

The Relationship between Knowledge Sharing and Innovation in Electronic Industry of Iran

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Abstract

In relation to innovation's crucial role in the improvement of economic growth, this quantitative survey attempts to underline the significance of two knowledge sharing types; which are tacit and explicit, in the increasingly innovative (with regards to the speed and quality of innovation) in Iran's electronic industry. For this objective, 224 data were collected from six subsidiaries of IEI (Iran Electronics Industry) and was submitted to multiple regression analysis the results of which indicates that explicit knowledge sharing as well as tacit knowledge sharing have notably significant effects on the speed and quality of innovation.

Keywords: Tacit Knowledge Sharing, Explicit Knowledge Sharing, Innovation Speed, Innovation Quality, and IEI

Introduction

In the last few decades, the number of researches on innovation and knowledge with a special emphasis on issues related to performance and functioning at different levels including micro, meso and macro levels is increasing. The interpretation and deduction concerning the influence of innovation on functioning and performance is contingent upon many features, each of which give rise to different studies including assumption, context (such as industry, country and time period); the clearly defined knowledge and its sources, innovation's kind and type; the kind of performance under examination. The knowledge that individuals and organizations possess is a concept which is exceedingly hard to measure by indicators that are directly quantifiable.

The presence of different knowledge sources and the access to these sources is a lot easier to recognize and capture. Another related subject is the evaluation of the significance of various knowledge sources for innovative performance since they inform organizations, in their strategic decisions for developing various channels to acquire knowledge, and governments in strategic decision making about the innovations policies at regional as well as national levels. Innovation definitely plays a crucial role in the electronic industry and it can also help in the improvement of the economic advancement and growth. The followings are some examples of electronic organization and industries influencing the economic growth of a country.

Samsung had a powerful and significant effect on Korea's economic growth. Finland possesses an innovative background with the globally known company of Nokia and was the initiative telecommunication terminal equipment of Ericsson plc. in Sweden with whom has grown to compete (Seo and Hwang, 2012). From 1998, Finland has evolved to become the new leading industrial country; it became the origin of IT and various mobile industries such as Nokia which is labeled as one of the most innovative organizations of the globe (Seo and Hwang, 2012).

On the contrast, the Middle Eastern nations were not able to enter the international electronic market and competitions despite their vast financial support as well as great knowledge. Thus, the electronic industry of Iran is faced with this challenge and has to find a way to move toward the international market. One of Iran's well known electronic organizations is the IEI or Iran Electronic Industry which is estate owned and is a subsidiary of Defense Industries Organization which is a diversified enterprise operating in semiconductor, communication, electro-optic, optic, and electronic practices.

The company currently maintains six subsidiaries¹ which are each responsible for operational scopes in high-tech fields. The subsidiaries and their respective industries are:

- SHIRAZ ELECTRONICS INDUSTRIES (SEI)
 - Electronic Warfare Industry
 - Avionics Industry
 - Radar & Microwave Industry
 - Naval Electronics Industry
 - Mechanical Parts Industry
 - Electro-Optics Industry
 - Engineering and Tech. Support Industry
 - Computer Peripheral Industry
 - Missile Electronics Industry
- IRAN COMMUNICATION INDUSTRIES (IEI)
 - Tactical Communication Industry
 - Communication Security Industry
 - Telecommunications Industry
 - Mechanical Parts Industry
 - Electronic Components Industry
- INFORMATION SYSTEMS OF IRAN (ISI)
 - Setting up of computer sites
 - Design and establishment of networks
 - Maintenance of main frames and minicomputers
 - LAN development and services (X.25)
 - Offering super data base (SUPRA)
 - Offering total solution projects (turn-key)
 - High-grade training programs
 - Software migration
 - Handling of grand scale projects
 - Consultation services

