

How does knowledge based human resource management practices enhance organizational performance? The mediating role of knowledge workers productivity

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CITATION

Yasmin F, Haider SA, Sohail M, et al. (2024). How does knowledge based human resource management practices enhance organizational performance? The mediating role of knowledge workers productivity. *Journal of Infrastructure, Policy and Development*. 8(14): 9383. <https://doi.org/10.24294/jipd9383>

ARTICLE INFO

Received: 17 February 2024

Accepted: 29 September 2024

Available online: 18 November 2024

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Abstract: This research aims to investigate the impact of knowledge-based human resource management (KBHRM) practices on organizational performance through the mediating role of quality and quantity of knowledge worker productivity (QKWP). The data were collected from 325 employees working in different private universities of Pakistan by using convenience and purposive sampling techniques. The quantitative research technique was used to perform analysis on WarpPLS software. The result revealed that only knowledge-based recruiting practices have a positive and significant direct effect on organizational performance. While knowledge-based performance appraisal practices, training and development practices and compensation practices all were insignificant in this regard. However, through mediator QKWP, the knowledge-based recruiting practices (KBRP), knowledge-based training and development (KBTD), and knowledge-based compensation practices (KBCP) all were positively and significantly influencing organizational performance but only knowledge-based performance appraisal (KBPA) was insignificant in this mediating relationship. Lastly, the current study provides useful insights into the knowledge management (KM) literature in the context of private higher educational institutes of developing countries like Pakistan. The future studies should consider the impact of KBHRM practices on knowledge workers' productivity and firms' performances in the context of public universities.

Keywords: knowledge-based training and development; performance appraisal; recruiting practices; compensation practices; organizational performance

1. Introduction

In the modern era of globalization, every organization strives to be competitive in the market by using different strategies and practices to gain a competitive edge (Afsar and Qureshi, 2021). To remain competitive, Pakistan is struggling to evolve from an agricultural and production-based to a knowledge-based economy on a world marketplace. The government is entrusted with providing quality education to people under the jurisdiction of the Ministry of Education (MOE). The MOE's vision is to convert Pakistan into a center of excellence in education as other Asian countries have progressed in this regard (Iqbal, 2021). Therefore, it is crucial to recruit and retain quality academic and non-academic staff members to achieve the superior performance of universities (Qureshi et al., 2021). In the current era of research, knowledge management (KM) is considered as one of the novelists and

essential procedures of the advancement of organizational performances (Haider et al., 2020; Kianto et al., 2018a). KM has been emerged as a new process for organizational practice as well as a new research area for academics (Bolisani and Bratianu, 2018; Cohen et al., 2015; Wang et al., 2012). Knowledge management alludes to the processes just as practices applied in an association to unleash its scholarly potential by improving the proficiency and adequacy in dealing with the organization's knowledge resources (Andreeva and Kianto, 2012; Heisig et al., 2016).

The two avenues of research have been discussed while linking the KM and organization's performance. Initially, the current investigations on knowledge processes and organization performance deal with KM practices within firms that are associated with many types of organization's performances (Chen et al., 2010; Lee et al., 2013). KM practices refer to activities including knowledge acquisition and its sharing as well as utilization without considering systematic managerial intervention (Inkinen, 2016; Inkinen et al., 2015; Kianto et al., 2014). The subsequent stream of researches have conferred about cognizant firm's and administrative practices to accomplish firm's objectives by dealing with the information assets in a productive and compelling manner (Andreeva et al., 2012; Foss et al., 2009). In the context of this investigation, these practices are called as knowledge management practices that were considered by Andreeva et al. (2012); Inkinen (2016) and Kianto et al. (2014).

Several studies have associated KM practices with organization's outcomes (Inkinen, 2016). Knowledge-based human resource management (KBHRM) practice is one of the types of KM practices that is concerned with the organization's important intellectual capital dimension (Inkinen et al., 2015). The human resource management (HRM) practices can foster decision-making approaches that assist organizations to get valuable as well as unique expertise in order to achieve superior organization's performance (Haider and Tehseen, 2022). Furthermore, HRM practices can enhance the knowledge's value through interior improvement and impact the worker conduct towards the preferred course for this situation to enhance organization performance. Knowledge-based human resource management strategies may be thought of as a framework for acquiring important and distinctive knowledge through targeted methods of selection, development, assessment, training, and remuneration (Lepak et al., 1999; Lopez-Cabrales et al., 2009a). The current literature on KM practices especially KBHRM practices is exceptionally insufficient. Apparently, there are not many investigations that address the KBHRM on KM practices for knowledge management explicitly (Inkinen, 2016; Inkinen et al., 2015; Kianto et al., 2017). The investigations of HRM on KM practices have considered its effect on development execution of organizations (Andreeva et al., 2017), however its effect on organizational business execution is moderately disregarded (Kianto et al., 2018a, 2018b). By embracing the knowledge-based view of HRM, it can be convincingly argued that KBHRM practices, alongside broader knowledge management strategies, have the potential to significantly enhance organization performance (Zack et al., 2009).

