

The orientation of knowledge sources and knowledge transfer towards innovation capabilities are moderated by absorptive capacity: An empirical study in perspective of manufacturing industries.

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Abstract

This paper intends to explore the impact of knowledge sources on innovation capabilities of the firm. Firms tend to improve their innovation capabilities for the long term survival. In process of innovation, firms increasingly rely on the several knowledge sources. Objective is to find the effects of knowledge sources on firm's innovation capabilities. On the bases of self-administered survey, data was collected to achieve the convenience sample of 181 respondents. Different manufacturing industries in Faisalabad division were targeted for this purpose. Different manufacturing industries' owners, managers, directors or supervisors were consulted and collected the valid responses of 181 sample size. Data analysis was completed by using the SPSS, AMOS and Process macro. The results of this study signpost that the knowledge sources positively influence the innovation capabilities of the firm. Particularly, the knowledge sources' direct effect is fully mediated by knowledge transfer. Furthermore, the knowledge sources' effects are contingent upon the absorptive capacity. The contribution of this study is not only to investigate the effect of knowledge sources on firm's innovation capabilities in the literature of knowledge sources but also it contributes to the knowledge management research by illustrating the moderating effect of absorptive capacity.

Keywords: Innovation capabilities, Absorptive capacity, Knowledge sources, Knowledge transfer

Biographical Notes

Professor Muhammad Shahid Tufail has an outstanding work experience in teaching, training and coaching. He has interest in diverse areas of management. He has many published research articles. His major working was in employee performances at work place. He has written many research papers on employee task performances and contextual performances. He has a strong background of teaching and achieved many excellence awards in his career. He has given his services as trainer in many national and international business organizations. He has a notable teaching experience with range of practical knowledge.

Assistant Professor Kanwal Shaheen has a specialization in human resource management particularly in organizational behavior. She has a significant teaching experience in a public sector university. Her research interests include workplace stressors, counterproductive work behaviors, coping behaviors, negative emotions etc. She has got impact factor publications

Lecturer Sana Mehmood is a research scholar specialized in marketing, and working in a public university with considerable teaching experience. She is also pursuing PhD in marketing. Her research interests include word of mouth, social media marketing, impulse buying behavior etc. She has got publications in recognized journals.

Assistant Professor Nausheen Syed is a remarkable demonstrator and currently playing an active role in administration and leadership. Her area of interest is management. She keenly focuses on resource management including allocation and utilization. She has a considerable teaching experience and is the author of more than 20 published papers. She is the active member of research committee. She has a strong background of teaching and won many high performance awards in her career.

Assistant Professor Iram Bashir's interests are in human resource management specifically in organizational behavior and the wide range of organizational practices encountered in organizational structuring and restructuring also. She has written more than 15 research papers published in international journals. She has conducted trainings on behavior modeling of employees at work place. She has done some tutorials and workshops on basics of research at different platforms. She has a considerable teaching experience and has been a principal speaker at many courses in Pakistan.

Anum Jamil is working as a manager in a well reputed firm having considerable administrative experience. Her research interests include knowledge management, innovation, creativity etc. She has keen interest in research.

1. Introduction

In the contemporary competitive era, the firms have to improve their innovation capabilities to survive in this landscape. For the long run survival, the innovation plays an imperative part for the firms. Lawson and Samson (2001) anticipated that the innovation capability enabled the firms to transfer ideas and knowledge into the system to meet the desires of customers for the better performance of the firm Wegner et al. (2011), reasoned that all the activities that are innovative-based lead to enhance organizational efficiency and to maintain the competitiveness of the market. In the highly competitive landscape firm's necessary condition is to develop their innovative behavior for their long-term sustainability.

Innovation capabilities of the firm are considered the basic concept to achieve the competitive advantage. Firms tend to advance their innovation capabilities for long term existence. Morton and Burns (2008) described the innovation as the process in which improved and new procedures and products brought to the market; enrich the product quality and productivity via expansion and manufacturing operations and process adoption; improve the performance of the firm through developing and adapting business practices. Leskovar-Spacapan and Bastic (2007) proposed that innovation encloses the innovativeness in process technologies, management practices and product development.