¹<http://www.ieicorp.ir/>

- ELECTRONIC COMPONENTS INDUSTRIES (ECI)
 - Semi-conductors (transistors & ICs)
 - Electronic credit cards
 - Multilayer, single & double sided PCBs
 - Hybrid circuits (thick films)
 - Quartz crystals & oscillators
 - High purity oxygen & nitrogen gases
 - Micromodules
 - Electronic ceramics
- ISFAHAN OPTICS INDUSTRIES (IOI)
 - Computer aided Design of optical elements
 - Computer Aided Design of optical systems
 - Computer Aided Design of multi-layer coatings
 - Production of different interference filters
 - Production of long range binoculars
 - Production of military periscopes for tanks
 - Design and manufacture of reticles
 - Advanced optical tests and measurements
 - Transparent conductive coating
 - Design and manufacture of optical sights for guns
 - Analysis of optical systems
- IRAN ELECTRONIC RESEARCH CENTER (IERC)

Its telecom products include the assembly of mobile handsets under license from the Belgian company Sagem. Subsequent to the above discussions, it has to be mentioned that this research tries to explore and investigate the connection between IEI's innovation and knowledge sharing.

Literature Review

Innovational initiatives heavily rely on the experience, skills, and knowledge of the employees in the process of creating value. Based on the assumptions of this view, knowledge sharing can be regarded as valuable information for innovation due to their path dependent, socially complex, and firmly specified characteristics and features (Chiang & Hung, 2010; Dimitris, Konstantinos, Klas Eric & Gregory, 2007; Gachter, von Krogh & Haefliger, 2010; Su-Chao & Ming-Shing, 2008). It is quite evident that the ability of an organization in altering and exploiting knowledge; including new methods for solving of the problems as well as the production of new products to meet the demands of the rapidly improving and evolving market, can determine the degree of its innovation (Goh, 2002; Marina du, 2007; Tidd et al., 2005).

But companies are able to manage knowledge only when their employees have the willingness to share their information and knowledge. The continuous sharing of knowledge helps the innovations of units, teams, or the entire company. In order to manage the innovative tasks successfully, employees and staff always need to take help from the tacit knowledge (experiences and skills) of their coworkers or look for explicit sources of knowledge (Institutionalized practices or approaches) that exist within the organization. Hence, it is more probable for an organization that has the ability of promoting the practices of sharing knowledge within the company or groups to create new ideas for the development of new business opportunities; consequently facilitating the innovational practices (Lundvall & Nielsen, 2007; Michael & Nawaz, 2008).

Many researchers have argued that the knowledge sharing of employees will result in faster responses to the wishes and demands of customers with lower operation costs (Sher & Lee, 2004). Other authors have associated the sharing of knowledge with market orientations and learning believing that knowledge sharing is an important and crucial part of the learning practices of a company which in turn improves the understanding of the market along with the innovational activities (CLin, 2007; H.F Li, 2007; Ordaz, Cruz 7 Ginel, 2010). Furthermore, knowledge sharing can facilitate a various range of organizational alterations (Calantone et al., 2002; Law & Ngai, 2008; Vaccaro et al., 2010). Therefore, the tacit as well as explicit elements of practices of sharing knowledge in organizations play a significantly important role in innovation (Haindl, 2002; Mascitelli, 2000; Taminiou, Smit & de Lange, 2009; Xie, Wang & Wu, 2008; Houssin, Wu, Caillaud & Gardoni, 2010).

On the basis of knowledge theories from three dimensions including systematic-autonomous, tacit-explicit and simple-complex, a new topology of two kinds of innovation were suggested by Gopalakrishnan and Bierly (2001). Cheng and Abou-Zeid (2004) believe that these two kinds of innovations have a relation with the creation of knowledge and the utilization of activities, respectively.

