

# An Investigation the Impact of Knowledge Sharing on Improving Innovation in Companies ( Case Study: PERGAS International Consortium)

**Fatemeh Nadalizadeh**

Master Candidate of Business Management, International Business, Islamic Azad University ,E-Campus  
fatima@pergas.co.uk

**Esfandiar Doshman Ziari**

Assistant Professor, Department of Business Management, Faculty of Management and Accounting, Islamic Azad  
University, Islamshahr Branch  
doshmanziari@gmail.com

## Abstract

Creating the success factors of an organization such as organizational creativity, service quality depends on accessibility and efficient use of superior knowledge and better use of knowledge sharing; The purpose of this study is to study the effect of knowledge sharing on the improvement of innovation in companies (Case study: PERGAS International Consortium) which is applied in terms of purpose and is a descriptive survey research. The statistical population of this research is the managers and staff of the PERGAS International Consortium, which is about 635 people based in Kish; Taking into account the error rate of 0.5, the probability of success of 0.5 and the target population of 635 people, the number of samples required for this study was determined to be about 240 tons. That the same amount has been analyzed; The stratified random sampling method was proportional; Data analysis for the hypotheses was linear regression analysis; The results of data analysis showed that knowledge sharing and its types (tacit and explicit knowledge sharing) had a positive and significant effect on innovation and its elements (speed and quality).

Keywords: Knowledge sharing; Corporate innovation; PERGAS International Consortium.

## 1. Preface

According to the definition of knowledge management, knowledge sharing is one of the key areas in the knowledge management process. Our culture offers different definitions and messages from the concept of "sharing"; In some organizations, knowledge sharing is natural, but in others, the old view that knowledge is power still prevails; Many new organizations have started strategies to change these outdated attitudes. They have used a variety of motivational factors to show that they are determined and serious about sharing knowledge in their organization. For example, some of them, for people who share their knowledge with others, have planned appreciation and reward programs that range from appreciation in the company (among other partners), listing in the newsletter to paying rewards. Includes significant material (Bartel and Streistava, 2002); Other companies evaluate their employees based on how much they have participated in knowledge-sharing activities and offer them promotions or extraordinary vacations.

Continuous sharing of knowledge by individuals often leads to innovation; This has been confirmed in continuous research (for example: [9] and [16]).

On the other hand; Innovation is the application of new ideas resulting from creativity. In fact, implementing the idea of creativity that is presented as a new product or service is called innovation [13].

Several factors can be considered effective in improving human resource performance and organizational performance; Some of these factors have an organizational aspect and some have an individual aspect; Among these factors, some factors have both individual and organizational aspects; A kind of interference in the level of measurement of these factors shows the high importance of research in this field, one of these factors is innovation [7]; Innovation is generally divided into two categories: fundamental (radical) and non-fundamental (continuous); If we consider the individual aspect, we should consider the related aspects of innovation such as speed and quality; Research has shown that knowledge sharing and its types (tacit and explicit knowledge sharing) affect innovation [9]

Capable employees in knowledge-based companies or consortia usually to improve the organizational performance of these companies; While taking advantage of innovation, they must share knowledge; The PERGAS International Consortium is no exception; Due to the special environmental conditions of these companies, they seek to continuously improve the situation, improve performance and, consequently, gain competitive advantages for survival and development. In order to improve performance and gain a competitive advantage, this consortium must raise the level of innovation in its organization, which in this way needs the support of their employees. One of the best ways for these companies to ensure that they are effective in

promoting innovation is to expand and use in-house knowledge. Knowledge that leads to understanding the internal conditions of the organization, recognizing the environment around the organization and identifying competitors and helps employees to improve the level of innovation in the organization. This can be achieved through knowledge sharing [8].

Whereas the PERGAS International Consortium, like all international organizations, has its own bureaucratic process; Improving innovation is always an issue; In this regard, utilizing the capabilities of its employees and their knowledge can improve innovation. In this regard, the following question arises:

Does knowledge sharing have an impact on improving innovation in companies, especially in the PERGAS International Consortium?