The firm's important need is involved in innovation activities for the long run survival in the market. Many scholars of management have recognized that innovation is considered to be the engine of progress (Shumpeter, 1983; Volberda et al., 2014). For today's societies, innovation is referred as the most widely used key to hold the sustainable development (Boons, Montalvo, Quist and Wagner, 2013; Matos and Silvestre, 2013). In the field of business management's early studies, knowledge is considered to be an important element for firms to develop unique advantage and compete with other firms (Nonaka, 1994; Grant, 1996). According to this context, the growth in literature suggested that innovation's determinants has defined the knowledge sources a successful factor to improve the innovation capabilities (Mol and Birkinshaw, 2009). In the most studies, knowledge is considered the most important resource for any firm, which is used to create new and unique advantages and compete with the other rivals (Nonaka, 1994; Grant, 1996; Nguyen et al., 2022).

In the innovation process, businesses are depending more and more on the various information sources. Firms used developments and ideas which acquire from knowledge sources, in which the firms get access to human capital, infrastructure and partners of innovation capacities (Freitas et al., 2011). The innovation system of under develop countries are poorly structured because they have insufficient resources (Berger and Diez, 2008). The developing countries are not interested to invest in these activities of innovation, because these activities are costly and risky (Back, Parboteeah and Nam, 2014; Bashir et al., 2017). This research is built upon the following objective.

“To find out the influence of knowledge sources on the firm’s innovation capabilities, using Knowledge-based view theory of the firm”.

This study will focus on knowledge sources which impact the innovation capabilities of the company by the applicability of Knowledge-Based View of the firm (KBV). Knowledge-based view shows that the main resource is organizational knowledge to sustain and develop competitive advantage by innovation activities (Kogut and Zander, 1992; Thrassou et al., 2014). It is the most important resource for the firm. These resources are socially complex and difficult to copy, heterogeneous capabilities and knowledge base major elements across firms of superior performance and sustained competitiveness.

2. Theoretical foundation and hypotheses

2.1 Knowledge sources and firm’s innovation capabilities

Damanpour (1991) proposed the term innovation as the development and creation of new processes, services or products. Therefore, the innovation capability’s association with novelty or originality leads to improve or enhance the value of innovation for the firm. Introduce and develop new ideas of doing things at work like products, procedures and outcomes (Anderson et al., 2014, p. 4). The capacity of businesses to innovate allowed them to concentrate on transferring information and ideas that satisfied client needs into systems for improved business performance (Lawson and Samson, 2001). Innovation strategies utilized the flow of external knowledge that represented a new source for companies’ competitive advantage (Gassmann et al. 2010; Del Guidice et al. 2013).

Many studies explored the term innovation in their own way, according to Morton and Burns (2008) the process to conduct enhanced and new processes and products to market; establishing, adopting and adapting processes of manufacturing to improve the product quality and productivity and to improve the firm's performance by establishing, adopting and adapting new business practices. Different knowledge sources in which firms depended are involved in innovation process. These knowledge sources are related with developments and using ideas that are resulting to human capital, infrastructure and innovative capabilities of partners. These sources allow access to that research information or market elaborated by different firms (Freitas et al., 2011). Many scholars pointed out that the maximum new knowledge generation and use of existing knowledge could be possible by the effectively exchange of knowledge (Nonaka et al., 2000; Nonaka and Van krough, 2009).

In the most studies, knowledge is considered as the important resource for any firm, which is used to create new and unique advantages and compete with the other rivals (Nonaka, 1994; Grant, 1996). Knowledge could be generated either internally or externally in the firms. Firms needed to develop knowledge and found the scattered knowledge to enhance their competitiveness (Von Krogh, 1998; Argote and Ingram, 2000; Alavi and Leidner, 2001; Bashir et al., 2019), which helped the firm to reply to the changes of technological and competitive environment (Teece 2007). So, the firms needed to expand their internal capacity of their knowledge management to organize the inward and outward knowledge flow, which is improved the exploring and exploiting opportunities externally (Lichtenthaler and Lichtenthaler, 2009).

In the most studies, knowledge is considered the most important resource for any firm, which is used to create new and unique advantages and compete with the other rivals (Nonaka, 1994; Grant, 1996). This new and novel knowledge enable the firm to make a competitive advantage for the firm and this knowledge offer the firms to start the innovation activities. So, according to this perspective this study intends to propose that:

H1. Knowledge sources are positively associated with the firm's innovation capabilities.

