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Knowledge management framework for the collaborative innovation projects: A case of aviation industry in the UAE

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ABSTRACT

Innovation has been always seen as the competitive advantage of industrial companies, if not most of the organizations. Many researches were dedicated to improve the quality of innovation or to fasten its process. However, over the last three decades, knowledge management had gained an academic and practical importance towards strengthening the innovation process. In most of the studies, researchers were focusing on the technological and algorithmic dimensions of the knowledge management, rather than its epistemological dimension. Moreover, only very few studies focusing on the inter-organizational knowledge management, or the knowledge management with collaborative innovative projects. Therefore, there is a need for a comprehensive framework that can deals with a large organizations with multiple industries globally. In this article a new Knowledge Management Framework for collaborative Innovation Project (KMFCIP) is proposed. The KMFCIP will help the aviation industry in particular and large organization in general to collaborate in the production. It will provide a simplified plate form for knowledge sharing that will improve production and reduce the overall delivery time and production cost.

1. Introduction

The firms that provide the customer demand based products at the lowest price are considered successful economies. Producing customer oriented products are collaborative efforts of the marketing, designing, and manufacturing teams (Centobelli et al., 2017b). Nowadays, the widespread interest in the knowledge economy, intellectual capital and all intangibles, the increase of workers operating in a virtual environment. Moreover, the spread of project team members all over the world, push the companies to be organized as a collaborative innovation network and create new ventures in order to face their threats and specially to create value from the intangibles which enable it to be more competitive (Chen and Yang, 2012; Isip and Young, 2017). Moreover, in order to compete, companies operating in complex industries, such as automotive industry and aviation industry; they should increase their capabilities in producing the customer oriented products are the economical prices while complying with the regulatory bodies standards. Such achievement is demanding for global industries with the low volume, complex production system, and highly reliance on the customers. New Product Development (NPD) is probably the most important process for many complex industries, but also one of the least understood. New Product Development is responsible for the revenues and margins that a company can achieve and its ultimate value (Baldwin and Von Hippel, 2011; Barragan-Ferrer et al., 2017).

The aviation industry offers a number of chances to explore the possibilities of the NPD efforts for challenging products that necessitate extensive expanses to meet the diversified requirements of the aviation sector. In this sector, the product is built in units and a number of units are built by different manufacturer. Some of these manufacturers belong to other sectors such as plastic and rubber, fabricated metal, glass, textile, and metal casting sector. It appears that the products in the aviation sector needs noteworthy designing expenditure with a complex and challenging environment to manage the new product development and a heavy coordination among a number of different experts involved in the different phases of the product development. It is generally run by a number of functional activities that may results in delaying the production process that can lead to the potential loss of customers (Bajaj, 2015).

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The success of the NPD is highly dependent on the large volume of new information from different sources. The innovation in the new product development in anticipated initiating from the new knowledge base and combination of the existing knowledge (Cohen and Levinthal, 1990). Thus, the designing, development, manufacturing, assembling, and testing of aviation platform. Indeed, maximum aviation organizations have created virtual businesses. In this model, virtual design teams and globally distributed operating sites must be able to function in highly disciplined, integrated and synchronized value chains.

The extensive literature discussed the knowledge, innovation and new product development about the problems facing the knowledge sharing during a new product development within a collaborative network. On the other hand, it also allows us to design our research questions and even expecting some results (Shakerian et al., 2016). The conceptual framework of a successful inter-organizational management in an innovative collaborative project by going beyond the traditional factors of KM process. Companies operating in a collaborative environment, sharing data and information with their partners in order to achieve better, faster and more efficient results. Many researchers have worked to develop and strengthen this collaboration among organizations (Centobelli et al., 2017a). Moreover, researchers and practitioners have recently turned their attention to building a strong knowledge management strategy (Barbaroux et al., 2016).

Therefore, the aim of this paper is the use of knowledge in the collaborative process of developing new products (CNPD). It requires a high degree of participation of partners in recognizing the existence of problem, problem-solving processes, creating knowledge-based capabilities, efficiency in knowledge-based and high cooperation level of knowledge integration. In the light of the above discussion, this research focuses on answering the following research questions,

1. How is knowledge shared inter and intra organizations?
2. Who are the main owners of knowledge in a NPD process?
3. How do partners share their key knowledge while working in such network?

