Knowledge Management & E-Learning, Vol.15, No.2. Jun 2023

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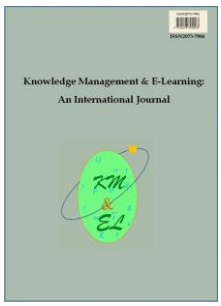

Knowledge Management & E-Learning: An International Journal (KM&EL)
ISSN 2073-7904

Recommended citation:
Umer, M., Nawaz, F., & Ali, M. (2023). Reconciling the impact of knowledge management processes on knowledge worker productivity. *Knowledge Management & E-Learning, 15*(2), 269–286. https://doi.org/10.34105/j.kmel.2023.15.015

Knowledge Management & E-Learning, 15(2), 269–286

Reconciling the impact of knowledge management processes on knowledge worker productivity

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Abstract: Knowledge management has been a proven tool to foster organizational performance, innovations, and individual knowledge workers' productivity. A stream of empirical studies has demonstrated with contradictory results that each single organizational knowledge management process – knowledge creation, knowledge sharing and utilization – can enhance the knowledge workers' productivity in isolation. In contrast, our study argues with the support of Nonaka's theory and alignment theory that knowledge utilization is the only frontline and primary knowledge management process which can enhance knowledge workers' productivity while other knowledge management processes (knowledge creation and knowledge sharing) support and supplement each other as well as improve knowledge utilization. This means that shared and created knowledge will not enhance the productivity of knowledge workers until organizations strive for knowledge utilization. This study used data collected from 336 knowledge workers in the Telecom industry of Pakistan and examined it using partial least squares modelling. The findings indicated that knowledge utilization is the sole frontline and primary knowledge management to enhance the productivity of knowledge workers. Hence, knowledge utilization can only influence productivity indirectly by increasing the utilization of knowledge created and/or shared.

Keywords: Knowledge management; Knowledge management processes; Knowledge creation; Knowledge sharing; Knowledge utilization; Knowledge worker; Knowledge workers productivity

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1. Introduction

According to the knowledge worker productivity theory, the knowledge worker's productivity is the most complex issue (Drucker, 1999; Becerra-Fernandez, Gonzalez & Sabherwal., 2004). Knowledge management provides a simple toolkit to increase knowledge worker productivity (Ahmad et al., 2017; Sahibzada et al., 2022). Knowledge management is essentially comprised of three processes: knowledge creation, knowledge sharing, and knowledge utilization (du Plessis, 2007). Knowledge management impacts the knowledge worker's productivity (Omotayo, 2015; Ramírez & Nembhar, 2004; Suchitra & Gopinath, 2020). However, the most patent definition of knowledge management was given by (Gold et al., 2001; Kianto et al., 2016; Kianto et al., 2019; Shujahat et al., 2019) as the mixture of procedures and practices, supported by knowledge management structure, to develop the modernization and organizational performance.

Two components of knowledge management may be asserted. These are knowledge management practices or knowledge management processes (Darroch & McNaughton, 2002), and the knowledge management infrastructure (Gold et al., 2001; Inkkinen et al., 2015). Knowledge management infrastructure is the combination of elements which facilitate the knowledge management processes to happen; it might be comprised of human resources, organizational culture, information technology, organizational structure, and top leadership support (Hajir et al., 2015). This study concentrates on knowledge management processes, defined as the motion of knowledge

between the employees and different units of a knowledge-based organization (Gold et al., 2001; Alguezaui & Filieri., 2014).

The knowledge management process refers to the process consisting of sub-processes, which include knowledge creation, knowledge sharing and knowledge utilization (Nonaka and Takeuchi, 1995; Kang et al., 2007; Andreeva et al., 2017; Shujahat et al., 2019). Though, the active explanation of these knowledge management processes refers to the method of creation, sharing, and utilization of knowledge (Shujahat et al., 2019; Ahmad et al., 2017; Kianto et al., 2019).

Several studies (Kianto et al., 2019; Haas & Hansen, 2007; Iranzadeh, & Pakdelbonnab, 2014; Table 1) over 15 years suggested knowledge management (processes) as a toolkit to improve knowledge worker productivity. The term knowledge work is comparatively new and sometimes also refers as―White-Collar Work and is associated with a workforce who works with intangible resources, they are high-level workers who apply theoretic and logical knowledge learned via formal education and grow novel products/services with innovation & expertise (Drucker, 1994; Drucker, 1999; Davenport & Prusak., 2000; Ramiez., 2004).