## 2. Research Precedent and Theoretical Foundations

### 2.1. Definition of Knowledge in Order to Share Knowledge

Implications of tacit and explicit knowledge in the study of knowledge; Knowledge exchange, knowledge management and other related issues are important; This research practically follows the logic of Nonaka and Takeuchi to define knowledge sharing or knowledge creation, and categorizes the type of knowledge that is shared or uses a definition that categorizes the latent state of knowledge (as opposed to using a definition that generally applies to all types of knowledge.) Includes knowledge) will not matter much. Academic resources contain several definitions and sub-definitions of knowledge that can meet these criteria.

Davenport and Prosa (1998) similarly acknowledge that complete knowledge categorization is important; However, a pragmatic definition will be useful when discussing topics outside the finite scope of knowledge definition. Davenport and Prosa (1998)'s definition of knowledge pays attention precisely to its pragmatic concept; This definition states that knowledge is not yet categorized by simple or precise definitions; And it is difficult to record and define it with logical words. Their definition expresses explicit knowledge in the form of information, but shapes it in such a way that one must use one's own implicit interpretation of the information; Thus, this definition includes the implicit dimension of knowledge. This definition eliminates the need to determine the latent state of knowledge in knowledge sharing. According to Davenport and Prosa (1998), knowledge is knowledge, knowledge is a fluid combination of formed experiences, values, implicit information and expert insights, and refers to the concept that knowledge is in the mind of the "knower". This definition applies specifically to work environments and provides a framework for evaluating and incorporating new information and experiences. According to this definition, knowledge originates from the minds of knowers and knowledge is applied in their minds. In organizations, knowledge is often included not only in documents or archives but also in organizational norms, practices, processes and routines [11].

In the classification of tacit and explicit knowledge, knowledge sharing becomes the process of transforming tacit knowledge into explicit knowledge so that other people can implicit it for themselves [10]. Knowledge must be clearly stated before sharing. However, Nonaka and Kono (1998) introduced the concept (BE) into the knowledge sharing literature. (BE) is a common space in which information is transformed into knowledge based on one's thoughts and experiences. Nonaka and Kono state that this common space is different from the interaction between people; Because the creation of knowledge is one of its inseparable components.

### 2.2. The Concept of Innovation

Although more than half a century has passed since the invention of the term innovation in texts, the perception of this concept has changed over time. To show the course of change and evolution; The following definitions can be considered:

- ✓ Innovation is any new thought, behavior, or thing that is qualitatively different from existing forms.
- ✓ Innovation is the effort to create purposeful and focused change in an enterprise or social potential.
- ✓ Innovation is the use of a new tool, system, policy, program, process, product, product, or service that may have been created within an organization or purchased from another organization for adaptation.
- ✓ Innovation is the ability to creatively manage knowledge in a way that can meet market demand and other social needs.
- ✓ Innovation is an idea, method, or topic that is considered new by the individual. The objectivity of an idea is not objectively new in relation to the length of time, it does not depend much on its first application or discovery, but it is a mental perception or novelty of the idea that determines the individual's reaction to it.

- According to the above definitions, it can be said that innovation is a special change that puts a new idea into practice for the first time to build or improve a product, service or process. So all innovation leads to change, but not every change is necessarily innovation.

From an economic point of view, innovation is a process that is used through efficient and developed resources to produce goods of higher quality and lower cost than products that have existed in the past, and

requires some visible capabilities. Which has been hidden before and it is believed that these products are available.

According to the Economic Development Cooperation Organization, innovation is new processes and products that are done technologically and leave significant technological advances in processes and products. According to Robbins, innovation is the implementation of new thoughts and ideas resulting from creativity. In other words, information is obtained in creativity and in its innovation, information is presented in various and optimal ways [15].

Research shows that innovation is the use of new technological tools and market knowledge to offer a new product or service to customers. This definition seems to be based on a functional view of innovation. From a process perspective, innovation means a set of operations that begins with the processing of an idea and ultimately leads to the production and supply of a new product or service to the market. But innovation is not limited to the product or service, but also involves changes in organizational processes [12].

