Innovation Process with Some Evidences for Romania and EU-13 Countries

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Abstract: *The aim of this article is to study the innovation process as being generated by the evolutionary process and knowledge management within the company. Innovation and knowledge systems are an important source of competitiveness. Innovative companies gather more data, process them better and identify better the technological opportunities that they discover within a shorter time, being thus confronted with a lower level of uncertainty. At the same time, they will be able to accumulate a greater stock of knowledge about the respective technologies. Companies experiment with technologies, while managing to better understand their internal configuration. The firms will be able to adapt their organisational structure and will be able to gain competitive advantages at the expense of other non-innovative companies from the market. Companies learn dynamically about new technologies and those who learn better are rewarded by the market by some rents and for those who don't learn, the market penalizes them by rising costs or even bankruptcy. From this innovation behavior, some companies are able to adapt, improve their products, have better technologies than their competitors and introduce new knowledge management systems. The research methodology is based on a quantitative method.*

Keywords*:* innovation behavior, organisational innovation, product innovation, EU-13 firms, Romanian firms.

JEL Classification: D22, L21, O14

Introduction

The innovation is a source of competitiveness and performance for the company. Although innovation is associated in many situations with technological changes there are several types of innovations. Most studies are focused on product innovations and process innovations. Another classification was made for incremental innovations and radical innovations in order to improve the company's performance. By its nature, technology raises questions regarding the ways in which it will be adopted by companies while the adoption of new technologies involves certain adjustments in the structure of the company. Firms are facing uncertainty about the future costs and results, there are many elements that can't be known ex-ante, there are severe gaps regarding the implementation alternatives of the new technologies. Therefore, arguments can be made that the economic problem is precisely the identification and ordering of the technological options and the company has to dynamically adapt the technologies to the local conditions. Firms are facing contextual problems and they aim to minimize this uncertainty through various approaches. Adopting a new technology and attracting specialists, maintaining the old technology but increasing the production scale are common problems for which companies have to make decisions. Experts estimate that globalization and technological changes will intensify in the next years. That is why the industry must face the challenges posed by technological changes and take advantage of the opportunities offered by the new technological processes with low energy consumption. Globalization, integration within the European Union, changes in demand and scientific progress, technological changes and innovation will have a major impact on long-term industries.

Literature review

Changes generate opportunities but raises competition which is why a turbulent environment will force the company to permanently make organisational changes within the company in order to maintain its competitiveness. These changes represent innovations for a company that manifests itself through the accumulation of tacit knowledge and which leads to the improvement of the production process and product. In this approach the organisational changes are influenced by organisational learning and the market selection mechanism will eliminate firms that did not know how to reorganize effectively (Wang and Chen, 2020).

Schumpeter (1934) distinguished five types of innovation:

1. Product innovation consisting of the introduction of a new product or a product of different quality;
2. Process innovation which consists in introducing a new production method;
3. Creating new markets;
4. Discovery of new primary or intermediate resources;
5. Creating new organizational forms.

Giovanni Dosi (1982) studied the role played by "technological paradigms" from an evolutionary economic perspective. A "technological paradigm" is defined as a "perspective", a set of procedures, a set of "relevant" problems and a set of "specific knowledge" related to the solutions of some problems considered relevant. Each "technological paradigm" has a heterogenous

concept of "progress" based on its own specific economic and technological market selection.

The "technological path" is a direction of technological advancement within a technological paradigm. The innovative process was theorized in terms of practical, theoretical understanding and knowhow. Thus, knowledge appears implicitly through the process of innovation and this implies an experimentation process by trial and error, generating accumulated improvements in the understanding of the object studied. These improvements are specific to each technology and create structural differences significant at the rates at which certain components of the technological frontier can be developed. Innovation patterns follow certain directions in which accumulations of knowledge take place. Through this approach, it correlates the evolution of knowledge with the evolution of technology (Tunzelmann et. al., 2008). Companies are constantly learning about new technologies. Some companies intend to be competitive in the long-term market and for this they choose to always own in the company the latest technologies, thus being in a continuous process of adaptation and structural reorganization.

Wang and Chen (2020) explored the impacts of organisational innovation on imitation and innovation and identified some patterns related to organisational innovation which suggest that a superior level of organisational innovation is needed for product innovation and a change between product imitation to product innovation requires an enhancement in organisational structure.

Several studies have attempted to highlight the relationship between the ability to learn (innovate) for heterogeneous companies, the ability to make a profit in a certain industry and the rate of survival. Some economists have proposed a "noisy" selection of companies through the market, that is, some firms are able to learn in conditions of uncertainty. In the traditional approach, adoption technological changes affect the performance of the company for a short period of time because competing companies are starting to imitate the respective technology. In an alternative approach, there are two classes of companies, respectively some companies with intrinsically innovative behavior and non-innovative firms. In the second vision, innovative companies are considered to adopt the new technologies and then follows a dynamic process of idiosyncratic adaptation of technologies to the economic context of the company in efficient conditions.

In the traditional economic approach, the companies want to adopt the technical progress due to the rent offered and has a temporary character because it begins to be imitated by the competitors.

The output obtained in the innovative technological process consists of:

1. Technological product innovation and consists of:

- changes in the performance of the characteristics taken as a whole of a new product;

- changes in certain parts of the product that allows it to improve efficiently, including the provision of high quality services. Incremental improvements additions to a product can be considered minor accumulations to a product innovation which can lead in time to significant changes;

- patenting activity or obtaining research grants is an innovative activity but it does not necessarily lead to product or process innovation;

2. Technological process innovation:

- implies a significant improvement of the production process as a result of implementation of a new technology.