While scholars continue to debate the merits of knowledge management, there remains a dearth of empirical evidence regarding the specific benefits of KM in driving exceptional organization's performance, particularly within emerging

contexts such as Pakistan (Lee et al., 2016; Mata et al., 2021). Moreover, these existing studies did not examine universities' staff members while assessing influence of KM on universities' performance. A recent study by Sahibzada et al. (2020) examined the impact of KM measures on OP of HEIs by considering the mediating role of knowledge worker's productivity (KWP) but did not study the KBHRM practices in this regard. Thus, the current study investigates the impact of KBHRM practices on organizational performance. KBHRM practices are very important because recruitment, training, performance appraisal, and pay methods are essential for maximising human capital to improve organizational performance. KBHRM methods promote knowledge sharing, innovation, and organizational success. Second, this study also explores the impact of KBHRM practices on quality and quantity of knowledge worker productivity (QQKWP). QQKWP includes qualitative characteristics like skill development and innovation behaviour and quantitative aspects like outputs, punctuality, and efficiency. KBHRM practices improve QQKWP by recruiting knowledgeable and experienced staff, providing training and development, conducting effective performance appraisals, and designing compensation systems that recognise and reward knowledge contribution. These practises boost HEI knowledge worker productivity and organizational effectiveness. Lastly, QQKWP's impact on organizational performance is also explored in this study. HEIs must boost knowledge worker productivity to improve performance and stay competitive. Knowledge worker productivity boosts innovation, service delivery, and institutional success. Thus, Pakistani HEIs must comprehend and improve QQKWP to excel in the global knowledge economy. KBHRM practices and QQKWP drive organisational performance in Pakistani HEIs and the nstitutions can attain excellence in education and develop the knowledge-based economy by utilising human capital and improving knowledge worker productivity.

This study prioritizes QQKWP as a mediator for various reasons. First, QQKWP covers both qualitative and quantitative output to understand how knowledge workers improve organizational performance. This holistic approach lets us examine how knowledge management practices affect organizational outcomes in detail. Second, assessing quality and quantity determines how knowledge management practices affect productivity. Quality is the quality or efficacy of output, whereas quantity is the volume or amount generated, revealing how KM practices affect productivity. Thirdly, QQKWP allows organizations to choose interventions based on their goals—quality, quantity, or both—making KM strategy alignment more strategic. Finally, QQKWP provides a clear framework for analyzing organizational performance and identifying areas for improvement by evaluating KM interventions. Thus, using QQKWP as a mediator, this study seeks to explain how knowledge management practices affect organizational performance through knowledge worker productivity. The study also investigates how KM efforts affect knowledge worker productivity to determine the mechanisms linking KM to organizational outcomes. Targeted interventions that use knowledge resources to improve organizational performance need understanding these mediation mechanisms. The study further advances knowledge management theory by showing how QQKWP mediates KM practices into organizational advantages. Thus, using

QKWP as a mediator enhances our understanding of the relationship between KM and organizational performance and provides practical advice for optimizing KM practices to attain desired outcomes. The current investigation mainly contributes in the existing literature of KM with regards to higher educational institutes (HEIs) because this seems to be very first study in developing context like Pakistan that examines Pakistani universities' academic and non-academic staff members' perception while assessing the impact of HRM based KM practices on universities' performances.

Additionally, this article is in accordance with the following. To begin, we show important literature and theory to support the development of hypotheses. After that, methodology was described, followed by data analysis. Next comes the findings, discussion, and implications, followed by the conclusion and suggestions.

2. Literature review

2.1. Impact of knowledge-based HRM practices on organizational performance

Both “knowledge-based human resource management” and “knowledge-based human resourced practices” can be used interchangeably. The KBHRM framework can be used to learn what is really unique and important in the world of work (Lepak et al., 1999; Lopez-Cabrales et al., 2009b). Human resource management strategies have a significant impact on knowledge management and are the most effective way to support staff effort with a KM organization approach via transparent planning, providing instruction, assessment, development, and compensation. Moreover, they are the fundamental foundation of KM (Foss et al., 2009; Wong, 2005), HRM should be reorganized to focus on the knowledge-creating capabilities of the organization. Compensation and performance evaluation are the two HR practices that set desires, energize desired behaviors, and give input just as assessments (Haider et al., 2022). From the point of view of knowledge, the compensation for knowledge practices point in empowering just as managing the knowledge practices alongside perceiving the accomplishments to encourage the organization's development (Bock et al., 2005; Cabrera et al., 2006). Such compensations often include prizes for unique ideas or the use of newly learned knowledge in practice (Andreeva et al., 2017). In this sense, compensations and performance evaluations may promote and encourage knowledge activities, which may lead to institutions achieving predominant performance. KM has considerable significance for HRM, especially for enhancing knowledge sharing (Haider et al., 2020). According to Scarbrough (2003) and Wong (2005), there are three vital phases of HRM in influencing the flow of knowledge and human resources:

- 1) Employee selection methods: Appropriate selection of new employees with the required capabilities and knowledge is essential for bringing knowledge into firms.
- 2) Compensation strategies: Both tangible and intangible forms of compensation may motivate employees to produce and share knowledge.