The term innovation was introduced to economics by Schumpeter at the beginning of the twentieth century. According to him, innovation should be understood in the following ways:

- ✓ The introduction of a new thing or a modified product into the production process
- ✓ Introducing a new production method
- ✓ Creating a new market
- ✓ Use a new way to sell or buy existing products
- ✓ Use of new raw materials or new semi-finished product
- ✓ Introducing a new process organization

- From the above statement, it is clear that the term innovation can be very broad and include any change, whether organizational or technical. According to Schumpeter, innovation is not even limited to technical aspects and also includes organizational aspects.

Another definition says that innovation is the introduction of products, services, processes or solutions in an organization or operation that are either completely new or have undergone significant improvement. Innovation is an economic dimension that means the ability of the organization to research and use the results of that research through new ideas or inventions. The word innovation may have another dimension; in the field of business, many organizations have understood innovation in their own way. These definitions are based on the strategic results that those organizations adopt, especially in the space of green organizations [17].

### **2.3. Research History**

- ❖ Dehghan Najm (2009) in an article entitled "Knowledge management and its role in organizational innovation" has analyzed the impact of knowledge management on organizational innovation. This article has been published in the Journal of Automotive Engineering [2].
- ❖ Ardakani et al. (2010) in an article entitled "Study of the relationship between knowledge management and competitive advantage of organizations" obtained the presented results: [1]. Today, knowledge management is considered as a strategy to improve organizational competitiveness. This paper aims to identify the relationship between knowledge management and competitive advantage of companies. For this purpose, the existing literature on knowledge management and business strategies has been reviewed and strategic concepts and knowledge management have been presented. In addition, knowledge management strategies have been linked to business strategies. The results of this research are a useful source of information for users, employees and managers to be able to change their thoughts about knowledge management and strategic resources of the company. In addition, it suggests a practical method for creating knowledge management innovations. These results not only provide a framework for understanding strategic concepts, but also show us how we can derive business results from knowledge management.
- ❖ Shaemi et al. (2012) in an article entitled The effect of knowledge sharing on innovation and performance of small and medium enterprises with a balanced scorecard approach concluded that the sharing of tacit and explicit knowledge has an impact on the quality and speed of innovation. [3].
- ❖ Lin (2007) in a study entitled "Knowledge Sharing and Organizational Innovation Capacity" examined the impact of knowledge sharing on innovation among 172 employees of 50 large companies in Taiwan; His research showed that at the individual level, employee participation in learning knowledge and the impact of knowledge sharing on others, and at the macro level, senior management have a positive and significant impact on innovation in the organization, he has used structural equation modeling in data analysis. [9].

- ❖ Sains et al. (2009) in a study examined the impact of knowledge sharing on innovation performance and a comparative study of this issue in companies with advanced technologies and new technologies; Their statistical population includes Spanish companies with more than 50 employees and research and development activities; The results of this study have shown that knowledge sharing is a key element affecting the improvement of corporate innovation performance (p. 22); Data analysis in their research was done using structural equation modeling and PLS software. [11].
  - ❖ Zhou and Lee (2012) in a study examining the effect of knowledge on radical (fundamental) innovation, they concluded that the more knowledge an organization (the more knowledge the organization has) the more it innovates, according to Because innovation is divided into two categories, radical and continuous, they have paid close attention to radical innovation [16].
  - ❖ Wang and Wang (2012) in an article examined the impact of knowledge sharing on organizational and financial performance; Considering innovation as a mediating variable, they considered the two characteristics of innovation quality and speed to be effective in transferring tacit and explicit knowledge to improve the organizational and financial performance of companies; The statistical population of their research was 89 companies with advanced technologies in Jiangsu Province, China; The results of their research have led to a positive relationship between knowledge sharing on innovation and financial performance [15].
  - ❖ Vahid et al. (2013) in an article related to 4 variables of knowledge sharing, organizational performance, innovation and competitive advantage, the results of their research show that knowledge sharing has a positive and significant effect on organizational performance. They were 0.94, which indicates that if 1 unit or 100% change in knowledge sharing is given, organizational performance will increase by 0.94 units or 94%, their statistical population was technology companies (based on science and Technology), they also consider competitive advantage and innovation as a subset of organizational performance [14].
  - ❖ Jenks (2020) in a study examining the effect of knowledge sharing on improving innovation and entrepreneurship in a changing world, this study, which has been done analytically, has pointed out that in the Corona era and its prevalence that It has created global changes, the results of which have confirmed that there is an effective relationship between the mentioned variables in the Corona period [8].
- Based on the review of the research literature, the research hypotheses are presented as follows:
- The Main Hypothesis:  
Knowledge sharing has a positive and significant impact on the innovation of the PERGAS International Consortium
  - Sub-Hypotheses:
    - ✓ Sharing tacit knowledge has a positive and significant effect on the innovation of PERGAS International Consortium
    - ✓ Explicit knowledge sharing has a positive and significant impact on the innovation of the PERGAS International Consortium
    - ✓ Knowledge sharing has a positive and significant effect on the innovation speed of the PERGAS International Consortium
    - ✓ Knowledge sharing has a positive and significant impact on the quality of innovation of the PERGAS International Consortium
- Also in this research, the conceptual model of the research is drawn as follows:

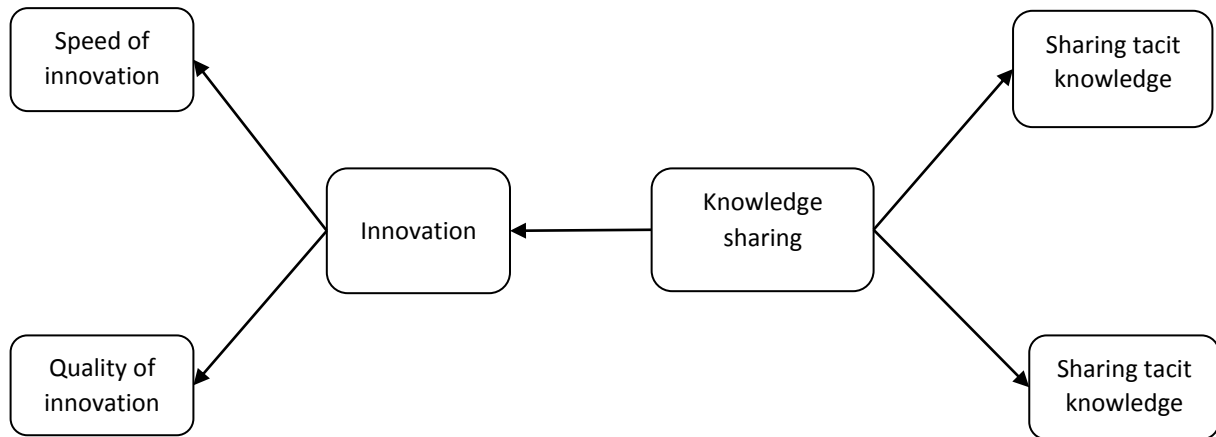


Figure 1. Conceptual model of research (taken from [7])

**3. Research Methodology**

The present research is applied in terms of purpose and descriptive (non-experimental) research in terms of data collection and is a branch of field studies. It is causal in terms of the relationship between research variables. The research method is survey. The most important advantage of survey research is the ability to generalize their results, the stratified random sampling method has been proportional; Because the samples were not homogeneous.

The tool for measuring research variables was a questionnaire that used the Likert scale to quantify it, to measure knowledge sharing, two dimensions of tacit and explicit knowledge sharing, and to measure innovation, two dimensions of innovation speed and quality were used. The standard scale (Wang and Wang, 2012) was used.

To evaluate the validity of the measurement tool, the opinions of professors and experts of the PERGAS International Consortium were used. For reliability, Cronbach's alpha was used, which was greater than 0.7 for all variables.

Population and statistical sample: The statistical population of this study is the managers and staff of PERGAS International Consortium, which is about 635 people, considering the error rate of 0.5, probability of success of 0.5 and the target population of 635 people, the number of samples required for this study is about 240 tons were determined. In order to compensate for the unanswered questions, more questionnaires were distributed, which in the end, the number of healthy questionnaires was 258 people, and the same number was analyzed.

