowledge sharing improves the actual knowledge sharing intentions of employees. However, this study did not consider various critical factors for knowledge sharing like top management support, organizational rewards, and ICT use. A study conducted by Shah and Mahmood [26] on knowledge sharing behavior of employees working in the dairy sector of Pakistan reported that intention, attitude, acceptance for technology, and behavior positively affected knowledge sharing. Again, this study did not consider organizational factors and also ignored the dimensions of knowledge sharing processes. Similarly, Ellahi and Mushtaq [28] also ignored the organizational and technology linked factors that are precursors of knowledge sharing.

Above inadequate literature pertaining to knowledge sharing and innovation in Pakistan [24,26] requires a deeper study of this concept. Few knowledge management practices and their impact on organizational performance have been studied in the past [22], but organizational and technology linked drivers of knowledge sharing processes with its outcome in the form of better innovation efficiency particularly did not receive the desired attention. Therefore, there is room to study the impact of knowledge sharing processes on innovation efficiency. Therefore, this study sought to investigate the relationship between knowledge sharing enablers, processes, and outcomes by adapting the model developed by Lin [57].

### 3. Methodology

Following the method suggested by Lin [57], this study can be characterized in three parts: enablers, processes, and outcomes. Enablers are the drivers for nurturing individual and organizational learning and also assist in knowledge sharing between employees. For this study, the enabler dimension comprises of organizational and technology factors. “Knowledge sharing processes” mean how employees share their information, job experiences, and know-how with other employees. This dimension covers knowledge donation and knowledge collection. “Outcomes” refer to how much organizational innovation is achieved through knowledge sharing. The outcome dimension covers the innovation efficiency achieved by the organization.

#### 3.1. Research Hypotheses

The literature on knowledge sharing has repeatedly reported the importance of organizational factors for facilitating knowledge sharing among workers. The two constructs

for knowledge sharing at the organizational level are recognized in the literature in terms of (1) top management support and (2) organizational rewards.

Managers shape the behaviors of staff members in the organization. The construct of top management support refers to how the managers create a knowledge sharing network through their support. In order to have a healthy knowledge sharing environment, managers must ensure that employees are interacting with each other at all levels and in every direction. Managers should focus on team work, carry out coaching programs, and allocate budgets for knowledge sharing initiatives [74]. Lin [46] emphasized that employees would be keen to contribute toward knowledge sharing activities if they perceived support from their top management. Similarly, Connelly and Kelloway [11] and Yeh et al. [58] also showed that top management could successfully create a knowledge sharing culture by supporting it. Employees will perceive knowledge sharing as a useful act only if top management is determined for knowledge sharing [42,48]. In this way, they will contribute toward both knowledge donating and knowledge collecting activities [13,19,40].

These views propose the formulation of the following hypotheses:

**Hypothesis 1a (H1a).** *Top management support is positively related to employee inclination to donate knowledge.*

**Hypothesis 1b (H1b).** *Top management support is positively related to employee inclination to collect knowledge.*

Referring to organizational rewards, Bock and Kim [9] explored the relationship between organization rewards and knowledge sharing based on the concept of economic exchange theory. This theory states that individuals prefer self-interest and behave accordingly. From a socio-economic perspective, a person only chooses the option they think can maximize their utility [75]. Employees will exchange knowledge if they perceive more benefit and less cost [76]. Ho [77] argued in this context that organizational rewards are incentives that are awarded to workers for their knowledge management efforts. As knowledge sharing demands time, energy, and threat of losing the title of knowledge, in return, employees should be satisfied with the reward/compensation for doing all of this [78]. A number of studies have reported that employees are more interested in sharing knowledge if they are assured of rewards thereafter [79]. Kulkarni et al. [48] also showed how rewards directly or indirectly impact the knowledge sharing process. Similar association between organizational rewards and knowledge sharing have also been found by other credible researchers [12,41,47]. By looking into the findings of the literature along with economic exchange theory, this study views that organizational rewards are effective in knowledge sharing activities.

