



RESEARCH PAPER

The Knowledge Economy and Open Innovation: Evidence from Pakistan

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PAPER INFO	ABSTRACT
Received: January 12, 2019	In the era of industrialization, the role of small and medium-sized enterprises (SMEs) is more crucial to boost the economy of every nation. Particularly, in line with developed nations, SMEs has also key importance for developing nations like Pakistan. However, the SME's performance in open innovation (OI) is not reached the satisfactory position in Pakistan. That is the reason, the Pakistani SMEs are not achieved the higher performance. In response to this issue, the objective of this study is to investigate the role of maximization of internal innovation and external knowledge incorporation to increase the firm's OI performance. Furthermore, the moderating role of knowledge management is also observed. Managerial staff of SMEs was preferred to get response. After evaluating the data by using Smart PLS 3, it was found that maximization of internal innovation; external knowledge incorporation and knowledge management is the key contributor to enhance OI. Additionally, knowledge management is one of the moderating factors which enhance the positive effect of internal innovation and knowledge management on OI. Thus, the study is significant for SMEs and practitioners to enhance OI performance in SMEs.
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Introduction

It is evident form literature that innovation trend has been transformed; now organizations are working in a different on commercialization as well as conceptualization due to which the organizations are working without boundaries (Trott& Hartmann, 2009). It is examined that many of entities are participating in various innovation practices such as suppliers, customers, agents, dealers, various research firms and competitors (Gama &Frishammar 2018; Wallin& von Krogh,

2010). It is based on the fact that, an extensive amount of knowledge is compulsory to bring innovativeness (Conboy& Morgan, 2011) and these new ideas lead small and medium sized enterprises (SMEs) towards open innovation (OI).

“OI is the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and expand the markets for external use of innovation, respectively” (Chesbrough 2006). Lichtenthaler (2008) highlighted that, OI is the outside-in as well as inside-out transfer of different technologies and latest ideas as shown in Figure 2. These OI activities are most crucial in the success of SMEs (Freel& Robson, 2017). However, OI success is one of the challenges in Pakistani SMEs, due to various challenges.

Unwillingness of company employees to utilize the extra-organizational knowledge is one of the important challenges of OI (Chesbrough& Crowther, 2006; Huston &Sakkab, 2006; Lichtenthaler& Ernst, 2006; Lucas & Goh, 2009). Employees of an organization have not positive attitude towards the utilization of external knowledge (EXKN) and employees have also negative attitude towards commercialization of ideas (Lichtenthaler et al., 2010). Here, the idea commercialization is crucial, as the commercialization of idea is the key to get success in OI. Moreover, maximization of internal innovation is also most crucial which requires R & D department (Chesbrough, 2006). R & D department requires more finance which is difficult for SMEs (Van de Varnde et al., 2009). Therefore, integration of EXKNas well as internal innovation is a challenge which creates another issue related to knowledge management (KM).

Based on these issues, Pakistani SMEs are lacking with OI activities which effects adversely on performance. As mentioned, Rasheed et al., (2017), Pakistani SMEs are facing the problem of low performance. Low performance in OI is based on various challenges such as internal innovation maximization and EXKN incorporation. Maximization of internal innovation and EXKN incorporation are basically the major challenges of OI (West & Gallagher, 2006). It is apparent from Figure 1 that SMEs sector of Pakistan is lacking behind India. India is neighboring country of Pakistan having same resources; however, the performance of Pakistan SMEs in each section of innovation is low as compared to India.