**4. Results**

The results of the research are presented in this section. First, the first and second hypotheses are examined in detail and then the other hypotheses are briefly discussed.

- Main Hypothesis: Knowledge sharing has a positive and significant effect on the innovation of PERGAS International Consortium.

- The hypotheses of this test are as follows

$$\left\{ \begin{array}{l} H_0: \beta_1 = 0 \\ H_1: \beta_1 \neq 0 \end{array} \right.$$

- $$\left\{ \begin{array}{l} H_0: \text{Knowledge sharing has no significant effect on the innovation of the PERGAS International Consortium} \\ H_1: \text{Knowledge sharing has a significant impact on the innovation of the PERGAS International Consortium.} \end{array} \right.$$

- If the value of the significant level is greater than the error value 0.05, we conclude the null hypothesis, and if the value of the significant level is less than the error value 0.05, we conclude the hypothesis one.

Table 1: Results of regression analysis for the main hypothesis

Meaningful Level	T Statistics	Standard Coefficient	Non-Standard Coefficient
0.006	2.912	0.414	0.434

- ✓ Because the value of the significant level is equal to 0.006 and less than the error value is 0.05 (absolute value of the statistical t is greater than the value of 1.96), we conclude hypothesis one with 95% confidence. So the knowledge sharing variable remains in the model and its coefficient value is 0.434. We also conclude that knowledge sharing has a significant effect on innovation and the effect is 41.4%. Whose value is positive (direct); This means that if knowledge sharing changes by 1 unit, the dependent variable (innovation) increases by 41.4 units; The regression line equation is as follows:

$$Y1 = 2.405 + 0.434X1$$

➤ First Sub-Hypothesis:

Linear regression (2) :

- The assumptions of this test are as follows.

$$\left\{ \begin{array}{l} H0: \beta_{02} = 0 \\ H1: \beta_{02} \neq 0 \end{array} \right.$$

- If the value of the significant level is greater than the error value 0.05, we conclude the null hypothesis, and if the value of the significant level is less than the error value 0.05, we conclude the hypothesis one.

Table 2: Regression analysis results for constant value of regression (2)

Meaningful Level	T Statistics	Standard Coefficient	Non-Standard Coefficient
0.946	0.068	-	0.049

- ✓ Because the value of the significant level is equal to 0.946 and greater than the error value is 0.05 (absolute value of the t-statistic is less than the value of 1.96), we conclude the null hypothesis with 95% confidence, so the constant value is removed from the model.

- Sub-Hypothesis 1:

Tacit knowledge sharing has a positive and significant effect on the innovation of PERGAS International Consortium

$$\left\{ \begin{array}{l} H0: \beta_2 = 0 \\ H1: \beta_2 \neq 0 \end{array} \right.$$

H0: The sharing of tacit knowledge has no significant effect on the innovation of the PERGAS International Consortium

H1: The sharing of tacit knowledge has a significant impact on the innovation of the PERGAS International Consortium

- If the value of the significant level is greater than the error value 0.05, we conclude the null hypothesis, and if the value of the significant level is less than the error value 0.05, we conclude the hypothesis one.

Table 3: Results of regression analysis for the first sub-hypothesis

Meaningful Level	T Statistics	Standard Coefficient	Non-Standard Coefficient
0.000	4.904	0.608	0.925

- Since the value of the significant level is equal to 0.000 and less than the error value is 0.05 (absolute value of the statistical t is greater than the value of 1.96), we conclude with a 95% confidence that the implicit knowledge sharing variable remains in the model. And its coefficient value is 0.925. We also conclude that the sharing of tacit knowledge has a significant effect on innovation and the amount of impact is equal to 60.8%, the amount of which is positive (direct);  
The regression line equation is as follows:

$$Y2 = 0.925 X1$$

✓ Linear regression (3) :

- The assumptions of this test are as follows:

$$\left\{ \begin{array}{l} H0: \beta_{03} = 0 \\ H1: \beta_{03} \neq 0 \end{array} \right.$$

- If the value of the significant level is greater than the error value 0.05, we conclude the null hypothesis, and if the value of the significant level is less than the error value 0.05, we conclude the hypothesis one.