To answer these questions, this research contributes to the community in the following directions. Research design, survey/case study, research results and research findings contribution.

a) It will develop a new framework for knowledge management in collaborative innovation in aviation industry.
b) A detailed survey based on the aviation industry as case study will be done
c) The new findings will be disseminated with the research community
d) The new framework will be evaluated according to the findings of the data collected from in the form of survey.

The rest of the paper is organized a way that the next section provides a detailed debate on the antecedents of the knowledge management and collaborative innovation discussed in literature. Section 3 elaborates the research framework and the last section concludes the research paper.

2. Literature review

The globalization of economy and the evolution of ICT and digital networks have determined the affirmation of new organizational archetypes such as value networks, business ecosystems discussed by Allee (2003), and digital business ecosystems (Corallo et al., 2007). In the 'New Economy', attention is focusing on the emergence of a new organizational form, Network Enterprise: networks of organizations, linked by information and communication technologies, and sharing closely coordinated operations. In this paradigm, virtual design teams and globally distributed operating sites must be able to function in highly disciplined, integrated and synchronized value chains.

Then, the aim for partners and suppliers is to optimize internal processes while implementing new ways to effectively manage up activities. The trend toward strategic sharing of development and manufacturing is focusing on effective and secure value chain collaboration when designing, building and maintaining aeronautic products.

2.1. Knowledge management

Knowledge management the community accepted method to evaluate the performance of the collaborative innovation in firms (Barbaroux et al., 2016; Fuller et al., 2012). Effective knowledge management encourages and enhances the collaboration between and among employees in their pursuit of innovative business practices in an organization (Deng, 2012). Knowledge management itself, however, does not automatically increase collaboration in organizations. This is because knowledge management is a collaborative activity that depends on the creation of 'a shared context' between participants. The process of developing innovations depends on knowledge and how the knowledge is created and shared in an organization. There is a wide recognition that the management of knowledge is an essential element of running any types of business (Du Plessis, 2007). There is, however, a lack of in-depth studies on the role of knowledge management in aviation industry.

Until the mid of the 1980's, the economic environment was more stable and less complex, thus, knowledge was standard and people behaviour and skills were slowly growing and changing. Nowadays, everything moves fast, companies must follow the cadence in order to survive and the big

industries such as the aerospace one should continuously innovate by improving their human, technical and structural capacities.

KM can indeed improve the creation of knowledge in the NPD process, allowing the transformation of tacit knowledge into explicit knowledge, as well as making it available to partners and managers of NPD in terms of reuse. Thus, KM can (1) facilitate the integration of dispersed knowledge, (2) accelerate the replication of good practices in time and space, and (3) reduce the costs of research and processing of customer knowledge available for NPD managers.

2.2. Collaborative innovation

The success of the firms is dependent on the innovation due to a number of vital reasons (Bueno and Balestrin, 2012; Du Plessis, 2007). Those organizations who fail to achieve the level of innovations can easily lose their markets to the business rivals. Resultantly, they may lose the competent staff reducing productivity (Chen and Yang, 2012). It the key factor that differentiate among the market leaders and their competitors. Generally, there are three different viewpoints that highlight the significance of the innovation. Firstly, it helps the firms to find the new opportunities in the future to extend their market and production. Secondly, despite Management Framework for collaborative innovation the improvement in the production, it can improve the existing business activities in order to increase the overall throughput the firms. Thirdly, consumers often see innovation as something that adds value to a company or to its products (Baldwin and Von Hippel, 2011; Boehm and Hogan, 2013; Cai, 2012; Cowan et al., 2007; Iriondo, 2009).

Collaboration, on the other hand, is to work together, to join the other expert members in certain situation or to resolve other challenging problems. Collaboration increases the level of talented staff from the individual firm to a global network. Such global team has more opportunities and increases the additional innovation in solving the routine problem or other challenging issues. This can help the organization to find new ways in the firms. Innovations are important to improve the organizational process (Bommert, 2010; Chen and Yang, 2012).