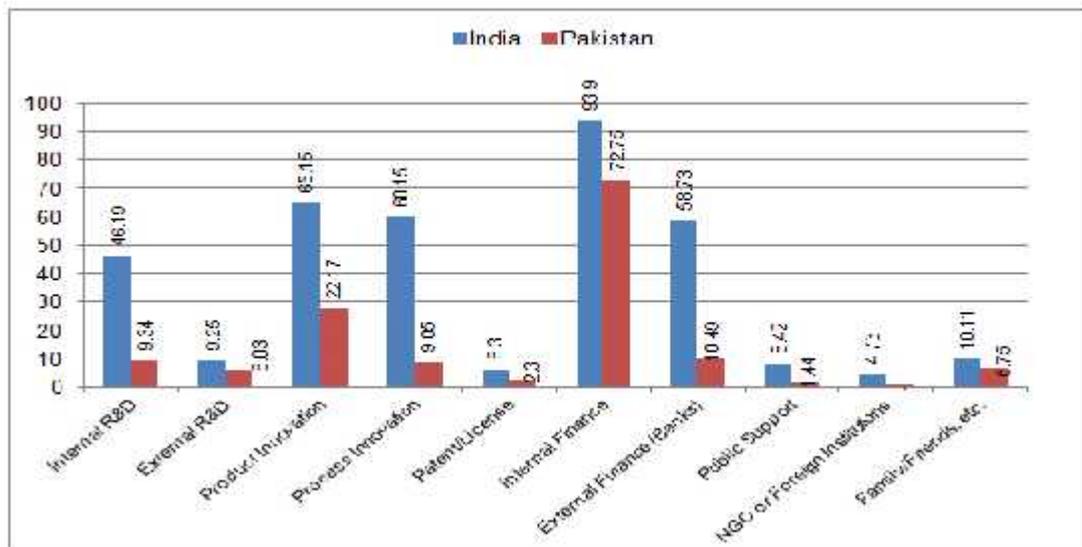


Figure 1. Comparison of Pakistani and Indian SMEs

Source: Small and Medium Enterprises Development Authority (2017)

However, these issues can be handled through proper KM practices. As the KM has an important influence on firm’s innovation practices (Antonelli, 1999; Nonaka& Takeuchi, 1995). Therefore, maximization of internal innovation as well as EXKN incorporation has significant relationship with OI. Moreover, KM is one of the factors which moderates the relationship. Thus, in the current study KM is taken as moderating variable as shown in Figure 3. Hence, the study has two major objectives;

1. To investigate the role of maximization of internal innovation and EXKN incorporation to boost up the OI performance in SMEs.
2. To investigate the moderating role of KM.

The current study filled the literature gap by identifying the important factor, namely, KM as moderating variable which can enhance the positive effect of internal innovation of the company and EXKN on OI activities. Effective KM is most important to get maximum benefit from EXKN/information and internal innovation, as the Pakistani SMEs are struggling to incorporate EXKN and the issue of maximization of internal innovation. In this direction, EXKN management could be most beneficial to boost OI performance in SMEs.

Hypotheses Development

Close innovation model which is one of the authoritative as well as individualistic process of innovation, transfer towards a new model of innovation. New model highlights collaboration with external partners and commercialization of various new ideas, here the point of departure between two models is

collaboration with external stakeholders like suppliers, customers, research organizations, dealers and competitors (Abulrub& Lee, 2012; Fichter, 2009; Laursen, 2006). This new model is called OI as shown in Figure 2. In contrast to the close model of innovation, knowledge as well as ideas cannot flow (inter or exit) through a single way but it flows through different ways like external players, partnership, internal research investigation etc. (Lamerias et. al., 2012).

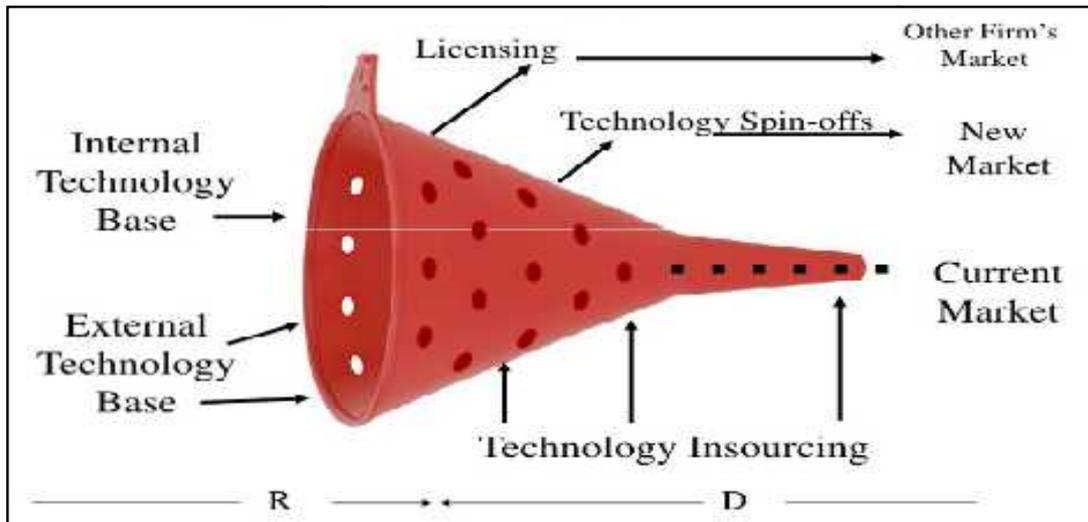


Figure 2. The OI models. (Source: Chesbrough (2012))