Therefore the following hypotheses can be formulated:

**Hypothesis 2a (H2a).** *Organizational rewards are positively related to employee inclination to donate knowledge.*

**Hypothesis 2b (H2b).** *Organizational rewards are positively related to employee inclination to collect knowledge.*

The next independent variable studied here is technology. Information technology means the use of technology aided facilities that can assist knowledge management [49]. Numerous factors determine the knowledge sharing process, but the most important factor in the modern era is the technology linked factor. The use of modern technology is a key factor in implementing knowledge sharing networks in the organization. ICT is an important means of bagging, keeping, converting, and circulating information. The use of ICT enhances the intention toward knowledge sharing [15,63]. Previous studies have highly emphasized the effectiveness of ICT tools in knowledge sharing. For example, Naeem [14] reported a significant relationship and also found that perceived advantage

and compatibility for knowledge sharing could be increased with technology. The use of various ICT tools was found to stimulate knowledge sharing and learning within the organizations [15,55,58].

The following hypotheses can be proposed in this regard:

**Hypothesis 3a (H3a).** *ICT use is positively related to employee inclination to donate knowledge.*

**Hypothesis 3b (H3b).** *ICT use is positively related to employee inclination to collect knowledge.*

Organization innovation efficiency is the dependent variable of this study. Innovation efficiency is the degree to which the firm embraces innovation [57]. There are numerous studies that have shown a significant association between knowledge sharing and innovation efficiency [17,20,66,69]. Sliat and Alnsour [19] noted that knowledge sharing enablers lead to improved innovation level in the organization. Singh et al. [71] showed that open innovation in the organization is an organic yield of a strong knowledge sharing culture within the organization. Wang and Wang [80], through a quantitative study, reported the significant association between knowledge sharing and innovation. Lin [57] noted that knowledge sharing resulted in the implementation of new ideas and products and process advances and so a positive relationship exists between knowledge donation along with knowledge collection to innovation efficiency. Furthermore, the findings by Chang et al. [21] and Podrug et al. [17] endorse that both knowledge collection and knowledge donation show a positive effect on all types of the organization's innovation capability.

Thus, the following hypotheses can be formed in this regard:

**Hypothesis 4a (H4a).** *Employee knowledge donating is positively related to organization innovation efficiency.*

**Hypothesis 4b (H4b).** *Employee knowledge collecting is positively related to organization innovation efficiency.*

Relationship between independent variables and dependent variable is shown in Figure 1.

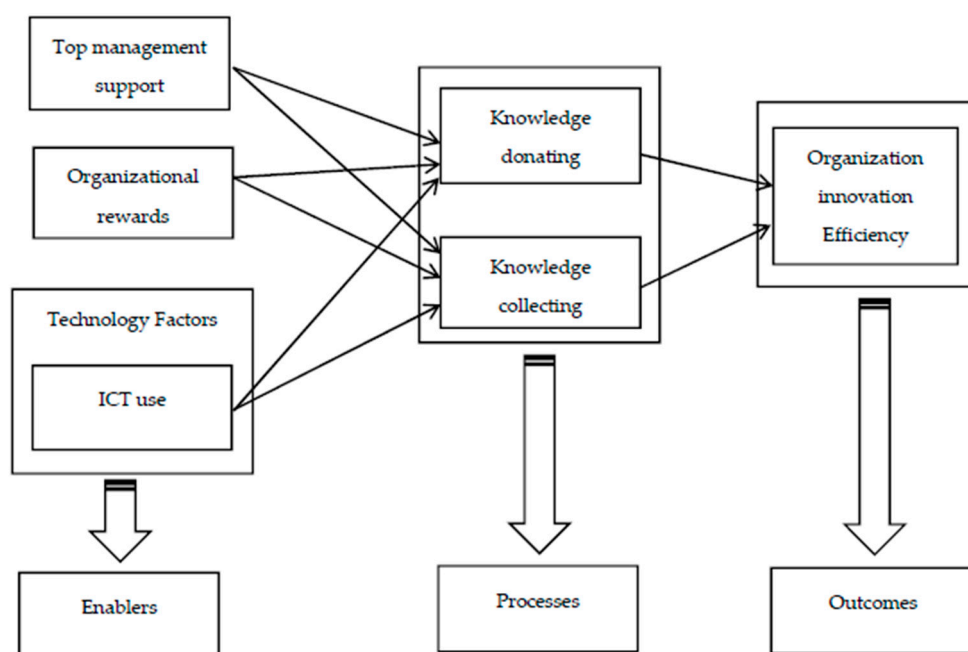


Figure 1. Research model.