2.2 Knowledge transfer

In the innovation process, businesses are depending more and more on the various information sources. Firms used developments and ideas which acquire from knowledge sources,

in which the firms get access to human capital, infrastructure and partners of innovation capacities (Freitas et al., 2011). Knowledge transfer plays an important part in the firm's innovation capabilities. It is used to transferring knowledge in the organization from one place to another. Knowledge transfer is defined as it requires a source and a recipient, it transfers knowledge from source to recipient who obtains the knowledge and utilize this knowledge (Ko et al., 2005).

Nowadays knowledge transfer is becoming common part in acquisition or mergers. Knowledge transfer focuses on the transferring of market experience, corporate culture, technological platform, intellectual capital and other managerial expertise, which can be used to enhance the competence of the companies. In this global competition, knowledge and technical skills are pertinent assets for the competence of the firms, but if there is not any proper way to transfer knowledge it will show negative influence on corporations and it will lead to time consuming and expensive, which will show no values to firms (Nguyen et al., 2022).

The knowledge transfer literature showed that not only the source's characteristics important but the characteristic of recipient also plays a key role in successful transformation of knowledge (Chang et al., 2012; Easterby-Smith et al., 2008). Knowledge transfer is the important process which is contributed to the success of the firm (Argote and Ingram, 2000; Mubako et al., 2017). The transfer of knowledge has been defined as the movement of knowledge from one ownership, person or place to another (Liyanage et al., 2009, p. 122).

It is necessary for the business to have a good knowledge base. According to Tidd and Bessant (2009), when the implementation phase is considered, different knowledge transfer channels in which contract research, patents, consultancy and spin outs are involved these could all be used to enable the firms to start the innovation activity and if this activity managed properly, it could be maximize the capture or uptake rate. The study described the process of knowledge transfer in which the acquisition of knowledge by the receiver from the provider or source so it could be accumulated and which renew the capability of productivity (Liao and Hu, 2007). On the bases of previous studies, the tentative statements are proposed as:

H2. Knowledge sources are positively associated with the knowledge transfer.

H3. Knowledge transfer is positively associated with the firm's innovation capabilities.

2.3 Absorptive capacity

This term is first time formulated and is demarcated as “the capacity of a firm to identify the value of new, peripheral information, assimilate it and relate it to commercial ends”. The knowledge flow and stock, and knowledge absorptive capacity as well, determine the establishment of innovative outputs. So the study considered that the absorptive capacity is a critical part for firms’ innovation. Relevant theories about innovation outcomes proposed that at the firm level absorptive capacity played an important role for innovation (Kocha and Stortmanna, 2008). Absorptive capacity is reflected to be the important element of firm’s ability to be familiar with external knowledge, conform it and feat this knowledge to enhance innovation performance in a profitable way. Firms have to improve their absorptive capabilities to identify the value of external knowledge, absorb it, transform it and utilize that knowledge for their innovation activities, which leads the firms to improve their performance (Daghfous, 2004).

Hence, the absorptive capacity of the firms can enhance the innovation activities’ effectiveness (Cockburn & Henderson, 1998). Moreover, (Daghfous, 2004) anticipated that the firm’s absorptive capacity shows a constructive role for the R&D activities and learning of the firms. Schilling (1998) pointed out that with the help of absorptive capacity organizations can increase their skill and knowledge base enhance their ability of assimilation and utilization of future knowledge and at the end it enables the firms to improve their technological developments’ performances. So, the firms with in top elevation of absorptive capacity, it would direct the firms to boost their innovation performance. Furthermore, (Nguyen et al., 2022) proclaimed that the absorptive capacity of a firm is considered to be acute to innovative capabilities of a firm. In our study, we propose that the absorptive capacity of the firm can positively influence the firm’s innovation capabilities. So, the present study proposes the hypotheses as:

H4. Absorptive capacity moderates the effect of knowledge transfer on firm’s innovation capabilities.

3. Methods

3.1 Sample and data collection

To test the model, this study targeted the population of Faisalabad division for the collection of sample size. Different manufacturing industries were targeted for this persistence. The owners, managers, directors or supervisors of different manufacturing industries were contacted for the purpose of collecting their response regarding the influence of knowledge sources on the firm's innovation capabilities.