OI is different from close innovation in which organizations make their own ideas, develop these ideas, market, finance, distribute as well as support with the help of own internal applications (Huizingh, 2011). It is the use of ideas and knowledge from outside (Von Krogh, Netland, &Wörter, 2018). As described by the experts that the traditional innovation model or closed innovation model is shifted to OI model with the help of internal research and development (Chesbrough, 2003; Gassmann, 2006; Lichtenthaler, 2011).

However, according to the author, employees do not want to bring EXKN inside the firm which is one of the main challenges to bring new ideas for promotion of OI. As the EXKN is key to OI success (Chesbrough, 2006). Thus, in this sense, KM is most important to create better ideas through employees. As the KM has significant positive association with innovation activities (Antonelli, 1999; Carneiro, 2000).

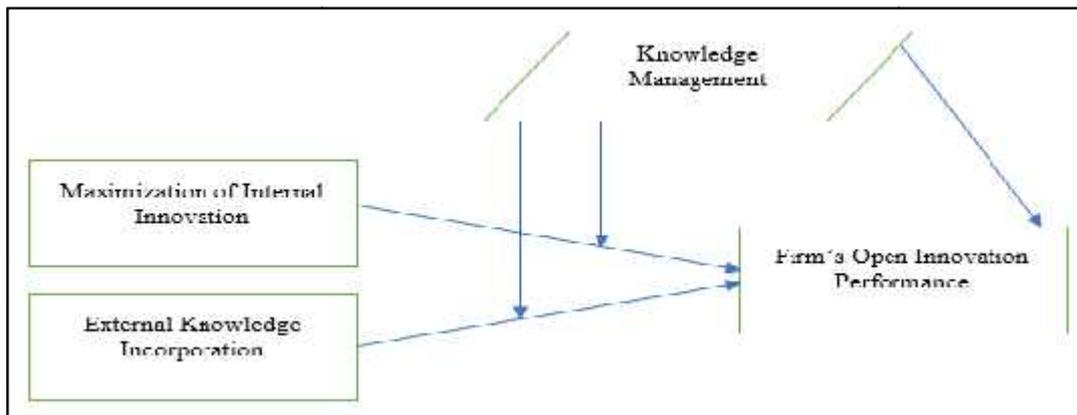
According to Zabala Martinez (2009), technological knowledge is not sufficient to gain competitive advantage, but it comes from coordination/EXKN incorporation. According to the definition of OI, it is the process in which both internal as well as EXKN combine to bring something new. Therefore, it is clear that EXKN incorporation is positively correlated with OI but from the above discussion, negative attitude toward EXKN shows that it will not reach inside the

boundaries of the firm and OI process cannot reach to the completion. So, EXKN incorporation is one of the main challenges of OI.

Furthermore, how to best utilize internal research and development capabilities to gain maximum advantage is the central concern to OI (West & Gallagher, 2006). Author further says that to feed product pipeline line of company is not enough to gain maximum advantage from internal innovation but its need's wide range approaches. Therefore, it can be described as if the company focuses on quantity of product and just try to meet the demand of market by producing more products then this will not provide maximum advantage from internal innovation. Therefore, it needs to introduce new methods to promote internal innovation and to enhance the OI system which is a challenge. In past, number of industries focused on internal innovation (Grönlund et al., 2010) but other industries focused on co-innovation process (Mowery, 2009).

Majorly, stakeholders such as suppliers, external partners and customers are the key providers of information (Gama & Frishammar 2018; Wallin & von Krogh, 2010). New ideas are generally based on this information which helps to expediate internal innovation with the help of employees of the company. Proper utilization or management of these information's generally called KM which is crucial to get maximum benefits from EXKN. As the KM is positively associated with innovation (Carneiro, 2000).