### 3.2. Measure

The items forming part of the questionnaire were adapted from previous studies. All core questions were measured on a seven-point Likert-type scale (ranging from 1 = strongly disagree to 7 = strongly agree). Hair, Black, and Babin [81] recommended that at least three questions should be asked to measure each construct in order to have better consistency. Therefore, each construct was measured with at least three questions. Top management support was measured using a four-item scale devised by Tan and Zhao [82]. For organizational rewards, four items were derived from the study of Davenport and Prusak [83]. The four item scale for ICT use was also based upon the central ideas of prior literature [84]. Knowledge donating was analyzed using three items formulated and validated by van den Hooff and van Weenen [85]. For knowledge collecting, four items were employed from the study of van den Hooff and van Weenen [85]. The organization innovation efficiency construct was measured via a six item scale derived from the study of Calantone, Cavusgil, and Zhao [16], tapping the extent to which knowledge sharing relates to organization innovation efficiency.

### 3.3. Data Collection and Sample

The questionnaires were sent to the organizations selected on the basis of convenience. As the sampling frame of the study population was missing, therefore this study opted for convenience sampling. As this study was directed to analyze the knowledge sharing behavior of employees, the questionnaires were addressed to the employees irrespective of post and sector distinction. A total of 237 questionnaires were distributed and 210 were collected back, thus exhibiting a response rate of 88%.

### 3.4. Data Analysis Technique

For this study, SEM (Structural Equation Modeling) was done using AMOS 20. AMOS (Analysis of Moment Structures) is an extension of SPSS (Statistical Package for the Social Sciences). It is particularly designed for SEM, path analysis, and also covariance structure modeling. SEM was used here because of its effectiveness in checking relationships with multiple items. Lin [57], Chang et al. [21], and Podrug et al. [17] also used SEM in similar studies.

## 4. Data Analysis and Results

For this study, SEM was employed using AMOS 20. Before SEM, reliability and construct validity of the instrument was tested along with model fit assessment.

### 4.1. Reliability

Reliability measures the internal consistency of the instrument. Cronbach's alpha coefficient value was used to measure the internal consistency. The Appendix A presents the Cronbach's alpha coefficient values of all the constructs greater than 0.7, thus displaying good reliability [86].

### 4.2. Construct Validity

Construct validity refers to the extent to which the construct is measuring what it purports to measure. Construct validity is assessed through convergent validity and discriminant validity.

Convergent validity tests the extent to which constructs that are anticipated to be related are actually related. Standardized factor loadings need to be significant for convergent validity to be satisfied. The Appendix A shows that the standardized factor loadings of all constructs were significantly high.

Discriminant validity tests the extent to which constructs that are anticipated to be unrelated are actually not related. Discriminant validity is satisfied when the square root of the average variance extracted is greater than the squared correlation of two constructs. Table 1 shows the robust discriminant validity among all the constructs.

**Table 1.** Discriminant validity.

	AVE	CR	TMS	OR	ICTU	KD	KC	OIE
TMS	0.616	0.865	0.784					
OR	0.640	0.876	0.341 **	0.8				
ICTU	0.697	0.902	0.396 **	0.295 **	0.834			
KD	0.594	0.854	0.587 **	0.299 **	0.310 **	0.749		
KC	0.562	0.793	0.522 **	0.270 **	0.246 *	0.586 **	0.770	
OIE	0.662	0.922	0.375 **	0.169	0.208 *	0.635 **	0.570 **	0.813

Note: \*\*. Correlation is significant at the 0.01 level (2-tailed). \*. Correlation is significant at the 0.05 level (2-tailed).

SQROOT AVE is on the diagonal and should be greater than the correlation of each construct with other constructs

#### 4.3. Measurement Model

Confirmatory factor analysis (CFA) was employed to assess the validity of the measurement model [87]. A separate CFA was conducted on the independent, mediator, and dependent model due to limited sample size and to enhance the robustness of findings as the items from one domain will not load onto other domains. Referring to the model fit statistics shown in Table 2, the measurement model presented good fit.