- 3) Career development systems: Providing regular training programs to educate employees can build up knowledge beneficial to the firm.

Numerous past studies reported that a fundamental function of HRM in KM is employee remuneration and reward. HRM activities such as reward system must be adopted to encourage employees to develop the performance abilities and add up more knowledge power (Mohrman et al., 2002). An empirical study by Goh and Yahya (2002) among Malaysian managers discovered that reward systems for knowledge contribution were typical in “knowledge organizations” or firms that perform well with knowledge process. In the present literature, reward strategies have usually been considered in association with knowledge contribution. According to Idrees et al. (2023), encouraging individuals to share knowledge with each other and disperse this knowledge throughout the organization has frequently been considered as the centre of focus of KM. Employees are reportedly less motivated to share knowledge unless they receive rewards for it (Husted and Michailova, 2002). Reward techniques that motivate knowledge sharing may be both intangible such as recognition and status, and tangible such as one-off rewards or bonuses (Scarbrough, 2003).

Numerous theoretical studies have explored the connections between KM, HRM, and organization’s performance. However, there is a lack of empirical research in this domain. (Andreeva et al., 2012). Basically, exact investigations on huge parts of HRM for KM have to a great extent been built up on contextual analyses, which makes a requirement for more quantitative exploration (Andreeva et al., 2012). HRM practices are prevailing in enhancing knowledge performance in workers, which thusly would positively affect organizational performance. Hence, the subsequent hypotheses have been developed based on above relevant literature:

H1: Knowledge-based recruiting practices are positively associated with organizational performance.

H2: Knowledge-based training and development practices are positively associated with organizational performance.

H3: Knowledge-based performance appraisal practices are positively associated with organizational performance.

H4: Knowledge-based compensation practices positively are associated with organizational performance.

2.2. Impact of KBHRM practices on QKWP

The KWP includes the aspects of both quality and quantity of knowledge workers. The productivity of knowledge worker’s states to the efficacy of knowledge workers in order to maximize knowledge work for intellectual output based on knowledge (Field et al., 2018). Knowledge work alludes to intellectual and cognitive tasks involving the creation and application of improvisational knowledge (Kianto et al., 2018a). The quality of KWP includes the aspects such as personal skill development, innovation behaviour, and compliance with work standards. Whereas, the quantity of KWP includes the indicators such as outputs and outcomes, timeliness, costs and profitability; autonomy, efficiency and effectiveness of works (Palvalin et al., 2015).

Since the universities' performances rely on both quality as well as quantity of their academic as well as non-academic staff members. Thus, it is very important for universities to consider the effective knowledge-based HRM practices to advance the quality along with quantity of knowledge workers' productivity. The KM-based human resource management practices specifically knowledge-based recruiting practices (KBRP), knowledge-based training and development (KBTD), knowledge-based performance appraisal (KBPA) and knowledge-based compensation practices (KBCP), all four practices assume as essential part in improving the quality and quantity of knowledge workers' productivity (QKWP). For instance, through the knowledge-based recruitment process, a knowledgeable and experienced workforce can be selected that determines the QKWP. Many studies have found positive as well as significant impact of knowledge-based recruiting practices on QKWP (Kianto et al., 2019b; Tapio et al., 2015).

Likewise, studies are evident regarding the positive impact of KM-based human resource management practices such as training and development practices on KWP (Butt et al., 2019; Kianto et al., 2018a; Usoro et al., 2018). Similarly, other studies revealed the influence of KBPA practices on KWP (Razzaq et al., 2018; Tapio et al., 2015). And scholars argued that KBCP impacts the quality as well as quantity of KWP and it is evident that if compensation practices are designed based on knowledge and expertise of employees then they would positive affect the knowledge workers' productivity (Kianto et al., 2017). Therefore, we have developed the following hypotheses based on above related literature.

H5: Knowledge-based recruiting practices are positively associated with QKWP.

H6: Knowledge-based training and development practices are positively associated with QKWP.

H7: Knowledge-based performance appraisal practices are positively associated with QKWP.

H8: Knowledge-based compensation practices are positively associated with QKWP.

2.3. Impact of QKWP on organizational performance

Increasing the productivity of workers within knowledge-intensive organizations can lead to increased operating performance and a competitive advantage (Westover et al., 2010). The theory of Drucker (1999) suggests that dimensions of the knowledge worker productivity should be used to measure the quality and quantity of the outputs. Both quality and quantity of knowledge workers' productivity positively impact the organizational performance. Several studies have provided empirical evidence regarding the positive correlation or impact of knowledge workers' productivity on firms' innovation performance across diverse contexts (Butt et al., 2019; Lee et al., 2013). Thus, considering the current appropriate literature, this study also argues that universities' academic and non-academic staff members' quality and quantity of productivity contributes towards the superior performance of universities. Thus, the following hypothesis has been established in this regard:

H9: Quality and quantity of knowledge worker’s productivity positively influence the organizational performance.