However, the findings of these studies were inconclusive and inconsistent such that numerous knowledge processes discovered significant determinants of knowledge worker productivity while others were not. Among the three studies on the theme, two studies found (Kianto et al., 2019; Haas & Hansen, 2007) that knowledge sharing is not a noteworthy way to foster knowledge worker productivity while Iranzadeh & Pakdelbonab (2014) finding was the opposite of that. These inconsistent findings need to be reconciled. The above-mentioned studies can easily be depicted in the following table (Table 1).

Table 1
Research gaps addressed

Serial No.	Study	Purpose	Sample	Sample size	Results
1	Kianto et al., 2019	To study the influence of knowledge management processes on knowledge worker efficiency.	Data is collected from knowledge workers belonging to all five mobile companies in Pakistan.	336	Knowledge utilization and knowledge creation increases the knowledge worker productivity while knowledge sharing does not do so.
2	Haas & Hansen, 2007	To assess the impact of knowledge sharing on productivity.	Management consulting firms/ sales teams.	182 sales teams	Personal advice Knowledge Sharing did not impact the productivity.
3	Iranzadeh & Pakdelbonab, 2014	Impact of knowledge management implementation on labour productivity in University of Tabriz, Iran.	Knowledge workers of the University of Tabriz, Iran.	680	All Knowledge processes affect the knowledge worker productivity statistically significantly.

These studies address the relationships between knowledge management, knowledge management processes, and knowledge workers' productivity (Iranzadeh & Pakdelbonab, 2014; Haas & Hanson., 2007; Kianto et al., 2019). Haas & Hanson (2007) assesses the effect of knowledge sharing only on knowledge-workers productivity. They draw data from 182 sales teams in a management consulting company for their empirical study. It was concluded by authors that arranged knowledge sharing impacts task-on-time negatively while information sharing improves the excellence of job performance and capabilities (Haas & Hanson., 2007). While Iranzadeh and Pakdelbonab (2014) examined the influence of knowledge-management practices on job productivity among university

teachers at the University of Tabriz, Iran with a sample size of 680. The general results recommend that all processes of knowledge management impact job productivity completely and significantly. Kianto et al. (2019) examine the same, i.e., the influence of these knowledge management processes on knowledge-workers efficiency. The data is collected from the knowledge workers working in all telecom companies of Pakistan with a sample size of 336. The authors have concluded that both knowledge creation and knowledge utilization influence the knowledge-workers efficiency positively, while knowledge sharing does not do so.

Alignment theory suggests that some assets are interactive and frontline while others are complementary or supportive (Lin et al., 2019). This theory suggests that some knowledge processes can be frontline while others are complementary to them.

1.1. Research questions

This study investigates the following research questions:

RQ1: Whether and how does the creation and sharing of knowledge affect the knowledge-workers productivity through the knowledge utilization process?

RQ2: Whether and how does the sharing of knowledge impact the knowledge-workers productivity through fostering knowledge creation and knowledge utilization, respectively?

2. Literature review

The root of the knowledge creation and transfer theory was presented by Nonaka and Takeuchi in 1995. This theory is also recognized as the SECI - Socialization, Externalization, Combination, & Internalization- a model of Nonaka & Takeuchi. The focus of this model is on presenting individual knowledge accessible to others. The Theory of Nonaka & Takeuchi sheds light on how knowledge was acquired, transferred, and newly generated amongst the course participants (Menkhoff et al., 2022).

2.1. Knowledge management and knowledge management processes

2.1.1. Knowledge management

The process and role whereby knowledge is generated, developed, arranged, shared, and used through facilitating environment to enhance the novelty and performance are known as knowledge management (Zack et al., 2009; Andreeva & Kianto, 2011; Rezaei et al., 2021; Suchitra et al., 2021). However, the most patent definition of knowledge management was given by Shujahat et al. (2018), who defines knowledge management as the mixture of procedures and practices, supported by the knowledge management structure, to develop modernization, and organizational performance. The contemporary definition of knowledge management is some justified, personal beliefs that increase one ‘s ability to take decisive actions (Turner et al., 2009). While Opele (2022) has defined knowledge management as it’s all about facilitating the processes by which knowledge is created, shared, and effectively used in organizations. To promote effective knowledge management, active participation is key at all levels of the organization (Turyahikayo, 2021)

2.1.2. Knowledge management processes

The knowledge management processes are defined as the motion of knowledge between the employees and different units of a knowledge-based organization (Gold et al., 2001). Several definitions of these processes of knowledge management were found by past researchers, Cossta and Monnteiro (2016) stated that these processes comprise the production, acquirement, hoarding and holding of knowledge. Inkkinen (2016) defined these processes as the procedure which consists of other sub-processes including acquirement, formulation, collation, transmission, and holding of knowledge.