**Table 2.** Measurement model goodness of fit statistics.

Goodness of Fit Measure	Independent Model	Mediator Model	Dependent Model	Recommended Value
$\chi^2/\text{df}$	1.325	1.564	1.752	$\leq 3$
CFI	0.954	0.975	0.979	$\geq 0.95$
NNFI	0.950	0.960	0.965	$\geq 0.95$
RMSEA	0.057	0.075	0.08	$\leq 0.08$

#### 4.4. Structural Model

First, the goodness of fit of the research model was analyzed.

The  $\chi^2$  was 1.307 ( $\chi^2/\text{df} = 1.307$ ;  $\text{df} = 6$ ), CFI was 0.997, NFI was 0.976, NNFI was 0.971, and the RMSEA was 0.05, as evident in Table 3.

**Table 3.** Model fit statistics of the full composite model.

Goodness of Fit Measure	Value	Recommended Value
$\chi^2/\text{df}$	1.307	$\leq 3$
CFI	0.997	$\geq 0.95$
NFI	0.976	$\geq 0.95$
NNFI	0.971	$\geq 0.95$
RMSEA	0.05	$\leq 0.08$

Results of the structural model are presented in Table 4. H1a and H1b were supported with significant path coefficients of  $b = 0.198$  ( $t = 2.414$ ,  $p < 0.05$ ) and  $b = 0.193$  ( $t = 1.978$ ,  $p < 0.05$ ), respectively, thus underlining a positive association between top management support and the knowledge sharing process and the same results have been reported in the literature [11,19,39,40]. H2a and H2b were not supported with  $b = 0.038$  ( $t = 0.543$ ,  $p > 0.05$ ) and  $b = 0.070$  ( $t = 0.856$ ,  $p > 0.05$ ), respectively, thus asserting an insignificant relationship between organizational rewards and knowledge sharing processes, hence supporting the previous literature in this context [31,39]. Additionally, economic exchange theory cannot be applied in this case as material incentives do not provoke the knowledge sharing intents of employees. H3a and H3b were also not supported with  $b = 0.067$  ( $t = 0.968$ ,  $p > 0.05$ ) and  $b = 0.008$  ( $t = 0.101$ ,  $p > 0.05$ ) and these findings were also consistent with the prior literature

findings [11,88]. Finally, H4a and H4b were supported with significant path coefficients of  $b = 0.463$  ( $t = 5.344$ ,  $p < 0.01$ ) and  $b = 0.303$  ( $t = 3.498$ ,  $p < 0.01$ ), respectively, thus supporting previous studies [1,17,19,21,57]. Figure 2 presents the relationship of independent variables and dependent variable and also shows the results of the structural model.

Table 4. Results of the structural model.

Hypotheses	Hypothesized Path			Standardized Regression Weight ( $\beta$ )	t-Value	p Value	Results
Hypothesis 1a	KD	<—	TMS	0.198	2.414	0.016 **	Supported
Hypothesis 1b	KC	<—	TMS	0.193	1.978	0.048 **	Supported
Hypothesis 2a	KD	<—	OR	0.038	0.543	0.587 <i>ns</i>	Not Supported
Hypothesis 2b	KC	<—	OR	0.070	0.856	0.392 <i>ns</i>	Not Supported
Hypothesis 3a	KD	<—	ICTU	0.067	0.968	0.333 <i>ns</i>	Not Supported
Hypothesis 3b	KC	<—	ICTU	0.008	0.101	0.919 <i>ns</i>	Not Supported
Hypothesis 4a	OIE	<—	KD	0.463	5.344	0.00 ***	Supported
Hypothesis 4b	OIE	<—	KC	0.303	3.498	0.00 ***	Supported

Note: \*\*\* Significant at  $p < 0.01$  as t-value is larger than 2.58. \*\* Significant at  $p < 0.05$  as the t-value is larger than 1.95. *ns*: not supported.