Thus, in both cases, maximization of internal innovation and EXKN incorporation, KM is most imperative. Because, the combination of internal knowledge and EXKN is important for OI. As described by Chesbrough (2006), OI is the mixture of internal as well as EXKN. Through EXKN, employees generate new ideas internally. Moreover, Nonaka and Takeuchi (1995) found a positive association between innovation and KM. Hence, best utilization of internal and EXKN requires effective KM. Therefore, based on above discussion, below framework is proposed. Based on this model in Figure 3, 5 hypotheses were proposed. Conceptual Framework shown in following figure



- H1:** Maximization of internal innovation has positive effect on firm's OI performance.
- H2:** EXKN incorporation has positive effect on firm's OI performance.
- H3:** KM has positive effect on firm's OI performance.
- H4:** KM positively moderates the relationship between maximization of internal innovation and firm's OI performance.
- H5:** KM positively moderates the relationship between EXKN incorporation and firm's OI performance.

Material and Methods

The research method is most important step of every research. Generally, it is grounded on the type of research, objectives and problem (Hameed, Azeem, Ali, Nadeem, &Amjad, 2017; Basheer et al., 2018; Hafeez et al., 2018). In this research study, data were collected from managerial employees of SMEs in Pakistan. Only those respondents were selected having direct participation in OI activities. Therefore, by examining the objective and nature of the study, it is observed that quantitative research is suitable with cross-sectional design. Data were collected through area cluster sampling technique. Area cluster sampling was divided into three steps.

1. Whole Pakistan was divided into 5 clusters based on states, namely; Punjab, Sindh, Khyber Pakhtunkhwa, Gilgit-Baltistan, and Baluchistan.
2. Three clusters were nominated randomly. Names of selected clusters were, Punjab, Sindh and Baluchistan.
3. Questionnaires were distributed randomly among respondents in each selected cluster.

The survey was conducted by using 5-point Likert scale. Moreover, the questionnaires were distributed through e mail. First, the email addresses of employees were collected from the SMEs main office and then questionnaires were sent to them. Purpose of study was explained in e mail and only those respondents were allowed to fill questionnaire having direct involvement in OI activities.

Nevertheless, 300 sample size was selected for this study. As Comrey and Lee (1992) provide sample in a series for inferential statistics. "Sample having less than 50 participants will observed to be a weaker sample; sample of 100 size will be weak; 200 will be adequate; sample of 300 will be considered as good; 500 very good whereas 1000 will be excellent."

Questionnaires were divided into different four sections. First section was related to the respondent's profile, second section was related to the scale items of firm's OI performance, third section was related to items of independent variables such as EXKN and internal innovation. Lastly, the fourth and last section was created on the scale items of moderating variable, namely; KM. All the items are shown in Table 1.

Finally, all the measures were adapted from prior studies and shown in Table 1. Smart PLS 3 was applied to assess the data. In this study Smart PLS was selected based on sample size. Among 300 questionnaires, only 93 valid responses were received. Therefore, the sample size was very small. As prior researchers support that SmartPLS is suitable for small sample (Reinartz et al., 2009). Moreover, in the present study, the response rate is only 31%. Sekaran (2003) described that, 30% response rate is enough if the data is collected by using e mail survey.

Results and Discussion

In first step of the analysis, measurement model assessment was performed. In this step, factor loading of items, Cronbach alpha of each construct, composite reliability (CR) of each construct and average variance extracted (AVE) of each construct was examined. In this study, none of the item has factor loading below 0.7. CR is more than 0.7, Cronbach alpha is also more than 0.7 and AVE is more than 0.5. Convergent validity was achieved through AVE. Figure 4 shows the outer model. Table 1 highlights the outcomes of outer model. Moreover, discriminant validity was studied through AVE square root as shown in Table 2.