2.1.2.1. Knowledge creation

The process and capabilities of an organization to generate fresh knowledge because of innovatory concepts and explanations are known as knowledge creation (Smith, Collins, and Clark, 2005; Andreeva and Kianto, 2011; Shujahat et al., 2018). There are four backgrounds of knowledge-creation processes (Andreeva and Kianto, 2011) which includes the opportunity for knowledge creation, motivation of the knowledge worker to create new knowledge, the knowledge worker's capacity to generate knowledge, and after all, perception of the newly created knowledge as essential.

2.1.2.2. Knowledge sharing

The movement of knowledge between various entities and performers inside an organization is known as knowledge sharing (Kianto et al., 2019; Nonaka, 1994; van den Hooff and de Ridder, 2004; Azeem et al., 2021). van den Hooff and de Ridder (2004) declare that knowledge sharing consists of donation and collection of knowledge. While Olaander et al. (2016) categorized it as formal and informal knowledge sharing. The elements of knowledge sharing include extrinsic & intrinsic motivation, loyalty, trust, job satisfaction, leadership support, and values & norms of an organization (van den Hooff and de Ridder, 2004; Al-Husseini & Elbeltagi., 2015; Andreeva and Kianto, 2011; Kianto et al., 2019).

2.1.2.3. Knowledge utilization

Knowledge utilization refers to the process of any organization to reserve, recover, read, and utilize knowledge for tactical commitments effectively (Gold et al., 2001; Rashid et al., 2021). Knowledge utilization is also known as knowledge application or knowledge implementation (Lee et al., 2013). Knowledge sharing is the application of knowledge which was shared (Song et al., 2005). The elements of knowledge utilization include remuneration, trust, Research & Development fund allocation and services, IT infrastructure, lesser information redundancy, knowledge sharing, knowledge integration, knowledge creation, and willingness & motivation (Song et al., 2005; Lee et al., 2013).

2.2. The knowledge worker productivity

Productivity and efficacy of the knowledge worker are known as knowledge worker productivity this is not just an issue related to quantity, but the quality of output is also as essential (Ali, 2013; Bosch-Sijtsema, Ruohomäki, & Vartiainen, 2009; Jamal Ali & Anwar., 2021; Sahibzada et al., 2022; Drucker, 1999). Drucker (1999) emphasizes six major factors which determine the knowledge workers' productivity. Firstly, the Knowledge workers' productivity must demand that the knowledge operative should

know the nature of the task, which is to be performed. Secondly, it requires that the responsibility for productivity will be fixed upon the individual personnel. The knowledge worker has ample job autonomy. Thirdly, the knowledge worker always innovates while performing the work. Fourthly, the knowledge worker must be part of the continuous teaching/ continuous learning process while performing daily organizational responsibilities. Fifthly, for knowledge-worker productivity, quality is also signifying quantity; by this virtue, Drucker's knowledge-worker efficiency theory differs from 19th-century manual worker theory. Lastly, the treatment of knowledge workers as assets, as an alternative to costly, enhances knowledge-worker productivity.

2.2.1. Knowledge management as a tool to enhance the knowledge workers' productivity

While keeping these six elements in mind i.e., knowledge-related nature of work, constant innovation condition, handling of the knowledge assets as the central asset, a continuous process of learning and teaching, focuses on both quality and quantity, and job autonomy are the determinants of knowledge worker productivity, it is inferred that literature review supports that knowledge management strengthens and retains these six elements within it. Briefly, diverse studies concluded that knowledge management supports employee empowerment and treatment of knowledge as a strategic asset, increases the total quality management, encourages learning by doing and continuous innovation for the sole purpose of strategic survival & development and thus, collectively the competitive advantage to the organization (Honarpour et al., 2018; Hasani & Sheikhesmaeili, 2016). Hence it is asserted that knowledge-management impacts employee productivity statically significantly.