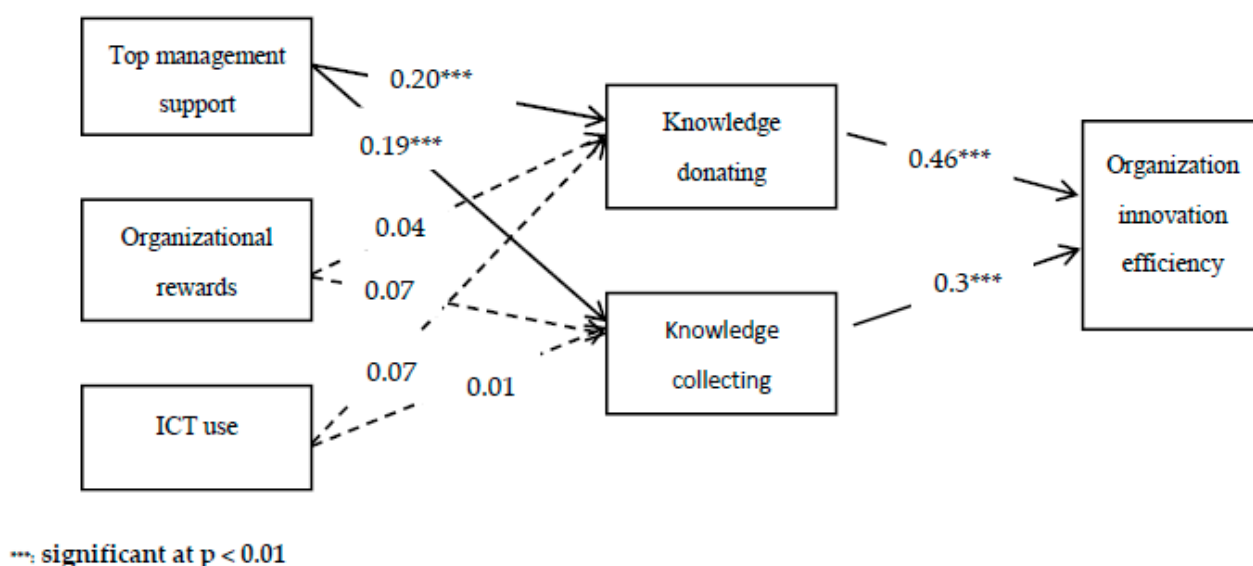


Figure 2. Results of the structural model.

## 5. Discussion and Recommendations

The first construct of organizational factors was the support from top management. The hypothesis for this construct was divided into two sub-hypotheses that showed its relationship to knowledge donation and knowledge collection. The analysis of the data collected confirmed that top management support significantly related to knowledge sharing processes by provoking employees to donate and collect knowledge. This finding indicates the significant role of a leader in knowledge donating and collecting activities with an understanding that employees in the organization are inclined to act in accordance with the top management directions [11]. Therefore, top management can use this support as a tool in the organization to introduce knowledge sharing activities. Top management support is also an intrinsic motivation for employees in enhancing knowledge sharing activities [10,11,31,42]. Therefore, it is in the hands of managers to promote the knowledge sharing intentions of employees by encouraging and endorsing a social interface culture of sharing.

The second construct of organizational factors was the provision of indigenous organizational rewards to the employees to promote knowledge sharing activities. The hypothesis for this construct was also divided into two sub-hypotheses dealing with knowledge donating and knowledge collecting. The results indicate that organizational rewards do not enhance employee intentions for knowledge donating and knowledge collecting activities. All of the extrinsic rewards like bonuses, salaries, and incentives did not provide significant benefits in this context. These findings suggest that employees are more inclined toward intrinsic rewards compared to extrinsic rewards for their knowledge sharing activities. Intrinsic motivation is perceived as enjoyment in helping others, self-efficacy as well as encouragement from top management [89]. Lin [89] also asserted that extrinsic rewards will only provide short-term benefits, and soon these rewards will stop motivating employees. Therefore, extrinsic rewards are not imperative in the long run.