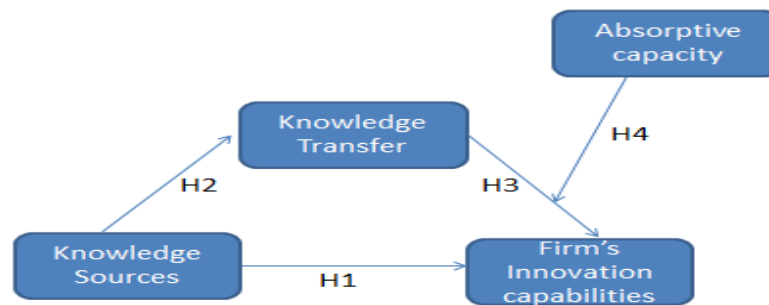


Figure 1: Research Framework

Data was gathered to create a convenience sample of 181 respondents based on a self-administered survey. The number of questionnaire was 200 that were distributed among the respondents. The questionnaire that was distributed, in which 19 questionnaires were not included because of some mistakes and 181 sample size were considered out of 200 questionnaires in this study. The questionnaire used for survey was consisted of two sections; in the first section variables are focused which are used in the study (19 questions), while the respondents' demographic profile was captured in the second section (4 questions). To test the model AMOS was used.

3.2 Measurements

Developed and verified scales were taken into consideration to assess the latent variables. The scales that were used in the study adopted from the relevant topic of firm's innovation capabilities. 5 point Likert scale was used to measure the each variable, where 1 is for "strongly disagree" and 5 for "strongly agree". Two reflective first-order construct was used to measure the knowledge sources which are tacit and explicit knowledge sources. . The main source of this scale was Gray and Meister (2004). This scale was used by the Che et al., (2018). In the scale of knowledge transfer three items were used, which is previously used by the Tho (2017) with composite reliability of 0.88. In this study, to measure the absorptive capacity the scale that was

used had four items. This scale was used by the Tho (2017) with composite reliability of 0.82. Innovation capabilities were measured by the six items scale. This scale was adopted from the Calantone et al., (2002) with composite reliability of 0.89. The control variables such as age, gender, qualification and designation were used for data analysis.

Table 1

Demographic statistics (181 sample size)

Characteristics	Distribution (%)
Gender	
Male	95.6
Female	4.4
Age	
20-30	34.3
31-40	29.3
41-50	20.4
Above 50	16.0
Qualification	
Intermediate	17.7
Graduation	29.3
Masters	20.4
MBA	22.7
DAE	0.6
M.phil	3.3
CA	3.3
PhD	0.6
LLB	1.7
ACCA	0.6

Designation	
Owner	6.6
Director	15.5
Chairman	13.3
Supervisor	15.5
Manager	32.6
Assistant manager	16.6

4. Results

4.1 measurement model

The Cronbach's Alpha was used to check the reliability of the study constructs whereas the CFA was used to measure the convergent as well as discriminant validity for the study in hand.

Table 2

Descriptive statistics, reliability and AVEs

	AVE	Composite reliability	Cronbach's alpha	Mean	SD
1.Knowledge sources	0.631	0.837	0.897	2.453	0.867
2.Knowledge transfer	0.724	0.887	0.882	2.383	1.035
3.Absorptive capacity	0.677	0.893	0.892	2.434	0.890
4.Innovation capabilities	0.537	0.872	0.871	2.447	0.708

Table 3

Discriminant validity								
Variable	No of Items	Mean	SD	KS	KT	AC	IC	
KS	5	2.45	0.87	0.631				
KT	3	2.38	1.04	0.611 (0.373)	0.724			
AC	4	2.43	0.89	0.547 (0.299)	0.605 (0.366)	0.677		
IC	6	2.45	0.71	0.697 (0.486)	0.733 (0.537)	0.563 (0.317)	0.537	

*Shared variance defined in parenthesis

**AVE are represented as diagonally

Through the comparison of construct's variance with construct's parameter, it can easily notice that the values of AVE are greater than correlation squares, thus it confirms that the discriminant validity exists.

4.2 Structure model results

In the literature of knowledge sources, there is significant impact of knowledge sources on innovation capabilities of the firms. Particularly, knowledge sources have positively significant effect on innovation capabilities ($\beta = 0.511$, $p < 0.00$).

Table 4

Variables coefficients

Variable	Coefficient	t-value	p-value	LLCI	ULCI
KT	0.305	7.1357	0.0000	0.2202	0.3886
KS	0.307	6.0220	0.0000	0.2063	0.4074

Table 4 shows that the indirect effect of knowledge sources on innovation capabilities via knowledge transfer. The value of KS on IC is 0.307 and KT on IC is 0.205, these values indicate that due to the KT the value of KS decrease which means that there is an existence of KT. There is no 0 value in the LLCI and ULCI, which is considered to be significant.