2.4. Knowledge-based HRM practices, quality and quantity of knowledge worker’s productivity, and organizational performance

Knowledge management enriches the KWP Kianto et al. (2018a). Similarly, increased productivity of workers within knowledge-intensive firms can lead to enhanced organizational performance and competitive advantage (Westover et al., 2010). The literature is evident regarding the strong correlation of KM with knowledge worker’s productivity (Fan and Tseng, 2011) and likewise, other studies are also evident regarding the positive impact of KM on knowledge workers’ productivity (Kianto et al., 2019; Shujahat et al., 2019). Butt et al. (2019) and Sahibzada et al. (2020) have found the mediating impacts of knowledge worker’s productivity on organizational performance. Lastly, assimilated literature arguments suggested that knowledge management could enhance KWP resulting in higher organizational performance (Haider et al., 2020). KM ensures the right worker has the optimum level of knowledge at the right time and the right place (Kianto et al., 2019). Thus, QKWP could positively mediate the influence of knowledge-based HRM practices including KBRP, KBTD, KBPA, and KBCP on organizational performance. Thus, the following hypotheses have been developed in this regard,

H10: QKWP mediates the relationship between KBRP and OP.

H11: QKWP mediates the relationship between KBTD and OP.

H12: QKWP mediates the relationship between KBPA and OP.

H13: QKWP mediates the relationship between KBCP and OP.

Based on above developed hypotheses, the conceptual model for this study has been shown in **Figure 1**. Knowledge-based view of firm theory supports the study’s conceptual model. Based on this theory, the organizational knowledge resources are essential to achieve competitive advantage. Because such knowledge-based resources are rare and valuable and difficult to copy by rivals (Butt et al., 2019). Thus, the KM based HRM practices lead towards the QKWP that results towards superior organizational performance.

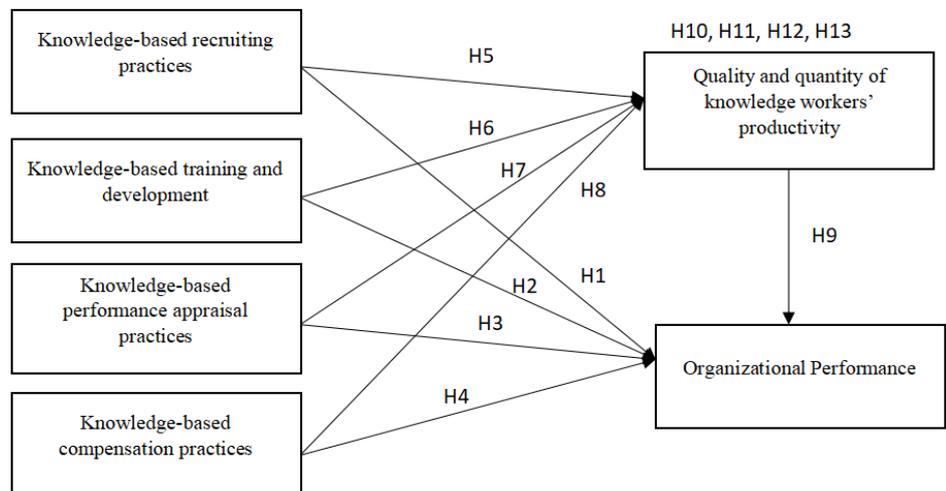


Figure 1. Conceptual model of the study.

3. Research design and sampling method

Due to resource and time constraints, gathering information from the entire population was not feasible. As a result, purposive and convenience sampling methods were utilized for data collection within a four-month period spanning from September 2023 to December 2023. Additionally, this study was cross-sectional in nature. A cross-sectional study is an observational study which involves data obtained only once, plus it represents a specific point of time (Cooper and Schindler, 2014). Furthermore, survey strategy was also used in this study. The survey strategy is seen as a deductive approach to the study. It is the most comprehensive strategy utilized in management researches to response the queries regarding who, what, where, as well as the amount (Saunders et al., 2009). Exploratory and descriptive research also utilize survey strategy regularly. The survey methodology employed in this study includes the utilization of standardized questionnaires to gather data from knowledge workers in universities, including professors, lecturers, administrative staff, and tutors, who are based in Pakistan.

The data was gathered by self-administered questionnaires that were created in Google Docs and then distributed across various online platforms, including Gmail, Whatsapp, and Facebook. Also, researchers personally visited different universities, meeting face to face for obtaining responses using questionnaires was useful as it warranted the questionnaire were being finished fully and also with the thorough understanding of the questionnaire's contents from the respondents. This made it feasible for a large sample of the population to fill out the survey. Out of 440 questionnaires that were sent out, 362 participants filled out the survey. After removing 37 incomplete surveys, 325 were selected further analysis.