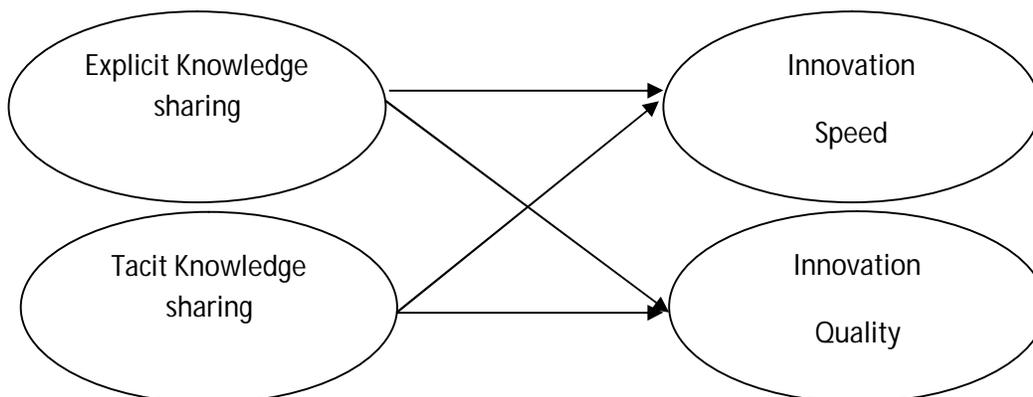
Furthermore, Swan (2007) investigated the relation of innovation and knowledge from three various viewpoints of practice, process and production.

Method and results

Despite the fact that the relation between the sharing of knowledge and different features of innovation have been tested in details empirically (Brockman & Morgan, 2006; Hall & Andriani, 2002 & 2003; Lee, Ooi, Tan & chong, 2010; Leiponen, 2006; Liu, Chen & Tsai, 2005; N. Wang and Z Wang, 2010), few studies have focused on the exact impacts that these practices of sharing tacit and explicit knowledge sharing has on the quality and speed of innovation respectively. In an attempt to fill this gap, this study suggests two hypotheses which have been developed in accordance with the following framework (See Fig 1.).

- H1: Explicit knowledge sharing affects innovation speed significantly and positively
- H2: Tacit knowledge sharing affects innovation quality significantly and positively
- H3: Tacit knowledge sharing affects innovation speed significantly and positively
- H4: Tacit knowledge sharing affects innovation quality significantly and positively

Figure 1: relationship between knowledge sharing and innovation



In order to test the above mentioned hypotheses, two multiple regression analysis and Pearson Correlation was employed (By SPSS19.0), and the variables have been chosen as show in Table 1.

Table1: Multiple Linear Regression and Variables

Multiple Regression	Variables
Regression 1	Independent Variable: Innovation Speed Dependent Variables: Explicit knowledge management and Tacit knowledge management
Regression 2	Independent Variable: Innovation Quality Dependent Variables: Explicit knowledge management and Tacit knowledge management

The required data for this study were gathered from the entire 6 subsidiaries in duration of 4 months. From the 350 distributed questionnaires; which were either handed out face to face or were distributed through email, only 278 were gathered (which is 79.4% of the total questionnaires). The data was monitored in an attempt to control and check the data for partiality. After the elimination of those containing extreme answers or miss-information, 224 responses that were usable

remained (the rate of usable data is 64%). The respondents were chosen from managers (either top or middle), engineers, and staff.

The outcomes of reliability test indicate that all Cronbach’s Alpha were above 0.7; therefore, all of them possess acceptable internal consistencies. Moreover, based on the outcomes of Pearson Correlation, the highest relationships refer to innovation speed and explicit knowledge sharing (See Table 2).

Table 2: Pearson Correlations

	Explicit Knowledge Sharing	Tacit Knowledge Sharing	Innovation Speed	Innovation Quality
Explicit Knowledge Sharing	Pearson Correlation Sig. (2-tailed) N	1 .192* .019 224	.675** .000 224	.425** .000 224
Tacit Knowledge Sharing	Pearson Correlation Sig. (2-tailed) N	.192* .019 224	1 .625** .000 224	.516** .000 224
Innovation Speed	Pearson Correlation Sig. (2-tailed) N	.675** .000 224	.625** .000 224	1 .324** .011 224
Innovation Quality	Pearson Correlation Sig. (2-tailed) N	.425** .000 224	.516** .000 224	.324** .011 224