To the best of my literature review, there have been only three past researches that address the relationships between knowledge management, knowledge management processes, and knowledge workers' productivity (Iranzadeh & Pakdelbonab, 2014; Haas & Hanson., 2007; Kianto et al., 2019). Firstly, Haas & Hanson (2007) assesses the effect of knowledge sharing only on knowledge-workers productivity. They draw data from 182 sales teams in a management consulting company for their empirical study. Authors concluded that arranged knowledge sharing impacts task-on-time negatively while information sharing improves job performance and capabilities (Haas & Hanson., 2007). While Iranzadeh and Pakdelbonab (2014) examined the impact of knowledge-management practices on labour productivity among university teachers. This study was undertaken at the University of Tabriz, Iran with a sample size of 680. The general results recommend that all processes of knowledge management impact job productivity completely and significantly. Kianto et al. (2019) examine the same, i.e., the influence of these knowledge management processes on knowledge-workers efficiency. The data is collected from the knowledge workers working in all Information Technology/ telecom companies of Pakistan with a sample size of 336. The authors have concluded that both knowledge creation and knowledge application or knowledge utilization influence the knowledge-workers efficiency positively, while knowledge sharing does not do so. These research gaps may easily be understood in Table 1 in the introduction section of this study.

But as per a review of past studies, the results of these studies were not convincing by the subsequent justifications. Firstly, the causality mechanism was not covered by these studies' literature. Secondly, the contradictory findings of these studies in which some knowledge processes resulted having a non-significant impact on assignment proficiency and suitability (Haas and Hannsen., 2007; Iranzadeh and

Pakdelbonnab, 2014). While Kianto et al. (2019) concluded that knowledge sharing didn't affect employee productivity positively. Thirdly, most researchers calculated the processes of knowledge management as separate variables and productivity from the extent of the output dimension by overlooking the split aspects of knowledge management processes. Fourthly, some researchers examined productivity by using objective data from the firm's reports. Though, Drucker (1999) suggested that fostering output is the obligation of knowledge workers. Therefore, using subjective data from these workers creates extra meaning. By using subjective data, it is concluded that employee productivity can only be calculated by the efficiency of the firm, and the effectiveness/quality of productivity was completely overlooked. Finally, these all studies except Kianto et al. (2019) assess the relation on basis of those data which was not collected explicitly from knowledge workers-which have the ability and competence of knowledge work. Considering these contradictions, we considered assessing the relationship between knowledge-management processes and employee productivity separately and in-depth.

2.3. Hypotheses of the study

***H1*:** Knowledge sharing has a statistically significant impact on knowledge utilization.

***H2*:** Knowledge sharing has a statistically significant impact on knowledge creation.

***H3*:** Knowledge creation has a statistically significant impact on knowledge utilization.

***H4*:** Knowledge utilization has a statistically significant impact on knowledge-worker productivity positively

3. Research method

The quantitative type of method is used for the current study. Hypotheses and the theoretical framework of the current study indicate that relationships among elements of the knowledge management process (knowledge sharing, knowledge creation & knowledge utilization) & knowledge-worker productivity are to be tested. Therefore, a quantitative type of research is adopted.

This study used the data gathered from the employees/ knowledge-workers of the IT/ Telecom Sector in Pakistan, who are serving at their respective headquarters. The target employees are those who are working in MIS, IT/telecom, and technical and engineering departments. There are several reasons behind this target population. These are as follows:

Those workers who work at the headquarters confront most of the modernization and consequently productivity pressures as they ultimately respond to the customers through calls. Knowledge workers there have greater autonomy than franchise employees. This sector demands knowledge-based employees as its educational demands reflect. It demands that employees have high tacit knowledge creation and knowledge utilization (Nair & Vohra, 2010). This sector has the knowledge and information management systems to meet the demands of the clients. The Telecom sector is the only sector where the basic/required qualification is a minimum master's degree, this differentiates them from other sectors as the more competent and knowledge-intensive one.

Sample from the study has been drawn by using convenience sampling. A sample of 336 usable responses was obtained out of a total of 400 distributed questionnaires. The response rate recorded is 84%. Among these 336 respondents, the male population is dominated by 76%, all the 336 respondents have a master's degree, 58.05% were frontline employees, 2% were senior managers and 40.18% were middle managers.