So as to examine the present framework, which comprises of 4 indicators, a sample size of at least 85 was required for a 0.80 capacity to be made for this specific exploration model. Though, the scholar attempted to accomplish information from 325 respondents, as it would make an intensity of 0.97 for the exploration model (Hair et al., 2016). Since the same respondents were used to gather all the variables, common method variance (CMV) might be present in the data. Nevertheless, a number of procedural measures were taken to mitigate CMV, including a cover letter assuring respondents' anonymity, defining new terms, asking concise and direct questions, etc. (Tehseen et al., 2017). Furthermore, the CMV's impact was investigated by means of "Correlation Matrix Procedure" (CMP) (Dziuban and Shirkey's, 1974). This method failed to detect CMV due to a correlation value below 0.90 among the key variables. In a similar vein, a comprehensive collinearity assessment method was used to study CMV.

Among these respondents, 60.3% were male and 39.7% were female. The majority of the sample fell within the age range of 24 to 45 years old. Regarding education, a significant portion of the respondents held master's and doctoral degrees. Furthermore, most of the survey participants reported being employed for 4–10 years or more than 10 years. Responses to the items were recorded on a 5-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree). Harman's single factor analysis results indicated that the study did not encounter any problems with common method analysis. This was determined through exploratory factor

analysis and principal analysis methods, as the single factor accounted for 19.84 percent of the total variance, falling below the recommended threshold of 50 percent (Aguirre-Urreta and Hu, 2019). The questionnaire consisted of 39-items in total. Items for independent variables namely KBRP, KBTD, KBPA and KBCP were adapted from (Kianto et al., 2017; Lopez-Cabrales et al., 2009a), mediating variable QKWP consisted of 6-items adapted from Palvalin et al. (2015) and 5-items of dependent variable OP were adapted from Tseng (2010). WarpPLS was chosen to analyze the data since this study aimed at predicting the main construct and involving new relationships (i.e., mediation) in the study (Hair et al., 2016).

4. Research findings

4.1. Measurement model analysis

The study was conducted using WarpPLS to analyze the impacts of variables stated in the research hypotheses. To ensure the instrument's reliability, specific conditions must first be met in regard to various fit models and quality indices in the WarpPLS analysis (Kock, 2017). As shown in **Table 1**, the findings reveal that all fit model estimates fulfil the normalized requirements of good, large, and ideal. In order to assess the collinearity problems in the structural model, the values of the variance inflation factor (VIF) were confirmed. The VIF values for all items are below 5 as shown in **Table 2**. According to Hair et al. (2016), when the VIF is less than 5, multicollinearity is not an issue in the model. Therefore, no constructs were essential to be excluded. In addition, the legitimacy and reliability of survey data, including the Cronbach's alpha (α), composite reliability (CR) and average variance extracted (AVE), must be reassessed. The legitimacy of explicit indicators can be assessed by checking specific and factor loads if the loading of > 0.50 on two or more factors is shown to be significant (Hair et al., 2014). **Table 2** indicates that KBRP, KBTD, KBPA, KBCP, QKWP, and OP are all legitimate measurements of their respective structures. As stated by Fornell and Larcker, if the AVE value is greater than 0.4 and CR value is over 0.7, the convergent validity of the construct is still considered to be valid (Fornell et al., 1981). The model given in **Table 2** demonstrates convergent validity since all estimates of factor loadings, CR, and AVE are higher than the specified cut off criteria.

After ensuring the model satisfies the predetermined criteria for convergence, the discriminating validity of the model was verified using Fornell and Larcker's criterion (Fornell et al., 1981). Discriminant validity is achieved when an indicator's external loadings on its target construct exceed its cross-loadings on unrelated constructs (Hair et al., 2014). The results revealed outer loadings are greater than the cross-loadings as shown in **Table 3**. Next, using Fornell-Larcker criterion, average variance extracted values' square root is compared with the correlations of the latent variable. To conclude, **Table 3** demonstrates that adequate discriminant validity is achieved by the square root of the AVE for each construct being shown in the diagonal, with this value being greater than the other values in the columns and rows for that specific construct.

Table 1. Quality indices and model fit.

No	Quality indices and model fit	Results	Remarks
1	APC	0.210	Good
2	ARS	0.738	Good
3	AARS	0.734	Good
4	AVIF	4.490	Acceptable
5	AFVIF	4.458	Acceptable
6	GoF	0.671	Large
7	SPR	0.889	Good
8	RSCR	0.984	Good
9	SSR	1.000	ideally
10	NLBCDR	1.000	ideally

Abbreviations, Criteria Fit: Average path coefficient (APC) $P < 0.001$; Average R -squared (ARS) $P < 0.001$; Average adjusted R -squared (AARS) $P < 0.001$; Average block VIF (AVIF) acceptable if ≤ 5 , ideally ≤ 3.3 ; Average full collinearity VIF (AFVIF) acceptable if ≤ 5 , ideally ≤ 3.3 ; Tenenhaus GoF (GoF) small ≥ 0.1 , medium ≥ 0.25 , large ≥ 0.36 ; Simpson’s paradox ratio (SPR) acceptable if ≥ 0.7 , ideally = 1; R -squared contribution ratio (RSCR) acceptable if ≥ 0.7 , ideally = 1; Statistical suppression ratio (SSR) acceptable if ≥ 0.7 ; Nonlinear bivariate causality direction ratio (NLBCDR) acceptable if ≥ 0.7 .