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

In addition, according to the outcomes of multiple regression analysis, the R-square is 0.631 which indicates that 63.1% of innovation speed's variation is accounted by explicit knowledge sharing and tacit knowledge sharing. Furthermore, both of the p-values equal to zero which indicates the significance effects on innovation speed. The unstandardized coefficient of explicit knowledge sharing equals .441 that asserts for every unit increase in explicit knowledge sharing, innovation speed will go up .441 units. Besides, the coefficient of tacit knowledge sharing equals .21 that results for every unit increase in tacit knowledge sharing, innovation speed will go up .21 units. Regarding the coefficient value of constant (-0.101), the first regression equation can be written as follow:

Innovation Speed= -.101+ .441 (explicit knowledge sharing) + .21 (explicit knowledge sharing)The results of second multiple regression indicates R-square= 0.554 that assert

that 55.4 % of variation of innovation quality is accounted by tacit knowledge sharing and explicit knowledge sharing. Besides, both p-values were less than 0.05 that show significant impacts on innovation quality. The unstandardized coefficient of explicit knowledge sharing equals 0.268 that asserts for every unit increase in explicit knowledge sharing, innovation quality will go up 0.268 units. Besides, the coefficient of tacit knowledge sharing equals .301 that results for every unit increase in tacit knowledge sharing, innovation quality will go up .301 units. Regarding the coefficient value of constant (-0.07), the second regression equation can be written as follow:

Innovation quality= -.07+ .268(explicit knowledge sharing) + .301 (explicit knowledge sharing)

Managerial Implementation

Based on the above outcomes, all hypotheses of this study are accepted which means that every plan toward increasing and improving the sharing of knowledge can be useful in the growth of quality and speed of innovation. In this relation, training the personnel and employees and encouraging them to frequently share the existing official documents as well as reports with their colleagues is a useful way of improving tacit knowledge sharing.

Moreover, encouraging the personnel and staff to share their IT system experiences or investing facilitates the sharing of knowledge are significant factors in the improving and increasing of knowledge sharing.

Conclusion

Without a doubt, innovation plays a crucial part in the electronic industry and it also has the ability of improving the economic growth. The

References

- Abou-Zeid, E., & Cheng, Q. (2004). The effectiveness of innovation: A knowledge management approach. *International Journal of Innovation Management*, 8, 261–274.
- Brockman, B. K., & Morgan, R. M. (2006). The moderating effect of organizational cohesiveness in knowledge use and new product development. *Journal of the Academy of Marketing Science*, 34, 295–307.
- Calantone, R. J., Cavusgil, S. T., & Zhao, Y. S. (2002). Learning orientation, firm innovation capability, and firm performance. *Industrial Marketing Management*, 31, 515–524.
- Chiang, Y. H., & Hung, K. P. (2010). Exploring open search strategies and perceived innovation performance from the perspective of inter-organizational knowledge flows. *R&D Management*, 40, 292–299.
- Dimitris, B., Konstantinos, K., Klas Eric, S., & Gregory, P. (2007). Knowledge effectiveness, social context and innovation. *Journal of Knowledge Management*, 11, 31.
- Gachter, S., von Krogh, G., & Haefliger, S. (2010). Initiating private-collective innovation: The fragility of knowledge sharing. *Research Policy*, 39, 893–906.
- Goh, S. C. (2002). Managing effective knowledge transfer: An integrative framework and some practice implications. *Journal of Knowledge Management*, 6, 23–30.
- Gopalakrishnan, S., & Bierly, P. (2001). Analyzing innovation adoption using a knowledge-based approach. *Journal of Engineering and Technology Management*, 18, 107–130.
- Haindl, G. (2002). Tacit knowledge in the process of innovation. *Ekonomicky Casopis*, 50, 107–120.
- Hall, R., & Andriani, P. (2002). Managing knowledge for innovation. *Long Range Planning*, 35, 29–48.
- Hall, R., & Andriani, P. (2003). Managing knowledge associated with innovation. *Journal of Business Research*, 56, 145–152.

existing studies have emphasized on two kinds of knowledge sharing which are explicit knowledge sharing and tacit knowledge sharing. Following the past studies, this study have investigated the effects of explicit knowledge sharing and tacit knowledge sharing on the quality and speed of innovation, and the findings indicate that the effects are positive and significance.