Table 3: Regression analysis results for constant value of regression (3)

Meaningful Level	T Statistics	Standard Coefficient	Non-Standard Coefficient
0.000	3.855	-	2.160

- Since the value of the significant level is equal to 0.000 and less than the error value is 0.05 (absolute value of the statistical t is greater than the value of 1.96), we conclude with a 95% confidence that the constant value remains in the model and its coefficient value is 2.160..

➤ Sub-hypotheses of the research showed that the sharing of tacit knowledge and explicit knowledge sharing has a positive and significant effect on the speed and quality of innovation; بیان In other words, knowledge sharing by creating an internal capacity and strengthening it can create innovative capabilities On the other hand, knowledge sharing by creating internal and external capacities for the organization can also affect the organizational performance of companies, because it leads to improved efficiency and performance, through the management of work teams and the diversity of structures.

- ✓ The second sub-hypothesis showed that explicit knowledge sharing had a positive and significant effect on the innovation of the PERGAS International Consortium; The effect value is 41.8%, which was positive (direct).
- ✓ The third sub-hypothesis showed that knowledge sharing had a positive and significant effect on the innovation speed of the PERGAS International Consortium; The effect value is equal to 37.5%, the value of which was positive (direct).

- ✓ The fourth sub-hypothesis showed that knowledge sharing had a positive and significant effect on the quality of innovation of the PERGAS International Consortium; The effect value is equal to 33.1%, the value of which was positive (direct).

**5. Conclusions and Suggestions:**

The main hypothesis of the research has shown that knowledge sharing has a positive and significant effect on the innovation of PERGAS International Consortium. Pergs International is improving by 0.414 points or 41.4%. Also, the research sub-hypotheses showed that the sharing of tacit knowledge and explicit knowledge sharing had a positive and significant effect on the speed and quality of innovation. He realized that knowledge sharing can be effective on innovation, this research is in line with research [9,14,15] in terms of these hypotheses; دیگر In other words, knowledge sharing by creating a kind of internal capacity and strengthening it can Creating innovative capabilities, on the other hand, knowledge sharing by creating internal and external capacities for the organization can also affect the organizational performance of companies, because it leads to improved efficiency and performance, through the management of work teams and diversity of structures. [5,6].

The first sub-hypothesis showed that the sharing of tacit knowledge had a positive and significant effect on the innovation of PERGAS International Consortium; The effect value is equal to 60.8%, the value of which was positive (direct); Based on this it is suggested:

Establishment of a service compensation system based on knowledge sharing for innovative behaviors; This action can encourage employees to share tacit knowledge in order to take innovative actions; Creating a service compensation system to support knowledge sharing will lead to more creativity and innovation in knowledge sharing behavior.

Paying attention to organizational structure in planning flexible processes, especially in teamwork; Creating and changing a structure that can be flexible and teamwork according to the structure that should be formed in this organization plays a role in innovation; Because teamwork can be more creative for people; In this case, the sharing of tacit knowledge will be more visible.

❖ In line with this research and other research hypotheses, practical suggestions are presented as follows:

- ✓ Establishment of a service compensation system based on knowledge sharing for innovative behaviors; This action can encourage employees to share tacit knowledge in order to take innovative actions; Creating a service compensation system to support knowledge sharing will lead to more creativity and innovation in knowledge sharing behavior.
- ✓ Paying attention to organizational structure in planning flexible processes, especially in teamwork; Creating and changing a structure that can be flexible and teamwork according to the structure that should be formed in this organization plays a role in innovation; Because teamwork can be more creative for people; In this case, the sharing of tacit knowledge will be more visible.
- ✓ Changing job duties in order to develop examples related to knowledge sharing; This action to share If the job tasks are defined in a direction where knowledge sharing is a priority, the resulting performance is based on knowledge sharing, so it can improve innovation.
- ✓ Training of multifaceted human resources with different capabilities to improve the vision of innovation in them and make more use of these forces.
- ✓ Changes in processes within the organization in order to delegate authority and support innovation have a high role in the emergence of innovation at a higher rate; In knowledge sharing, organizational processes must be defined in a way that improves this explanation.
- ✓ Establish a performance appraisal system based on knowledge sharing by senior management; If the organization wants to be based on knowledge sharing; Improve the quality of their innovation; Attention to the outputs that knowledge sharing activities will have must be constantly monitored; This will improve the outputs.
- ✓ Outsourcing activities with easy and repetitive processes that prevent high-quality innovative activities; Activities that have repetitive processes in different types of knowledge sharing should be outsourced to others so that they can become more familiar with knowledge sharing and become creative and innovative.