Table 5

Mediation through model 4

Effects	Coefficient	95% confidence interval (CI)
KS-KT-IC		
Direct effect	0.307	(0.206, 0.407)
Indirect effect	0.205	(0.125, 0.299)

Table 5 indicates the results of mediation. To estimate the mediation's existence by KT, (10,000 random samples) bootstrapping method were used in this process which is suggested by Preacher and Hayes (2014) and the Hayes (2013) process macro. The indirect effects' confidence interval of knowledge sources on innovation capabilities via knowledge transfer does not have 0 (Coefficient = 0.205, LLCI = 0.125, ULCI = 0.299), which proposed the existence of mediation.

Table 6

Moderation analysis Hayes (2009) model 1

Variable	Coefficient	t-value	p-value	LLCI	ULCI
AC	0.2235	4.1482	0.00	0.1172	0.3298
KT	0.2769	5.9894	0.00	0.1857	0.3682
KT*AC	0.1232	3.0373	0.00	0.0431	0.2032

Table 6 indicates the moderation analysis. To measure the hypothesis of moderation, a moderation analysis was conducted by determining the relationship between KT*AC and innovation capabilities. Table shows the significant interaction ($\beta = 0.12$, $p < 0.00$) for innovation capabilities.

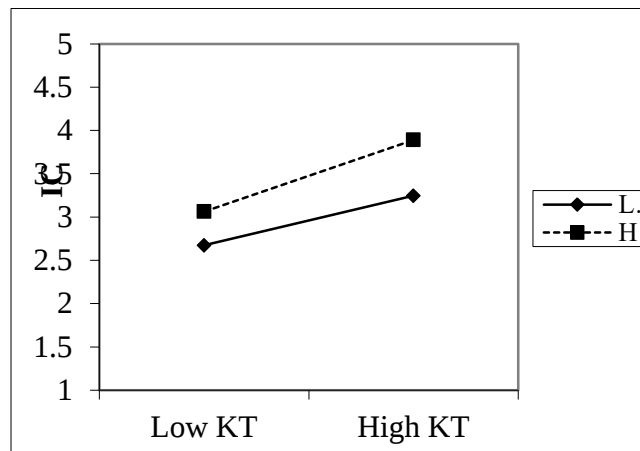


Figure 2: Moderation Graph

This moderation graph explains the relationship of knowledge transfer, innovation capabilities via absorptive capacity. The interaction graph was plotted for low and high moderator values (mean + 1 SD, mean – 1 SD). The graph of interaction for relationship of KT and innovation capabilities suggested the significant relationship for AC. The graph presents that at low KT with low AC shows the low level of innovation capabilities whereas at high KT individuals with high AC indicates the high level of innovation capabilities.

Table 7 Moderated mediation model summary model 14

R	R²	F	P
0.7540	0.5686	57.9874	0.0000

Table 7 indicates the moderated mediation model summary which shows the value of p is 0.00 that is significant.

Table 8 Coefficients measuring effects

Variables	Coefficients	t-value	p-value	LLCI	ULCI
KT	0.2188	4.7385	0.0000	0.1277	0.3100
KS	0.2255	4.2721	0.0000	0.1213	0.3297
AC	0.1610	3.0116	0.0030	0.0555	0.2666
KT*AC	0.0886	2.2403	0.0263	0.0106	0.1666

Table 8 indicates the significant effects in which the effect of KT on IC is significant and there is no 0 in confidence interval (coefficient = 0.2188, LLCI = 0.13; ULCI = 0.31), effect of KS on IC is also significant and no 0 in confidence interval (coefficient = 0.23, LLCI = 0.12; ULCI = 0.33), the effect of AC on IC is also significant and no 0 in confidence interval (coefficient = 0.16, LLCI = 0.06; ULCI = 0.27) and the effect of KT*AC on IC is also significant and there is no 0 in confidence interval (coefficient = 0.09, LLCI = 0.01; ULCI = 0.17).

Table 9

Conditional indirect effect of KS on IC at values of AC

Mediator	AC	Effect	LLCI	ULCI
KT	-0.8904	0.0941	0.0194	0.1891
KT	0.0000	0.1471	0.0769	0.2318
KT	0.8904	0.2001	0.1032	0.3070

Table 9 presents the conditional indirect effect of KS on IC at the values of AC. For moderated mediation test the Hayes model 14 was used to with similar boot strapping of 10,000 case and random samples, which concludes that confidence interval of AC on innovation

capabilities conditional indirect effect does not have 0, when low AC (coefficient = -0.89 LLCI = 0.019; ULCI = 0.189), same results found for high AC it does not have 0 (LLCI = 0.10; ULCI = 0.30) which means this effect is significant.