Future Study

In relation to the two regression analyses' R-Square values, this study proposes to find another variable that affect innovation more such as leadership styles or HRM practices. Furthermore, innovation weaknesses is not just limited to Iran's electronic industry, it is visible in the car manufacturing business of all Middle Eastern nations. Hence, due to the cultural differences, it is proposed to test this framework in other industries as well.

- Law, C. C. H., & Ngai, E. W. T. (2008). An empirical study of the effects of knowledge sharing and learning behaviors on firm performance. *Expert Systems with Applications*, 34, 2342–2349.
- Lee, V. H., Ooi, K. B., Tan, B. I., & Chong, A. Y. L. (2010). A structural analysis of the relationship between TQM practices and product innovation. *Asian Journal of Technology Innovation*, 18, 73–96.
- Leiponen, A. (2006). Managing knowledge for innovation: The case of business to business services. *Journal of Product Innovation Management*, 23, 238–258.
- Lin, C. P. (2007). To share or not to share: Modeling tacit knowledge sharing, its mediators and antecedents. *Journal of Business Ethics*, 70, 411–428.
- Lin, H. F. (2007). Knowledge sharing and firm innovation capability: An empirical study. *International Journal of Manpower*, 28, 315–332.
- Liu, P. L., Chen, W. C., & Tsai, C. H. (2005). An empirical study on the correlation between the knowledge management method and new product development strategy on product performance in Taiwan's industries. *Technovation*, 25, 637–644.
- Lundvall, B. A., & Nielsen, P. (2007). Knowledge management and innovation performance. *International Journal of Manpower*, 28, 207–223.
- Lynn, L. H. (2008). Recovering from success: Innovation and technology management in Japan (review). *The Journal of Japanese Studies*, 34, 543–548.
- Marina du, P. (2007). The role of knowledge management in innovation. *Journal of Knowledge Management*, 11, 20.
- Mascitelli, R. (2000). From experience: Harnessing tacit knowledge to achieve breakthrough innovation. *Journal of Product Innovation Management*, 17, 179–193.
- Michael, H., & Nawaz, S. (2008). Knowledge fusion for technological innovation in organizations. *Journal of Knowledge Management*, 12, 79.
- Ordaz, C. C., Cruz, J. G., & Ginel, E. S. (2010). Knowledge sharing: Enablers and its influence on innovation. *Cuadernos De Economia Y Direccion De La Empresa*, 113–150.
- Seo D., Hwang H-D, (2012), The Impact of EU's R&D focused policy on the Innovation Edge of Mobile Industry Procedia - Social and Behavioral Sciences 62 (2012) 595 – 601.
- Sher, P. J., & Lee, V. C. (2004). Information technology as a facilitator for enhancing dynamic capabilities through knowledge management. *Information & Management*, 41, 933–945.
- Su-Chao, C., & Ming-Shing, L. (2008). The linkage between knowledge accumulation capability and organizational innovation. *Journal of Knowledge Management*, 12, 3.
- Swan, J. (2007). Managing knowledge for innovation. *Rethinking Knowledge Management*, 147–169.
- Taminiau, Y., Smit, W., & de Lange, A. (2009). Innovation in management consulting firms through informal knowledge sharing. *Journal of Knowledge Management*, 13, 42–55.
- Tidd, J., Bessant, J. R., & Pavitt, K. (2005). *Managing innovation: Integrating technological, market and organizational change*. John Wiley & Sons Inc.
- Vaccaro, A., Parente, R., & Veloso, F. M. (2010). Knowledge management tools, interorganizational relationships, innovation and firm performance. *Technological Forecasting and Social Change*, 77, 1076–1089.
- Xie, H. M., Wang, X. B., & Wu, S. (2008). The impact of tacit and explicit knowledge on IJV management innovation: An empirical research in South China. *Advances in Management of Technology*, Pt 1, 230–235.
- Xu, J., Houssin, R., Caillaud, E., & Gardoni, M. (2010). Macro process of knowledge management for continuous innovation. *Journal of Knowledge Management*, 14, 573–591.
- Wanga Z., Wang N. (2012) Knowledge sharing, innovation and firm performance, *Expert Systems with Applications* 39 (2012) 8899–890