Data for the study was collected via survey and through adapted questionnaires as it is both cost and timesaving for the researchers. This study mainly contained three variables or constructs including knowledge management processes and employee productivity or knowledge worker productivity.

The knowledge management process is operationalized as the procedure of knowledge creation, knowledge sharing, & knowledge application. For measuring knowledge management processes Normalization & Normung (2004) questionnaire "European Guide to Good Practice in Knowledge Management: Guidelines for Measuring knowledge management" is adapted. For the measurement of knowledge creation, all 9 items are adapted. However, for the measurement of knowledge sharing and utilization, 8 and 9 items are adapted for each corresponding construct respectively as described by Normalization and Normung (2004). This scale has previously been employed by previous studies (Shujahat et al., 2019; Kianto et al., 2019) on the effect of knowledge management on employee productivity and showed good reliability and validity.

The second main construct of the study is employee/ knowledge-worker productivity which is composed of three dimensions: job autonomy at work, meeting time demands, and work efficiency (Malik, 2012). This construct is consistent with the prevalent knowledge management and human resource management perspectives that deal with employee productivity (Fernandez, 2013; Malik, 2012). Furthermore, this scale has also been used by past research (e.g., Malik, 2012; Shujahat et al., 2019; Kianto et al., 2019) on knowledge management and knowledge-worker productivity and demonstrated satisfactory reliability and validity. The scales for the measurement of these three dimensions are as follows. The first dimension, Job sovereignty was assessed using three adapted items of Morgeson and Humphrey (2006). Second, meeting time demands were assessed by using two adapted items from the Work limitation Questionnaire of Lerner et al. (2001). The third factor, work productivity, was assessed using three adapted items from Tangen (2005).

This study employed the data and technique used by Kianto et al. (2019) in their study on the effect of knowledge-management processes on knowledge-workers productivity. The current research used Smart PLS 3 software for the data analysis which uses partial least squares modelling as a data analysis and reporting technique. This data analysis technique and software are used because it is friendly to use and has dynamic features in the results reports. By acting upon the guiding principle for PLS-SEM of Hair et al. (2017) & Rinngle et al. (2018), all items with 0.7 or greater outer loading were taken while factor loadings lower than 0.7 were released during path analysis i.e., their removal did not impact the content validity. This study assessed the Harman factor test to address the potential risk of common method biases. In this data covariance explained by the single factor is 37.98% which is below the threshold value of 50% which shows that no issue of common method biases exists in the data.

The measurement model assesses and establishes the reliability & validity of every single construct while the research model tests the hypotheses of the study. This study assessed the reliability/outer loadings of the items and constructs, convergent validity, and discriminant validity as part of the measurement model. On the other hand,

path coefficients and associated significance values/*p*-values and R^2 or regression/coefficient of determination.

4. Data analysis and results

4.1. Measurement model

Table 2 reports the mean, standard deviations, and inter-correlations between the constructs of the study. The mean values indicate that knowledge-management processes and employee productivity exist in the sampled data and organizations. Furthermore, the higher and more significant values of inter-correlations in (Table 2) give preliminary support to the hypotheses of the study that knowledge-management processes are interrelated with each other, and that knowledge utilization is highly correlated with knowledge worker productivity.

Table 2
Descriptive statistics and correlations

	Mean	*SD*	Knowledge creation	Knowledge sharing	Knowledge utilization	Knowledge-worker productivity
Knowledge creation	2.017	0.532	1			
Knowledge sharing	1.650	0.533	0.596	1		
Knowledge utilization	1.922	0.511	0.779	0.616	1	
Knowledge worker productivity	2.013	0.562	0.71	0.565	0.754	1

Note. All correlation values are significant at 1% ($p < 0.01$)

This study assessed the four most important components of the research model which included outer loadings, convergent validity, construct-reliability, and discriminant validity. Table 3 exhibits that the outer loadings of all items taken in the measurement model after the analysis of data are higher than the threshold values of 0.7. Table 3 demonstrates that every single construct of the study has reliability, as the threshold of the two associated measures exceeds 0.7. Table 3 reports that every single construct of the study possessed convergent validity as the associated values exceed threshold values.