4.2. Structural model analysis

After the completion of the measurement model, the structural equation model is constructed. To assess the mediating results of QQKWP, we used the methodology proposed by Henseler et al. (2015).

Table 2. Construct validity.

Constructs	Items	FL	VIF	α	CR	AVE
Knowledge-based Recruiting Practices	KBRP1	0.831	2.871	0.925	0.937	0.625
	KBRP2	0.812	2.475			
	KBRP3	0.813	2.494			
	KBRP4	0.790	2.302			
	KBRP5	0.827	2.653			
	KBRP6	0.792	2.411			
	KBRP7	0.744	2.191			
	KBRP8	0.732	2.067			
	KBRP9	0.768	2.412			
Knowledge-based Training and Development Practices	KBTD1	0.869	2.932	0.922	0.939	0.719
	KBTD2	0.813	2.186			
	KBTD3	0.870	2.904			
	KBTD4	0.880	3.171			
	KBTD5	0.840	2.486			
	KBTD6	0.813	2.173			

Table 2. (Continued).

Constructs	Items	FL	VIF	α	CR	AVE
Knowledge-based Performance Appraisal Practices	KBPA1	0.826	2.619	0.895	0.917	0.614
	KBPA2	0.776	2.135			
	KBPA3	0.745	1.969			
	KBPA4	0.840	2.017			
	KBPA5	0.796	2.260			
	KBPA6	0.738	1.989			
	KBPA7	0.759	1.991			
Knowledge-based Compensation Practices	KBCP1	0.813	2.041	0.841	0.886	0.573
	KBCP2	0.814	2.011			
	KBCP3	0.828	2.140			
	KBCP4	0.409	1.111			
	KBCP5	0.797	1.911			
	KBCP6	0.792	1.896			
Quality and Quantity of Knowledge Worker's Productivity	QQKWP1	0.664	1.460	0.861	0.897	0.593
	QQKWP2	0.693	1.503			
	QQKWP3	0.837	2.415			
	QQKWP4	0.815	2.037			
	QQKWP5	0.792	1.987			
	QQKWP6	0.802	2.002			
Organizational Performance	OP1	0.796	1.708	0.651	0.790	0.530
	OP2	0.797	1.721			
	OP3	0.812	1.876			
	OP4	0.814	1.877			
	OP5	-0.248	1.048			

Abbreviations: Factor loading (FL), Variance Inflation Factor's (VIF), Cronbach's alpha (α), composite reliability (CR) and average variance extracted (AVE).

Table 3. Discriminant validity using Fornell and Larcker's criterion.

Variables	KBRP	KBTD	KBPA	KBCP	QQKWP	OP
KBRP	0.843^a	0.791	0.818	0.764	0.750	0.728
KBTD	0.791 ^b	0.848	0.784	0.745	0.743	0.751
KBPA	0.818	0.784	0.847	0.757	0.772	0.767
KBCP	0.764	0.745	0.757	0.832	0.773	0.726
QQKWP	0.750	0.743	0.772	0.773	0.794	0.770
OP	0.728	0.751	0.767	0.726	0.770	0.813

Notes: $N = 325$, ^a The Items displayed in boldface represents the square roots of the AVE. ^b Off-diagonal elements are the Pearson correlations between different constructs.

Direct and indirect impacts of structural equation models were evaluated by using four criteria including R^2 , Q^2 , f^2 , and path analysis. Firstly, R-Square (Coefficient of Determination) estimates the level of change in a latent endogenous variable clarified by other exogenous variables as a percentage (Chin, 1998b). The

value of R^2 coefficient ranges from 0 to 1, and higher values demonstrate the higher levels of prescient exactness (Ramayah et al., 2018). Based on Cohen (1988), the R^2 values of 0.02 and below are seen as weak, while R^2 values of 0.13 and 0.26 are seen as medium and high correspondingly. However, in current examination R^2 values for endogenous variable, the immediate impact model elucidated QKWP is 0.727, which infers that 72.7% variance of QKWP is anticipated by KBHRM practices. Additionally, the R^2 for OP is 0.749, which implies that 74.9% variance of OP is predicted by KBHRM. As shown in **Table 4**, this model has high predictive accuracy.