Collaborative innovation is serious for the success of individual firms due to a number of advantages that it provides to the companies (Gloor, 2006). Firstly, it share the new knowledge based ideas in the companies. The global teams of experts, working are a virtual environment using the facilities of the knowledge sharing results in the generation of new ideas. Secondly, it also simplifying making of other ideas. The collaborative innovation can be improved with new ideas in different directions and especially from various individuals with resourceful brain power. This is the new method of team work to encourage individuals to use brainstorming techniques which can boost the interest for getting innovation. This action can strive the persons towards success as they will own their work with pride and vigorous in the development of a new mind map. Lastly, collaborative innovation stimulates the engagement with the organization and work. Engagement refers to quality, loyalty and eventually profitability to get the targeted outcome towards success (Greer and Lei, 2012).

The literature is evident that globally, researchers have focused on the collaborative innovation. This special attention shows the possible success of the innovation in the individual firms (Chen and Yang, 2012). The searching keyword 'collaborative innovation' in the Web of Science database results in 179 articles. The in-depth investigation of these studies highlighted several major trends in collaborative. There is an increasing recognition of the importance of collaborative innovation (Gloor, 2006). The type of collaborative innovation through knowledge management including innovation ecosystems by Mercier-Laurent (2013), science-to-business collaborations (Boehm and Hogan, 2013; Braun and Hadwiger, 2011), university-industry collaboration (Buerkner and Damm, 2011; Gertner et al., 2011; Hanel and St-Pierre, 2006; Santoro and Bierly, 2006), and university-industry and research center collaboration (Nursall, 2003).

Also, several works have been achieved to manage specific domain knowledge. For example structuring and organizing database forensics domain (Al-dhaqm, et al., 2017a; 2017b; Al-dhaqm et al., 2016). Other example, structuring and organizing mobile forensic knowledge domain (Ali et al., 2017). Knowledge management for collaborative innovation in Aviation.

The aerospace is a challenging industry due to the large number partner involve in the development of the complex products. It has its own safety measure monitored by the concerned regulatory authorities. Therefore, it requires an extensive aeronautical knowledge that covers a vast range of production development activities. Such knowledge is essential for a range of product such are a component of the airplane to its associated electronics. Therefore, there is high need to get the proper knowledge and disseminate the same across the partner organizations.

3. Theoretical framework KMFCIP

Most of aviation and aeronautic companies are working to produce technologically challenging products. Such production cannot be accomplished by single organization; therefore, they are working with partners. These different organizations are sharing interrelating information with other possible business rivals. However, sharing knowledge into a collaborative NPD push companies to protect their knowledge and secure its management practices.

Based on the theoretical framework (illustrated in Fig. 1) a deductive research design is conceived enabling to illustrate the cause-effect construct by

studying the role of KM drivers, enablers and barriers within an inter-organizational NPD (Gao and Bernard, 2017; Wiewiora et al., 2014). The proposed research model will be validated empirically through a survey. To answer the research questions, this research follows the ethnographic study and a quantitative design paradigm in one or more aerospace industries established in UAE.

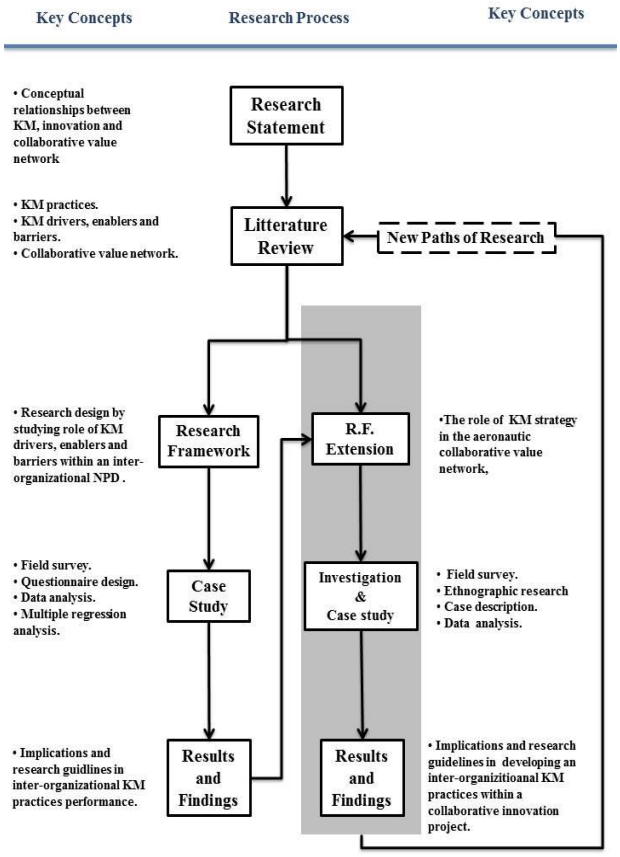

Fig. 1: The research framework for knowledge

The ethnographic method is frequently used to collect the experimental data for cultures and societies. The participant observation, interviews, questionnaires are the commonly used data collection tools in this method (Fetterman, 1998). It the systematic approach to describe a group or culture of similar nature. The description may be of a small tribal group in an exotic land or a classroom in middle-class suburbia. It denotes to social research that highlights the inhabitant's behavior in general context instead of the study under certain criteria developed by the researchers.