The third category is technology related. The construct on ICT describes the relationship of ICT usage toward knowledge donation and knowledge collection. The analysis of the data collected indicates an insignificant relationship between ICT usage and employee readiness to donate and collect knowledge. These findings are consistent with Lin and Lee [46], Handzic et al. [88], and Akosile and Olatokun [41] that ICT tools alone are not helpful in distributing knowledge, and that there are other organizational factors that must be taken into account first. Knowledge sharing is a human interaction process that depends mostly on other human- and organization-related factors. Only using ICT tools will not boost knowledge sharing activities unless grouped with other factors [57].

The final outcome of the study deals with the relationship between knowledge sharing processes and organization innovation efficiency. The structural model test confirmed that knowledge donation as well as knowledge collection promotes innovation efficiency in the organization. This indicates that employees think creatively when they are involved in knowledge donating and knowledge collecting activities, which results in the creation of novel ideas, superior products/services, and novelty in operational methods. Innovation occurs when employees freely exchange their ideas as only in this way, organizations come up with innovative products and services. Arguably, a knowledge sharing culture plays a critical role in boosting the firm's innovation capability. Change introduced by the organization such as introducing training workshops, allocating budgets, and involving employees in knowledge transfer surely introduce the new ideas generated by workers, which are the essence of innovation capability. Knowledge resides in the individuals, as discussed before, but this knowledge needs to be extracted out of the humans so that they can pave the way for new ideas of doing things. Knowledge sharing not only improves innovation, but it is helpful in augmenting open innovation. Organizations that are inclined toward boosting open innovation need to unravel certain strategies that are different from organizations pursuing conventional innovation [90]. The study of Chiaroni et al. [90] on asset intensive industries explained that the shift from close innovation to open innovation required an efficient knowledge management system along with intra organizational networks, organizational structures, and evaluation processes. These are the ways through which organizations can implement the ever evolving concept of open innovation in their strategies. On the other hand, there are certain drawbacks of openness, like open innovation lies at the heart of external collaboration but this commercialization of ideas need to be protected [91]. Therefore, the companies should design their business models keeping open innovation in mind [92]. Upholding a knowledge sharing culture ushers in continuous innovative performance while moving toward open innovation [57,71]. Hence, knowledge sharing is the lynchpin for organization innovation efficiency [17,19–21,66].

### 5.1. Implications

In general, this paper contributes to the literature and practice by: (1) examining the effects of knowledge sharing enablers including knowledge collecting and knowledge donating on organizational innovation efficiency; and (2) using a holistic approach to study knowledge sharing in a Pakistani context. In light of previous empirical findings, this study has various managerial implications in terms of designing a knowledge sharing strategy in organizations. First, top management should be supportive and proactive in developing a knowledge sharing culture. An organization can have a healthy social interaction culture if top management encourages the employees to share their information, skills, and expertise. However, organizational rewards showed an insignificant relationship with knowledge sharing. This denotes that extrinsic rewards are not mandatory in order to have positive knowledge sharing among employees, so they should not be considered as a primary force for knowledge sharing by managers. Next, dependence on a techno-centric method also does not ensure successful interpersonal interaction between employees.

Inconsistency in the previous literature makes this study's findings much more concerned with the development of a comprehensive model for knowledge sharing, particularly in the context of developing countries. With the help of the empirical findings of this study, managers can devise strategies for boosting a social interaction culture, which will help employees bring together novel ideas in product development, processes, and services, thus speeding up the innovation acceptance of organization.

### 5.2. Limitations and Recommendations

First, this research is limited to organizational and technology linked factors for boosting the knowledge sharing processes. Future studies must focus on the personal traits of individuals such as age, gender, and education, along with the organization's size and industry type as moderating variables between knowledge sharing enablers and processes with reference to an emerging concept of 'work from home' led by COVID-19. Second, inter-organizational knowledge sharing has not been taken into account. Therefore, future studies could focus on knowledge sharing with stakeholders like suppliers and customers because new ideas could be generated from this inter-organizational knowledge sharing. Third, this study was limited to a few knowledge sharing enablers and all knowledge sharing enablers were not considered. For example, van den Hooff and van Weenen [85] characterized employee commitment and communication climate as significant enablers for knowledge sharing. Therefore, future research must consider these essential enablers of knowledge sharing. Fourth, the sample size was small and was only taken from the employees working in Lahore-based organizations. Future research should be carried on with larger sample sizes taken from different cities and countries to understand the cultural differences in knowledge sharing behavior. Finally, studies should also focus on the long-term effects of these enablers like whether the employees' reactions toward knowledge sharing enablers are temporary or sustainable. For this purpose, longitudinal data must be gathered to analyze the relationship between variables. Future studies can also explore the role of absorptive capacity within the local context [18]. Furthermore, external knowledge sourcing is also an emerging phenomenon for organizational innovation efficiency [68]. This phenomenon can be further explored within the local context. Future studies may also explore knowledge sharing in the corridor of 'institutional memory' [93].