Secondly, the pre-validity measure (Q^2) was also used for measuring the validated significance of the study model by using a cross validation redundancy measure (Hair et al., 2014). The Q^2 values bigger than 0 shows the prescient significance for the particular reflective endogenous construct. Conversely, values of 0 and below designates a deficiency of predictive relevance (Ramayah et al., 2018). The rules for assessing the Q^2 value suggest that 0.35, 0.15 and 0.02 signify large, medium and small relevance for a specific endogenous construct (Hair et al., 2016). **Table 4** shows the adequate estimations' centrality of the direct impact model since estimation of Q^2 greater than zero, $Q^2 = 0.724$ for the endogenous latent variable, the direct KBHRM practices and QKWP also the indirect effect of KBHRM to OP is $Q^2 = 0.749$ all values greater than zero, it can be considered as a large predictive relevance for the endogenous constructs (Henseler et al., 2015).

Table 4. Results of coefficient determination in the PLS strategy.

Construct	R Square	R Square Adjusted	Q^2
QKWP	0.727	0.724	0.724
OP	0.749	0.745	0.749

The results indicate that H1, concerning the significant and positive direct impact of KBRP on OPs ($\beta = 0.413, p < 0.001$), is supported. However, H2, H3, and H4, which pertain to the direct effects of KBTD ($\beta = 0.086, p = 0.058$), KBPA ($\beta = 0.074, p = 0.089$), and KBCP ($\beta = -0.032, p = 0.278$), respectively, suggest that these three variables have an insignificant effect on the dependent variable OP. While the findings confirm H5, H6, and H8, indicating that KBRP ($\beta = 0.185, p < 0.001$), KBTD ($\beta = 0.270, p < 0.001$), and KBPA ($\beta = 0.401, p < 0.001$) all exhibit significant and positive direct effects on the mediator QKWP, however, H7 regarding KBPA ($\beta = 0.046, p = 0.203$) demonstrates an insignificant effect on OP. Finally, H9, indicating the direct effect of mediator QKWP ($\beta = 0.380, p < 0.001$), also demonstrates a significant and positive impact on the dependent variable OP. Consequently, hypotheses H1, H5, H6, H8, and H9 were accepted, while H2, H3, H4, and H7 were rejected, as illustrated in **Figure 2** and **Table 5**.

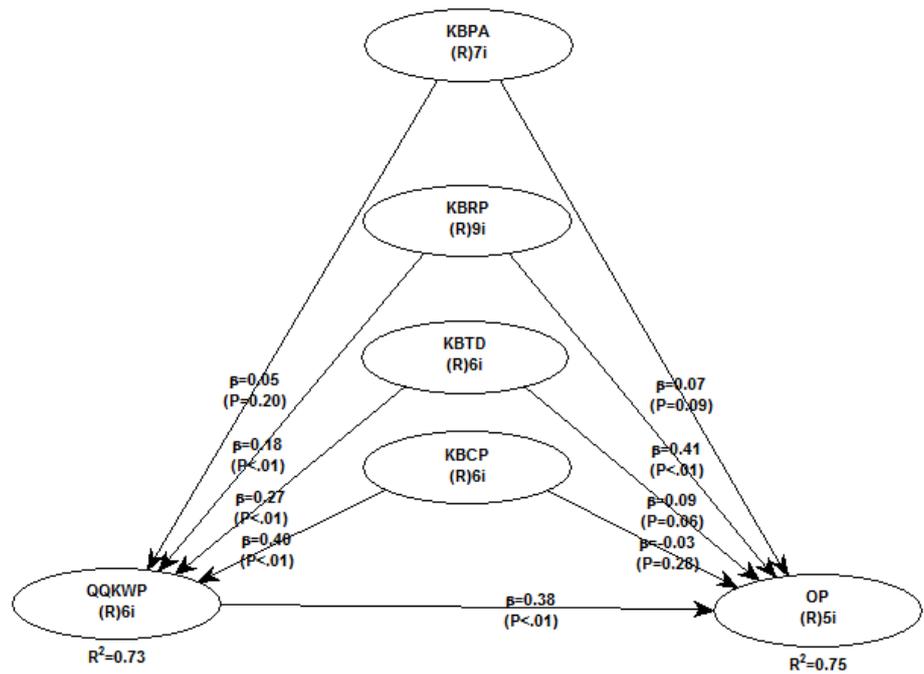


Figure 2. Path analysis result using WarpPLS.

Table 5. Structural model path coefficient strength (β).

		<i>B</i>	<i>P</i> Values	Effect Size	Remarks
Direct Effect of Path Coefficient					
H1	KBRP → OP	0.413	< 0.001	0.340	Supported
H2	KBTD → OP	0.086	0.058	0.068	Not Supported
H3	KBPA → OP	0.074	0.089	0.058	Not Supported
H4	KBCP → OP	-0.032	0.278	0.025	Not Supported
H5	KBRP → QKWP	0.185	< 0.001	0.146	Supported
H6	KBTD → QKWP	0.270	< 0.001	0.216	Supported
H7	KBPA → QKWP	0.046	0.203	0.036	Not Supported
H8	KBCP → QKWP	0.401	< 0.001	0.329	Supported
H9	QKWP → OP	0.380	< 0.001	0.309	Supported
Indirect Effect of Path Coefficient					
H10	KBRP → QKWP → OP	0.070	Highly Significant		Partial Mediation
H11	KBTD → QKWP → OP	0.103	Highly Significant		Full Mediation
H12	KBPA → QKWP → OP	0.017	Weakly Significant		Not Mediation
H13	KBCP → QKWP → OP	0.153	Highly Significant		Full Mediation