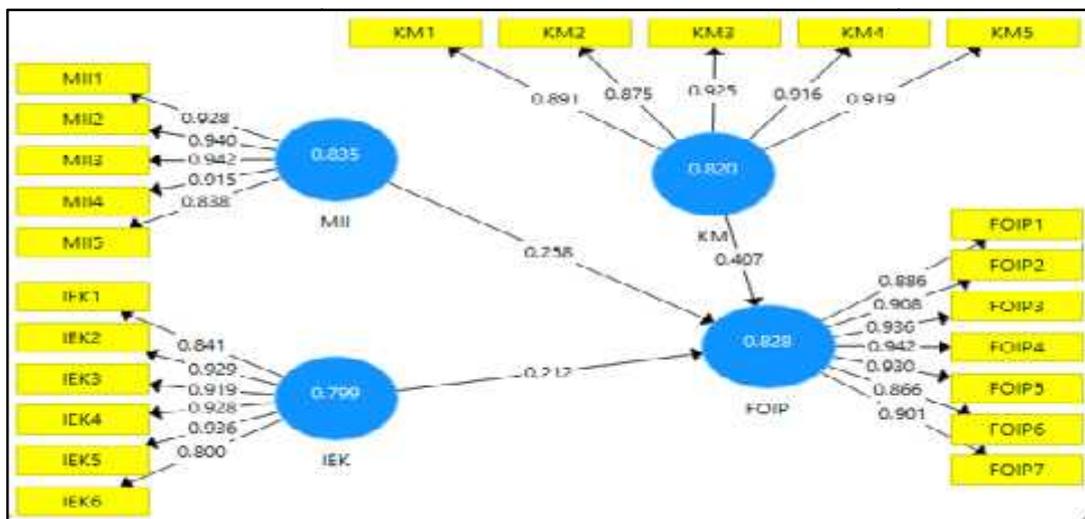


Figure 4. Measurement Model (Outer Model)

Table 1
Factor loading, Internal Consistency, Reliability

Construct	Indicators	Loadings	A	CR	AVE
Incorporation of EXKN (IEK)	IEK1	.841	.949	.960	.799
	IEK2	.929			
	IEK3	.919			
	IEK4	.928			
	IEK5	.936			
	IEK6	.800			
Maximization of Internal Innovation (MII)	MII1	.928	.950	.962	.835
	MII2	.940			
	MII3	.942			
	MII4	.915			
	MII5	.838			
KM (KM)	KM1	.891	.945	.958	.820
	KM2	.875			
	KM3	.925			
	KM4	.916			
	KM5	.919			
Firm's Open Innovation Performance (FOIP)	FOIP1	.886	.965	.971	.828
	FOIP2	.908			
	FOIP3	.936			
	FOIP4	.942			
	FOIP5	.930			
	FOIP6	.866			
	FOIP7	.901			

Table 2
Discriminant Validity

	FOIP	IEK	KM	MII
FOIP	0.910			
IEK	0.744	0.894		
KM	0.783	0.782	0.905	
MII	0.764	0.828	0.812	0.914

Moreover, the outcomes of direct hypotheses testing are shown in Figure 4 and Table 3. Results shows that the relationship of maximization of internal innovation and EXKN incorporation with firm's OI performance is significant with t-value 2.242 and 2.198 respectively. Beta value for both relationships is positive 0.258 and 0.212 respectively which shows a positive relationship. KM has also significant positive relationship with OI with t-value 2.379. Moreover, Table 3 displays the effect size (f^2). Maximization of internal innovation and EXKN incorporation have small f^2 , 0.05 and 0.036 respectively, however, KM has

moderate f^2 0.154 (Cohen, 1988). Additionally, R^2 is also shown in Table 3. R^2 value is 0.674 which specifies that all set of variables are likely to explain 67.4% variance in OI performance. This R^2 effect is substantial (Chin, 1998).