The collecting data following the ethnographic study will be on one hand direct, via participant's observations. On one hand, it includes the whole hierarchy observation. On the other hand, the data will be gathered via interviews that focus on the sketchy to detailed discussion with different levels of formality. In this research, an open-ended interview will be adopted in which we can question the respondents to explain their personal views about certain situations and can utilize these insights for further analysis (Yin, 2009).

Data gathering will be focused on two major topics which are knowledge management and new product development process whereas results will give us the opportunity to formulate the hypothesis and to identify the variables to test with the quantitative analysis in order to validate our ethnographic research.

Then, a quantitative study will be realized through web-based close-end questionnaire and data will be analyzed through the SPSS software into other organizations in order to verify our hypothesis.

4. Conclusion

In research, the needs of a systematic knowledge management are highlighted and its importance is discussed in the context of the aviation industry. The proposed framework will make the coordination easy and will share information among different organization to provide timely and accurate data to all the participant organization. Through this paper, we have presented the main issues of our study and the major steps are proposed that are required to reach the final result for designing NPD model. This will lead to a successful process of acquiring, storing and sharing the knowledge across the partners. The proposed framework is covering all the five steps (Idea, Research, Design, Development and Commercialization) required for NPD process. It will allow the aerospace industry elaborating within a value network to remain competitive while safeguarding the information.

Further study should be conducted to gain the deeper understanding of the aviation industry and their associated partners. The detailed data collection form all the partner will help to analyze the issues in detail and provide uniform implementable solution to the issue in hand.

References

Al-dhaqm A, Razak S, Othman SH, Choo KKR, Glisson WB, Ali A, and Abrar M (2017a). CDBFIP: Common database forensic investigation processes for internet of things. IEEE Access, 5. https://doi.org/10.1109/ACCESS.2017.2762693

Al-dhaqm A, Razak S, Othman SH, Ngadi A, Ahmed MN, and Mohammed AA (2017b). Development and validation of a database forensic metamodel (DBFM). PloS One, 12(2): e0170793. https://doi.org/10.1371/journal.pone.0170793

Al-dhaqm A, Razak SA, Othman SH, Aldolah AA, and Ngadi MA (2016). Conceptual investigation process model for managing database forensic investigation knowledge. Research Journal of Applied Sciences, Engineering and Technology 12(4): 386-394.

Ali A, Razak SA, Othman SH, Mohammed A, and Saeed F (2017). A metamodel for mobile forensics investigation domain. PloS One, 12(4): e0176223. https://doi.org/10.1371/journal.pone.0176223

Allee V (2003). The future of knowledge: Increasing prosperity through value networks. Routledge, Abingdon, UK.

Bajaj D (2015). Exploring market and competitive intelligence research as a source for enhancing innovation capacity. College Quarterly, 18(3): 3-16.

Baldwin C and Von Hippel E (2011). Modeling a paradigm shift: From producer innovation to user and open collaborative innovation. Organization Science, 22(6): 1399-1417.

Barbaroux P, Attour A, and Schenk E (2016). Knowledge management and innovation: Interaction, collaboration, openness. John Wiley and Sons, Hoboken, USA.

Barragan-Ferrer JM, Barragan-Ferrer D, Lopez-Flores R, Cortes-Robles G, Viliušienė I, and Kirvaitienė J (2017). Knowledge management framework for integrating biomedicine into the new product development. Sveikatos Mokslai/Health Sciences, 27(1): 78-79.

Boehm DN and Hogan T (2013). Science-to-business collaborations: A science-to-business marketing perspective on scientific knowledge commercialization. Industrial Marketing Management, 42(4): 564-579.

Bommert B (2010). Collaborative innovation in the public sector. International Public Management Review, 11(1): 15-33.