Finally, the measure of the discriminant validity–the degree to which two variables are distinct/different from one other–is the Heterotrait-Monotrait (HTMT) ratio between each of the two constructs of the research model (Henseler et al., 2015). The maximum value for this measure is 0.9. Table 4 reports that the HTMT ratio for each pair of the construct of this study is below the threshold value which means that every single construct is distinctive from the others.

4.2. Research model

This study assesses path coefficients and associated p-values to test the hypotheses and regression in the structural model. So, the hypotheses are tested, respectively (Table 5). H1 postulated that knowledge sharing impacts knowledge utilization positively and statistically significantly. The results support it ($\beta = 0.235$, p-value < 0.05; Table 5). Hence, H1 is accepted. H2 postulated that knowledge sharing impacts knowledge creation positively and statistically significantly. The results support it ($\beta = 0.596$, p value

< 0.05, Fig. 1). Hence, H2 is accepted. H3 postulated that knowledge creation impacts knowledge utilization positively and statistically significantly. The results support it (β = 0.638, p value < 0.05, Fig. 1). Hence, H3 is accepted. H4 postulated that knowledge utilization impacts knowledge-worker productivity statistically significantly. Results supported it (β = 0.754, p value < 0.05, Fig. 1). Hence, H4 is accepted. Finally, Regression or R^2 values of 0.25, 0.5 & 0.75 separately represent small, medium, and higher and indicate the number of variance-independent construct(s) explain in a dependent construct. Table 5 demonstrates that three dependent constructs have a substantial variance of 0.355 (knowledge creation), 0.642 (knowledge sharing) and 0.568 (knowledge-worker productivity). This means independent construct(s) explain substantial changes in dependent constructs.

Table 3
Outer loadings, reliabilities, and regression

	Outer loadings	Rho-A	Composite- reliability	Average variance extracted	R^2
KC		0.827	0.863	0.613	0.36
KC2	0.841				
KC4	0.706				
KC5	0.815				
KC9	0.763				
KS		0.915	0.924	0.752	0.64
KS1	0.803				
KS2	0.929				
KS3	0.836				
KS4	0.896				
KU		0.901	0.923	0.666	0.57
KU1	0.761				
KU3	0.84				
KU5	0.84				
KU6	0.822				
KU7	0.767				
KU9	0.861				
KWP		0.87	0.898	0.595	
KWP1	0.775				
KWP3	0.709				
KWP4	0.718				
KWP5	0.789				
KWP6	0.825				
KWP7	0.804				

Table 4
HTMT-ratio (discriminant validity)

	KC	KS	KU
KC			
KS	0.662		
KU	0.896	0.677	
KWP	0.842	0.624	0.845

Table 5
Test of the hypotheses

Hypotheses		Path coefficient (o)	STDEV	*t*-stats	*p*-value	R^2
H1	KS > KU	0.235	0.054	4.333	0	0.64
H2	KS > KC	0.596	0.038	15.518	0	0.36
H3	KC > KU	0.638	0.045	14.13	0	0.64
H4	KU > KWP	0.754	0.028	26.956	0	0.57

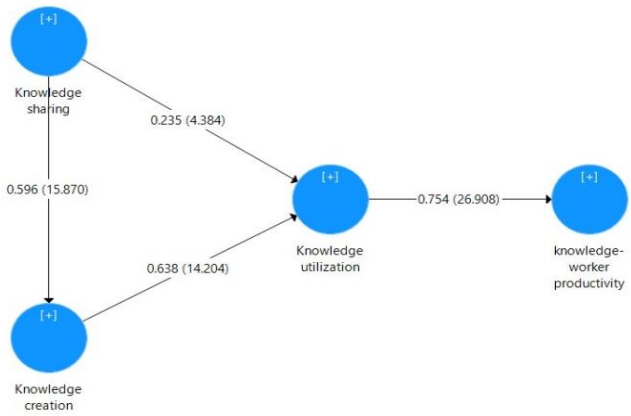

Fig. 1. Research model

5. Discussion

Data collection, for the test of the hypotheses of this study, has been collected from the telecom sector of Pakistan. The telecom sector is a highly innovative and thus, knowledge-intensive sector, which recruits employees with condition that they must have higher education qualifications and tacit knowledge creation abilities. This activeness, i.e., in the practice of client's dynamic complications & difficulties, motivates the knowledge workforce to constantly obtain and construct new knowledge which might be used to produce clarifications for better consumer satisfaction. All this helps to deduce that the target organizations telecom sector has the knowledge management systems to deal with this high origination and exploit the creativity of their highly skilled workers.