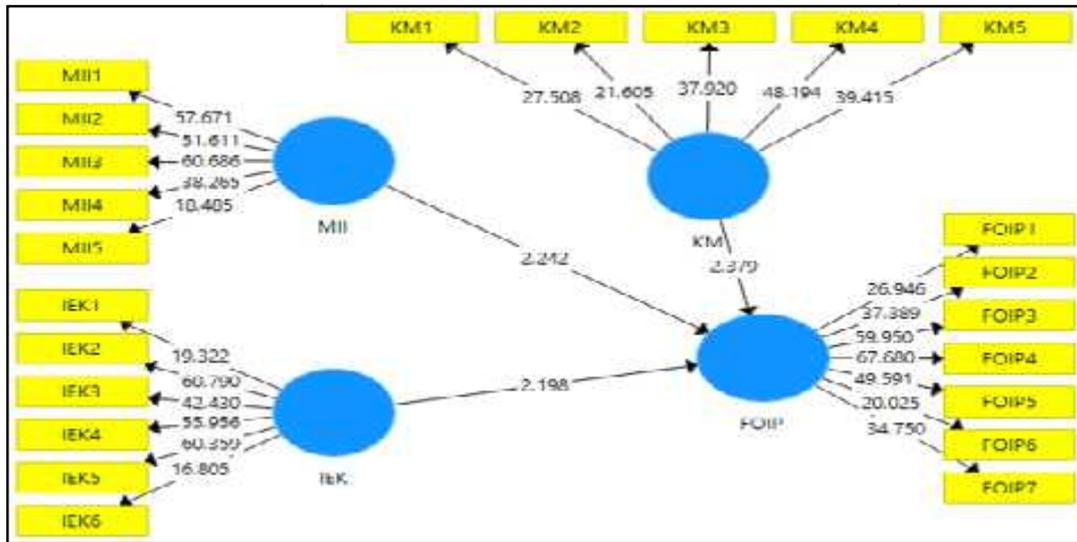


Figure 4 Structural Model Assessment

Table 3
Results of direct Hypotheses

Relationship	(β)	(M)	SD	T Value	P Values	F ²	R ²
IEK -> FOIP	0.212	0.223	0.097	2.198	0.028	0.036	0.674
KM -> FOIP	0.407	0.398	0.171	2.379	0.018	0.154	
MII -> FOIP	0.258	0.265	0.115	2.242	0.025	0.050	

Table 4 illustrates the results of moderation effect of KM. It indicates that moderation effect of KM between internal innovation and OI is significant with t-value 2.090. Furthermore, the moderation effect between EXKN and OI is also significant with t-value 4.041. Thus, it is demonstrated that KM positively moderates the both relationships. Finally, Table 5 shows the quality of model by examining the predictive relevance (Q^2) (Basheer et al., 2018; Hameed et al., 2018; Munner et al., 2018; Zahra et al., 2018; Henseler et al., 2009). This value should be above than zero (Chin, 1998). As shown in Table 5, Q^2 is more than zero.

Table 4
Results of Moderation effect

Relationship	(β)	(M)	SD	T Value	P Values	Decision
MII* KM -> FOIP	0.268	0.240	0.128	2.090	0.040	Moderation
IEK* KM -> FOIP	0.449	0.459	0.111	4.041	0.000	Moderation

Table 5
Predictive Relevance (Q²)

Total	SSO	SSE	Q ² = (1-SSE/SSO)
Firm's OI Performance (FOIP)	553.000	267.102	0.517

Findings and Discussion

These results of the study depict that increase in maximization of internal innovation, EXKN incorporation and KM will enhance OI performance. As all these three factors have significant positive relationship with OI. Therefore, these results supported the H₁, H₂ and H₃. Internal innovation, EXKN incorporation and KM are the key contribute towards OI performance.

These results are consistent with West and Gallagher (2006). As according to West and Gallagher (2006), maximization of internal innovation and EXKN incorporation are the major players in OI. Chesbrough (2006) also demonstrates that integration of EXKN and internal innovation is important for OI. Various other studies found the EXKN and internal innovation are key to OI (Berchicci, 2013; Brunswicker, & Vanhaverbeke, 2015; Hameed, Altaf, & Ahmed, 2018; Hameed, Basheer, Iqbal, Anwar, & Ahmad, 2018; Hameed, & Naveed, 2018; Poot, Faems, & Vanhaverbeke, 2014; West, & Bogers; 2014). Moreover, consistent with the results of current study, various other studies also described a positive linkage between KM and innovation (Carneiro, 2000). Therefore, KM is vital to overcome the various challenges of OI such as EXKN incorporation and maximization of internal innovation. Nevertheless, according to the findings, KM moderates the relationship between maximization of internal innovation and OI performance. It also moderates the relationship between EXKN incorporation and OI performance. Figure 5 and 6 proved that KM strengthens the both relationship of EXKN and internal innovation with OI performance. The results supported the H₄ and H₅.