5. Discussions and implications

To promote the company's innovation, individuals need to find out the credible and relevant knowledge which is useful for the company's innovation activities. For this purpose, absorptive capacity is considered to identify the value of external knowledge, absorb that knowledge and recombine the external knowledge with internal knowledge to enhance the knowledge base of the firm which improves the firm's capabilities of innovation.

The outcomes of this study shows that knowledge sources have positive impact on firm's innovation capabilities at high levels of absorptive capacity and knowledge sources may have negative influence on firm's innovation capabilities at low absorptive capacity's level. Thus, at high absorptive capacity, firms could identify the value of external knowledge, assimilate it and utilize that knowledge to improve the innovation performance. However, if absorptive capacity of the firm is low, then it is difficult for the firms to conduct the good knowledge base which leads no innovation activities. This study gives the firms a strong implication to establish the absorptive capacity if the firms want to absorb the knowledge sources to enhance the innovation capabilities. Furthermore, knowledge sources have positive influence on knowledge transfer at high absorptive capacity. If there is a proper way of transferring knowledge at the right time and then absorb that knowledge for the further operations. So, the effectiveness of firm's knowledge sources strongly relies on their capacity of absorption. Additionally, firms have to improve their absorptive capacity for the better innovation performance.

5.1 Overall findings

Overall findings of this study are as follows; in which Chi square is 1.696 and it is good fit because its value should be less than 3, the values of Chi square lies from 1 to 3, which are considered as best fit. (Schumacker and Lomax, 2016). The value of comparative fit indices (CFI) is 0.956, which indicates the best fit. It considers the most important measure in which target model's fit are compared to the independent model's fit. Independent model is that model

in which variables are not correlated to each other. So, it shows that the model of interest is good in the extent in which independent model exist.

The value of GFI is 0.883 and the value of AGFI is 0.844, which are good because these values should be closer to the 0.90 (Byrne, 1994). The values of GFI and AGFI should be range from 0 to 1 which is generally considered the best fit. According to Byrne (1994), the values of GFI and AGFI should be close or greater than 0.90, which is the best fit indication.

The value of RMR 0.05, which indicates the good fit. The RMSEA's value is 0.06, which is also good fit. The value of root mean square error of approximation (SMSEA) is 0.06, which is considered the best fit. While in early nineties, the value range of RMSEA 0.05 to 0.10 is considered the best fit indication and the values greater than 0.10 is considered the poor fit. It is suggested that the value from 0.08 to 0.10 gives an average fit and less than 0.08 indicates the best fit (MacCallum et al., 1996). So, the value of RMSEA is better fit or acceptable at 0.06 or below 0.06. All these values indicate the overall model is quite good.

5.2 Implications

For the practice of management, our findings also have some implications for the managers. This study explores the relationship of knowledge sources and firm's innovation capabilities with respect to increase the performance of the firm and increase the competitive advantage of the firm. This research's findings may help the managers to investigate the knowledge sources which are considered to be the successful factor of the firm's performance. Managers should need to improve their internal R&D and explore the external sources to acquire new ideas and information. This study also indicates the knowledge-based view theory, which can show the perspective of innovation between the knowledge management and innovative capabilities of the firm in workplace. Knowledge sources are the important factors which can stimulate firms to introduce new ideas and practices of management in the workplace; technological innovation's literature suggests that many of implementation skills and ideas come from the external sources for innovation activities in the workplace.

5.3 Limitations

Time is the major limitation of this study because in 2 to 3 months it is difficult to get large data quantity to conclude the accurate and significant results. So, this study could be

considered in the large data collection period to get accurate and significant results. In addition, in spite of the benefits of representativeness and the size of the data, in further research this relationship should be investigated by drawing the different research design, measures and data sources to estimate the results' generality. This type of future research will illustrate the conclusions of this study by considering the sourcing activities' significance for the performance of innovation. Particularly, our study's analysis was conducted only in smaller set of Faisalabad division, this research could be conducted in other different cities of Pakistan, which could generate another additional confirmation of the knowledge sources' influence on the firm's innovation capabilities.

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