5.1. Inter-relationship between the knowledge management processes and the knowledge worker productivity

All past studies on the relationship between knowledge-management processes and employee productivity address the effect of knowledge-management processes on different other constructs i.e. knowledge worker productivity, innovation, competitive intelligence, knowledge worker satisfaction, knowledge worker performance, knowledge risk management, innovation performance and the personnel knowledge management (Kianto et al., 2019; Shujahat et al., 2018; Razzaq et al., 2019; Butt et al., 2019; Shujahat et al., 2018; Iranzadeh & Pakdelbonab, 2014; Haas & Hanson., 2007; Gomez, 2007; Constantinescu., 2009). The interesting thing about the current study is that it is the only

study which measures the interrelationship among all the knowledge-management processes e.g., knowledge-creation, knowledge-sharing, and knowledge-utilization. While all the previous studies including the motivation of the current study i.e., Kianto et al. (2019) measure the separate impact of all the knowledge-management processes on employee productivity and finds that knowledge sharing didn't affect the knowledge-workers productivity directly, the knowledge utilization and knowledge creation affected the knowledge worker productivity statistically significantly. While Iranzaddeh & Pakdelbonab (2014) assesses the influence of knowledge-management practices on task efficiency or labour productivity among university teachers. The study was undertaken at the University of Tabriz, Iran with a sample size of 680. The overall results recommend that all KM processes impact task efficiency significantly. Haas & Hanson (2007) assesses the influence of knowledge-sharing only on employee productivity. They drew the data from 182 sales squads in a management consulting company for their empirical study. It was concluded by authors that codified knowledge-sharing impacts task on time negatively while advice-sharing improves the quality of the task performance (Haas & Hanson., 2007)

5.2. Knowledge-management processes and knowledge workers productivity

Results of the study indicate that only knowledge utilization among all three KM processes affects knowledge-workers productivity positively and significantly. The separate influence of these three elements indicates that knowledge worker productivity is a point of focus of the target telecom organizations in Pakistan. For meeting it, knowledge and information management systems have been deployed. These systems ought to increase the knowledge-sharing, knowledge-creation, and knowledge application among different levels of units within these organizations to stimulate the client's problem-solving process. Hence, this enhances the knowledge workers' productivity.

Moreover, results specify that knowledge utilization- impacts the productivity of highly skilled and educated knowledge workers significantly and positively. Knowledge sharing impacts knowledge creation and knowledge utilization positively and statistically significantly. Moreover, it was also proved that Knowledge creation impacts knowledge utilization positively and statistically significantly. Furthermore, the last among the knowledge management processes i.e., knowledge utilization impacts the knowledge-worker's productivity significantly. Insignificant and positive results regarding the impact of knowledge creation and knowledge sharing on employee productivity might allude that knowledge creation infrastructure and systems that have been introduced in the target organization are increasing the innovation, but not the productivity of their workers or knowledge worker productivity (Shujahat et al., 2018; Kianto et al., 2019).

5.3. Knowledge-management processes and knowledge-workers productivity

A significant and positive relationship between knowledge utilization and employee productivity or knowledge worker productivity was found, which suggested that systems and infrastructure only for knowledge utilization among the remaining knowledge management processes are influencing employee productivity. It shows that knowledge utilization improves the efficiency of an organization as well as workers while knowledge sharing, and knowledge creation further strengthen knowledge utilization through a cyclic process.

Further, the results also specify that knowledge utilization or knowledge application affected positively and statistically significantly the productivity of the

knowledge worker. These findings are in accordance with that of Iranzaddeh and Pakdelbonnab (2014), which discover the same effect of knowledge application on employee task efficiency. As per Lee et al. (2013) findings; when the creation and implementation of new knowledge take place, it substitutes former knowledge and supports resolving novel vigorous complications within the service sector (telecom sector here).