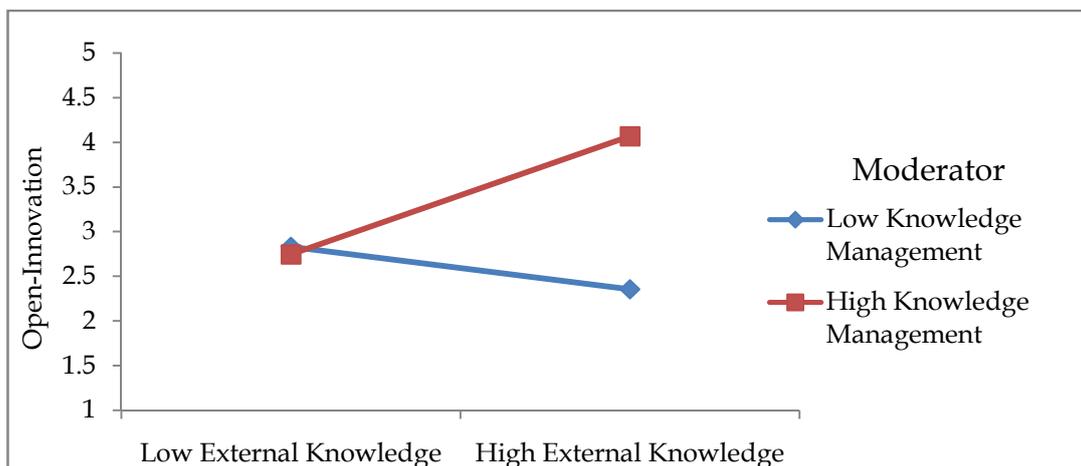


Figure 5. Moderation effect of KM between EXKN and firm's OI performance

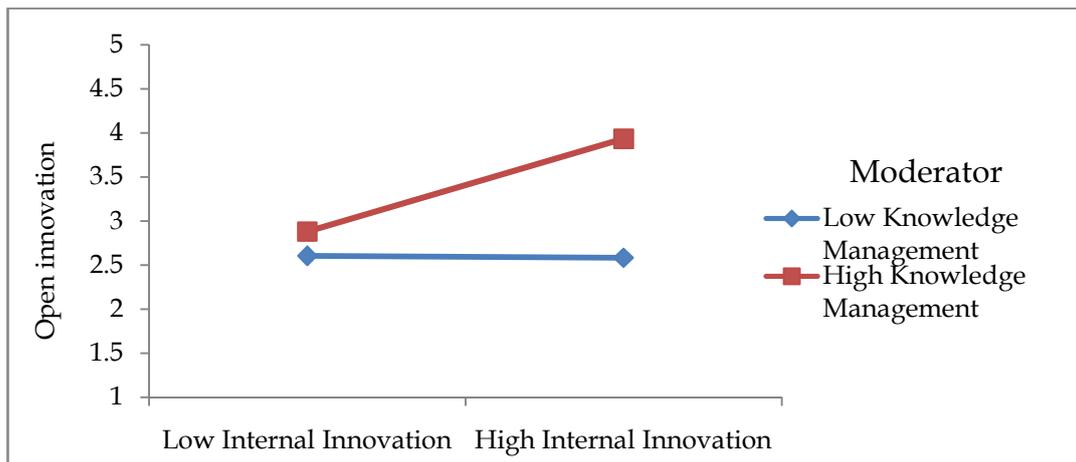


Figure 6. Moderation effect of KM between internal innovation and firm's OI performance

Conclusion

This study was conducted to examine the role of maximization of internal innovation and EXKN incorporation on firm's OI performance. Furthermore, the moderating role of knowledge was also examined. Data were gathered all over the Pakistan from the managerial employees of SMEs. It is found that maximization of internal innovation; EXKN incorporation and KM are the key contributing factors towards the higher performance of OI in SMEs. Increase in internal innovation, EXKN incorporation and KM will enhance OI performance. Nonetheless, it is revealed that KM enhances the positive effect of maximization of internal innovation, EXKN incorporation towards OI. Increase in KM practices will automatically enhance OI. Thus, KM is another key factor to enhance OI in SMEs. Finally, this study contributed in literature by investigating the moderating role of KM to enhance OI.

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