Braun S and Hadwiger K (2011). Knowledge transfer from research to industry (SMEs)–An example from the food sector. Trends in Food Science and Technology, 22: S90-S96.

Bueno B and Balestrin A (2012). Collaborative innovation: An open approach in the development of new products. Revista de Administração de Empresas, 52(5): 517-530.

Buerkner G and Damm M (2011). New approach to university-industry-collaboration: The knowledge-entrepreneur. In the 5th International Technology, Education and Development Conference, Valencia, Spain: 2030-2033.

Cai J (2012). The theory of collaborative innovation. Peking University Press, Beijing, China.

Centobelli P, Cerchione R, and Esposito E (2017a). Knowledge management in startups: Systematic literature review and future research agenda. Sustainability, 9(3): 1-19.

Centobelli P, Cerchione R, and Esposito E (2017b). Knowledge management systems: The hallmark of SMEs. Knowledge Management Research and Practice, 15(2): 294-304.

Chen J and Yang Yj (2012). Theoretical basis and content for collaborative innovation [J]. Studies in Science of Science, 2: 161-164.

Cohen WM and Levinthal DA (1990). Absorptive capacity: A new perspective on learning and innovation. Administrative Science Quarterly, 35(1):128-152.

Corallo A, Passiante G, and Prencipe A (2007). The digital business ecosystem. Edward Elgar Publishing, Cheltenham, UK.

Cowan R, Jonard N, and Zimmermann JB (2007). Bilateral collaboration and the emergence of innovation networks. Management Science, 53(7): 1051-1067.

Deng H (2012). A conceptual framework for effective knowledge management using information and communication technologies. In: Lee WB (Ed.), Systems approaches to knowledge management, transfer, and resource development: 117-130. IGI Global, Pennsylvania, USA.

Du Plessis M (2007). The role of knowledge management in innovation. Journal of Knowledge Management, 11(4): 20-29.

Fetterman DM (1998). Ethnography. Sage Publications, Inc., Thousand Oaks, California, USA.

Fuller J, Muller J, Hutter K, Matzler K, and Hautz J (2012). Virtual worlds as collaborative innovation and knowledge platform. In the 45th Hawaii International Conference on System Science, IEEE, Maui, HI, USA: 1003-1012. https://doi.org/10.1109/HICSS.2012.636

Gao J and Bernard A (2017). An overview of knowledge sharing in new product development. The International Journal of Advanced Manufacturing Technology, 1-6. https://doi.org/10.1007/s00170-017-0140-5

Gertner D, Roberts J, and Charles D (2011). University-industry collaboration: A CoPs approach to KTPs. Journal of knowledge management, 15(4): 625-647.

Gloor PA (2006). Swarm creativity: Competitive advantage through collaborative innovation networks. Oxford University Press, Oxford, UK.

Greer CR and Lei D (2012). Collaborative innovation with customers: A review of the literature and suggestions for future research. International Journal of Management Reviews, 14(1): 63-84.

Hanel P and St-Pierre M (2006). Industry–university collaboration by Canadian manufacturing firms. The Journal of Technology Transfer, 31(4): 485-499.

Iriondo AT (2009). Collaborative innovation: A tool for competitiveness. DYNA, 84(6): 461-462.

Isip G and Young O (2017). Feedback approaches and knowledge intensity in new ventures. M.Sc. Thesis, University of Gothenburg, Gothenburg, Sweden.

Mercier-Laurent E (2013). Innovation ecosystems. John Wiley and Sons, Hoboken, USA.

Nursall A (2003). Building public knowledge: collaborations between science centres, universities and industry. International Journal of Technology Management, 25(5): 381-389.

Santoro MD and Bierly PE (2006). Facilitators of knowledge transfer in university-industry collaborations: A knowledge-based perspective. IEEE Transactions on Engineering Management, 53(4): 495-507.

Shakerian H, Dehnavi HD, and Shateri F (2016). A framework for the implementation of knowledge management in supply chain management. Procedia - Social and Behavioral Sciences, 230: 176-183.

Wiewiora A, Murphy G, Trigunarsyah B, and Brown K (2014). Interactions between organizational culture, trustworthiness, and mechanisms for inter project knowledge sharing. Project Management Journal, 45(2): 48-65.

Yin RK (2009). Case study research: Design and methods fourth edition. SAGE, Los Angeles and London, USA and UK.