6. Conclusion

Applying knowledge management has been proven an effective tool to foster various organizational outcomes, such as organizational performance and innovation, and various important individual knowledge workers' outcomes. One of the various individual knowledge workers' outcomes is employee productivity which is the largest and main segment of today's human resources from Drucker's theory of knowledge worker productivity. A stream of empirical studies has already demonstrated that each single organizational knowledge management process– organizational knowledge-creation, organizational knowledge-sharing & organizational knowledge utilization – can improve the productivity of knowledge workers in isolation. Hence, findings of the stream of empirical studies suggested that even only one knowledge management process (e.g., knowledge creation) in isolation can improve employee productivity. In contrast, this study argues from Nonaka's organizational knowledge-creation theory and alignment theory to hypothesize that knowledge utilization is the only frontline and primary organizational knowledge management process which can improve employee productivity, while other KM processes (knowledge-creation & knowledge sharing in this case) support and supplement each other as well as improve knowledge utilization. This means that knowledge sharing improves knowledge utilization directly and indirectly via increasing knowledge-creation, & knowledge application then improves productivity. In other words, knowledge utilization mediates between knowledge-sharing and /or knowledge-creation and the productivity of knowledge workers. To test this postulate, the study used data collected from 336 knowledge workers in the telecom industry of Pakistan and analyzed it by partial least squares modelling. The findings from data analysis give support to the postulate of this study. Thus, the findings indicated that knowledge utilization is the sole frontline and primary knowledge asset to bring about the enhancement in productivity, while other KM processes – knowledge-creation & knowledge-sharing–support each other & can only influence productivity indirectly through increasing the utilization of knowledge created and/or shared in the context of IT/telecom sector of Pakistan.

6.1. Theoretical and practical implications

The current study makes the following theoretical contributions at the intersections of multiple theories (e.g., Drucker's theory of knowledge worker productivity, Nonaka's organizational knowledge-creation theory and alignment theory). It reconciles the contradictory findings of past studies on the effect of knowledge management on employee productivity by considering the alignment or interrelationship between knowledge management processes. This study demonstrated that knowledge-creation and knowledge-sharing–two KM processes - are supportive processes which give support to knowledge utilization. And this is the knowledge utilization which impacts productivity solely. Hence, knowledge utilization is the sole knowledge management process among others to affect productivity.

Theoretically, it offers to the researchers in the knowledge management field that rather studying knowledge management processes and their effects in isolation. They should consider different interrelationships or alignments in future studies as suggested by Nonaka's organizational knowledge-creation theory and alignment theory. Hence, knowledge utilization is the frontline/primary knowledge management process which impacts outcomes, such as productivity, while other knowledge management processes only give support to and affect knowledge utilization. Furthermore, it implies to the research community that knowledge application or knowledge utilization is the primary/frontline process which can help in the pursuit of productivity enhancement.

This study informs industry managers that to meet the challenge of the continuous enhancement of the productivity of their knowledge workers, it is not just enough to employ different tools, techniques, and strategies which create and/or share knowledge. They should make sure that knowledge shared is used for the further creation of knowledge. The created knowledge will not increase productivity and related outcomes unless they make sure that the newly created knowledge is applied. In the same vein, they should also make sure that the shared knowledge is also utilized consequently in performing everyday jobs. Otherwise, the shared knowledge and/or created knowledge will not yield benefits.

6.2. Research limitations and associated future research recommendations

This study acknowledges its following limitations and recommends the following areas for future research development. First, it used a cross-sectional research design which could only allow correlational analysis. The results may differ if future studies used qualitative case studies and/or longitudinal data. Second, it used the data collected from only one sector and that too only in Pakistan. Hence, the results are limited to these contexts. Third, the sampling technique used for obtaining data collected was convenience sampling because it was not pragmatic to collect data through formal ways. This technique may limit the consistency of findings. Future studies may use different sampling techniques to check whether findings may differ. Fourth, this study did not consider contingency factors such as the firm's years of experience with knowledge management and firm size as its purpose was to reconcile results regarding the effect of KM processes on employee productivity. Future studies may explore and empirically examine such contingency issues. Fifth, knowledge utilization emerged as the frontline and primary knowledge management process. It is recommended that future studies should explore managerial practices and determinants which may increase knowledge utilization in organizations to influence various individual and organizational outcomes. Finally, other interrelationships among knowledge management processes could be drawn with or without the theoretical deductions from relevant theories, such as Nonaka's organizational knowledge creation theory. Such interrelationships could further be explored and examined concerning the productivity of knowledge workers. For example, knowledge sharing also depends on knowledge creation. Hence, such alternative relationships can be considered for future empirical studies on the topic.

Author Statement

The authors declare that there is no conflict of interest.

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