## ➤ References

1. Ardakani, S.; Mirza Aliian; F, Ghazavi, H and Curious Monfared, AR (2010). Investigating the Relationship between Knowledge Management and Competitive Advantage of Organizations, Conference on Management and Leadership Challenges in Iranian Organizations, Isfahan, Islamic Azad University, Isfahan Research Sciences Branch
2. Dehghan Najmabadi, M. and Hamidi, S. (2008). Knowledge Management and Its Role in Organizational Innovation, Second Human Resources Empowerment Conference, Tehran, Iran Human Resources Empowerment Foundation.
3. Shaemi, A., Khazaei, P.J., Shabani, N., Baloui, H. and Salehzadeh, R. (2012). The effect of knowledge sharing on innovation and performance of small and medium enterprises with a balanced scorecard approach. *Improvement and Transformation Management Studies*: 22 (69): 59-93.
4. Bartol, K. M., & Srivastava, A. (2002). Encouraging knowledge sharing: The role of organizational reward systems. *Journal of Leadership & Organizational Studies*, 9(1), 64-76.
5. Cummings, J. N. (2004). Work groups, structural diversity, and knowledge sharing in a global organization. *Management science*, 50(3), 352-364.
6. De Vries, R. E., Van den Hooff, B., & de Ridder, J. A. (2006). Explaining knowledge sharing the role of team communication styles, job satisfaction, and performance beliefs. *Communication Research*, 33(2), 115-135.
7. Jansen, J. J., Van Den Bosch, F. A., & Volberda, H. W. (2006). Exploratory innovation, exploitative innovation, and performance: Effects of organizational antecedents and environmental moderators. *Management science*, 52(11), 1661-1674.
8. Jennex, M. E. (Ed.). (2020). *Knowledge Management, Innovation, and Entrepreneurship in a Changing World*. IGI Global.
9. Lin, H. F. (2007). Knowledge sharing and firm innovation capability: an empirical study. *International Journal of manpower*, 28(3/4), 315-332.
10. Polanyi, M. *The Tacit Dimension*. 1966 Chicago.
11. Sáenz, J., Aramburu, N., & Rivera, O. (2009). Knowledge sharing and innovation performance: A comparison between high-tech and low-tech companies. *Journal of Intellectual Capital*, 10(1), 22-36.
12. Srivastava, A., Bartol, K. M., & Locke, E. A. (2006). Empowering leadership in management teams: Effects on knowledge sharing, efficacy, and performance. *Academy of management journal*, 49(6), 1239-1251.
13. Utterback, J. M., & Abernathy, W. J. (1975). A dynamic model of process and product innovation. *Omega*, 3(6), 639-656.
14. Waheed, H., Qureshi, T. M., Khan, M. A., & Hijazi, S. T. (2013). Mediating role of knowledge sharing: Organizational performance for competitive advantage and innovation. *African Journal of Business Management*, 7(7), 536-547.
15. Wang, Z., & Wang, N. (2012). Knowledge sharing, innovation and firm performance. *Expert systems with applications*, 39(10), 8899-8908.
16. Zhou, K. Z., & Li, C. B. (2012). How knowledge affects radical innovation: Knowledge base, market knowledge acquisition, and internal knowledge sharing. *Strategic Management Journal*, 33(9), 1090-1102.
17. Zhang, J., Kang, L., Li, H., Ballesteros-Pérez, P., Skitmore, M., & Zuo, J. (2020). The impact of environmental regulations on urban Green innovation efficiency: The case of Xi'an. *Sustainable Cities and Society*, 57, 102123.