Thirdly, the effect size (f^2) measures a variable’s independent effect, explicitly indicating the extent to which an exogenous variable (independent variable) visibly influences an endogenous variable (dependent variable) (Hair et al., 2014). According to the Cohen (1988) rule, the effect size estimates between 0.02, 0.15 and 0.35 as having small, medium and large effects, correspondingly. **Table 5** specifies effect size of KBRP on OP is large ($f^2 = 0.340$), and KBTD ($f^2 = 0.068$), KBPA ($f^2 = 0.058$), KBCP ($f^2 = 0.025$) on OP is small. Though, effect size KBPA on QKWP is

selection of new staff members with the required skills and knowledge is essential to the introduction of knowledge into companies. Therefore, this study retains the assertions that the KBRP contributes towards superior performance of universities due to the quality and quantity of knowledge workers' including academic staff and admin staff's productivity. However, the non-significant impact of other KBHRM practices on OP in the context of Pakistani universities indicate that knowledge-based training and development, performance appraisal, and compensation practices of Pakistani universities do not contribute towards the superior performance of universities. These findings indicate that the knowledge workers including academic staff and admin staff may not be very much satisfied with these practices. Thus, Pakistani private universities need to strengthen their appraisal, compensation and training and development practices because hiring the suitable candidates together with the attractive compensation package would directly impact the universities' performances too (Rehman et al., 2021).

Regarding the influence of KBHRM practice on quality and quantity of knowledge workers' productivity, the results have shown the significant positive influence of only KBRP, KBTD and KBCP on QKWP. These findings are congruent with some other studies that have also found positive influence of KM practices on KWP (e.g., Butt et al., 2019; Kianto et al., 2018a; Razzaq et al., 2018; Usoro et al., 2018). However, KBPA was not found significantly related with QKWP which suggests that universities concerned need to strengthen their KBPA to improve the quality and quantity of productivity of academic as well as non-academic staff members. Current study results also align with the exiting studies (Tapio et al., 2015). However, this contradicts the findings of researchers Kianto et al. (2018a) and Razzaq et al. (2018), who discovered that performance assessment procedures based on knowledge will enhance productivity-quality. One possible reason for this result is that performance assessment limits workers' autonomy in the workplace and instead uses key performance indicators to evaluate their performance. This might be affecting their productivity levels. So, it can reduce their drive to provide high-quality results.

There are few managerial implications. Initially, the most important factors affecting the quantity and quality of a knowledge worker's productivity are knowledge-based recruitment practices and knowledge-based compensation practices; hence management should prioritize increasing these areas. Further, management should not disregard knowledge-based appraisal practices or training and development practices just because knowledge workers do not consider them important. To find out which training and development approaches are most effective, management might experiment with several approaches. Colleges and universities may gain a competitive edge through their faculty and staff by using value-added approaches. It is possible to encourage employees to work more efficiently via the use of effective performance evaluation methods.

6. Conclusion and future recommendations

Knowledge-based human resource management practice is one of the types of KM practices that is concerned with the firm's important intellectual capital

dimension (Inkinen et al., 2015). We believe that our research will improve understanding regarding the impacts of knowledge-based HRM practices on universities' performances. Furthermore, our study provides useful insights into the KM literature in the context of private higher educational institutes of developing countries like Pakistan. The future studies should consider the impact of KBHRM practices on knowledge workers' productivity and firms' performances in the context of public universities. Additionally, the comparative study could provide more useful insights by comparing the influence of KBHRM practices on knowledge workers' productivity and firm performance across manufacturing and service sectors.

Author contributions: Conceptualization, FY and SAH; methodology, FY; software, SAH; validation, MS, ST and PP; formal analysis, SAH; investigation, AA; resources, AA; data curation, FY and SAH; writing—original draft preparation, FY and SAH; writing—review and editing, AA; visualization, MS; supervision, ST and PP; project administration, MS; funding acquisition, FY, PP and AA. All authors have read and agreed to the published version of the manuscript.

Acknowledgments: This study is supported by the SPEV project 2105, run at the Faculty of Informatics and Management, University of Hradec Kralove, Czech Republic. Authors would like to express gratitude to Daniel Vondra for his contribution to this research.

Ethical approval: This study was approved by the Institutional review board (IRB) of the Faculty of Informatics and Management at the University of Hradec Kralove, Czech Republic (2023-332) by 1 June 2023. The study subjects gave their consent, and the principles specified in the Declaration of Helsinki were followed. All participants agreed to participate voluntarily, with informed consent when they fill the survey and were able to withdraw from the study freely at any time. All questionnaires were designed and applied to ensure anonymity of participants. The data was confidential and participation was anonymous without any potential risk to the integrity of the subjects.

Conflict of interest: The authors declare no conflict of interest.

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