## 6. Conclusions

The aim of the study was to examine the concept of knowledge sharing with reference to organizational innovation efficiency. This research is the first attempt to study the knowledge sharing through a holistic perspective in Pakistan by analyzing the impact of organizational and technology linked factors on knowledge donating and knowledge collecting activities and their subsequent impact on the rate of innovation adoption in Pakistan. The findings of the study have highlighted the significance of efforts that management should take to promote knowledge sharing activities in the organization. However,



this study suggests a point of disagreement with the provision of organization rewards to provoke the knowledge sharing intentions of employees. Similarly, ICT use does not guarantee healthy knowledge sharing among peers. The study offers insights to managers to understand their role in improving the knowledge sharing activities of their subordinates in the workplace. They can make work teams and organize periodic learning sessions for knowledge sharing. The concept is that crowd-storming among workers may lead to better idea generation and improved ways of doing things. Managers can introduce various IT-based knowledge sharing databases in the organization for the ease of employees. However, these IT-based practices by organizations also work best only when coupled with management support, supervision, and other contributing factors. This study finally concludes by empirically emphasizing that knowledge sharing processes can help the organization achieve a higher level of innovation efficiency.

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## Appendix A

**Table A1.** Factor loading table.

Constructs	Items	Factor Loadings	Cronbach's Alpha
Top management support	Top management holds the belief that inspiring knowledge sharing among co-workers is useful.	0.772	0.950
	Top management is always supportive for knowledge sharing among workers.	0.779	
	Top management provides needed resources to encourage sharing of knowledge among employees.	0.738	
	Top management is eager to see that workers are happily engage in knowledge sharing process.	0.846	
Organizational rewards	I expect a rise in salary for sharing my knowledge with other co-workers.	0.748	0.914
	I expect to be rewarded with a bonus for my knowledge sharing with other colleagues.	0.768	
	I expect to be rewarded with promotion for my knowledge sharing with other colleagues.	0.845	
	I expect to be rewarded with job security for my knowledge sharing with other colleagues.	0.834	

Table A1. Cont.

Constructs	Items	Factor Loadings	Cronbach's Alpha
ICT use	Use of electronic database is quite common among workers to have an access to knowledge.	0.848	0.940
	Knowledge networks like intranet groupware, virtual communities are used by employees to communicate with each other.	0.833	
	My company aims to use technologies to help knowledge sharing among workers in the organization	0.874	
	My company aims to use technologies to help knowledge sharing with others outside the organization	0.783	
Knowledge donating	I use to share the new stuff that I have learned with my co-workers.	0.783	0.887
	My co-workers use to share the new stuff that they have learned with me.	0.773	
	Sharing knowledge is a repetitive activity among co-workers in my organization.	0.690	
Knowledge collecting	I transfer my knowledge with co-workers whenever they inquire me.	0.837	0.896
	I transfer my skills with co-workers whenever they inquire me.	0.745	
	Co-workers transfer their knowledge to me whenever I need it.	0.755	
	Co-workers transfer their skills to me whenever I need it.	0.741	
Organization innovation efficiency	My organization continually works on novel ideas.	0.770	0.941
	My organization follows novel practices of doing things.	0.789	
	My organization is advanced in using operational practices.	0.705	
	Very often it's my own organization that introduces novel products and services	0.750	
	Innovation is considered as uncertain and this is why it is discouraged at my organization.	0.812	
	My organization has a record of introducing new products and services in the market since past five years.	0.800	

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