Nizar et. al. (2006) finds that process innovations are an indicator for firms competing through cost and thus they aim to achieve economies of scale. In Eastern European countries cheaper labor force allows a competitive advantage for the companies operating in this region, relative to the same industries that operate in the more expensive regions of Western Europe.

Tether and Tajar (2008) studied 2500 companies in Europe and identified three types of innovations:

- Based on product research;
- Oriented towards technological processes;
- Based on organisational inovations.

Adoption of a new technology can contribute to the innovation of some products and services if the respective company successfully manages to market its product. Manufacturing sector innovations are defined as "hard innovations" because they involve R&D and / or the production equipment is significantly modified and in the services sector for the "soft" innovations because some organisational adjustments are made within the company as an effect of introducing some sales techniques. For the manufacturing sector, technological innovations are also called "hard" because the innovation is oriented towards the production equipment or the commercialized product. In the services sector, the innovations are oriented towards the organisation form of the company, in particular towards innovations within the distribution chain.

Research methodology

A quantitative method was used in this paper in order to attain the aims of this paper. Several bibliographic sources were consulted from the Central University Library from databases such as Emerald Publishing, Springer and ScienceDirect to cover the topic of the paper. For the quantitative analysis were used the data provided by the European Bank for Reconstruction and Development through the Business Environment and Enterprise Performance Survey (BEEPS), from the fifth round of the data, for the year 2013.

Results and discussion

The study compared the results obtained for the indicators studied in Romania with the same indicators for the EU-13 group of countries within the European Union.

Table 1 includes data for both innovators and non-innovators for the countries chosen according to the European Comission point of view with regarding to a similar innovation structure (Ukrainski et. al., 2018). In the study "Overcoming innovation gaps in the EU-13 Member States" the European Commission appreciates there are structural similarities for EU-13: Bulgaria, Croatia, Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovakia and Slovenia. For EU-13, descriptive statistics can be seen within Table 1. Similarities can be observed for two indicators "Own technology has no competitors" and "Own technology which is more advanced than the main competitor" which are very close to. Romanian Managers appreciate their company to be a better product/ service innovator than the average of EU-13. However, an apparently innovative paradox

behavior can be seen for two indicators: "Own technology which is about the same or less advanced than the main competitor" and "New knowledge management systems". Although Romanian Manager appreciate their technology is the same or lower, they believe that they have introduced improved "knowledge management systems" and some interpretrations are:

- A higher degree of tacit knowledge can provide some competitive advantages;

- A higher level of competition in the segment in which it operates, which may imply a higher level of organisational transformation to achieve a product innovation;

- A higher degree of knowledge which can be measured by an improved level of "New Knowledge Management Systems";

- A higher degree of utilization for "New Knowledge Management Systems" may suggest that the rate of departure from the company by the employees is high and the Romanian companies invest more in computer systems to keep the knowledge after the employees leave or for a better conversion of the tacit knowledge into explicit knowledge.

Prange and Schlegelmilch (2016) argue that exploration leads to completely new innovations and exploitation maintains existing innovations. The exploitation of a certain innovation has a lower risk and has a certain stability in use. Exploration is at high risk because there is uncertainty about changes. For example, in times of economic stability the innovative behavior is incremental, the firms being oriented towards stability and balance. Long periods of economic stability will be followed by short periods of technological revolutions. The changes in the economic environment and the entry into turbulent times will generate certain technological revolutions that represent some jumps. The success of a company lies in its ability to know how to capitalize on both periods, both stability and instability, both through incremental and revolutionary innovations. If we observe that a company is profitable through incremental innovations it means that it is either in a period of economic stability or its competitors maintain their level of innovation. If a company adopts a greater number of innovations it means that it is either in a difficult economic period or it is active in a sector where the competitors have introduced a significant number of innovations. It is expected that companies that successfully exceed a period of technological revolution will have to gain from the period of incremental innovation that follows. Therefore, it is expected that the allocation of resources within the enterprise will be different depending on the two stages.

A phase of technological revolution would imply a higher degree of flexibility of the product design and a relaxation of the company's organisation. A period of stability in which the innovation rate is maintained at a lower level would require a more rigid control of the production process. The period of technological revolution has higher risks and higher potential benefits and the period of incremental innovation has lower risks and benefits proportional to market share. Prange and Schlegelmilch (2016) refers to the notion of "strategic inflection points" (SIPs) as being the point at which a company decides to leave the state of equilibrium to change different types of innovations. To have sufficient resources to engage in innovative exploration behavior, a company might be constrained by a period of exploitation of a sufficiently large

innovation to allow it to finance its exploration activity but also to have the knowledge. required. (Prange and Schlegelmilch, 2016)

Arranz et al. (2019) is orientated to the line of thinking in which organisational innovations (OI) reflect the introduction of those processes changes that have the purpose to enhance the structure of the organisation which improves the firm's performance with respect to productivity, quality, flexibility and other competitive advantages.

Table 1 - Indicators for Measuring Innovation Process

Innovation indicator	New/significantly improved product/service introduced and developed from own ideas	Own technology has no competitors	Own technology which is more advanced than the main competitor	Own technology which is about the same or less advanced than the main competitor	New knowledge management systems
EU-13* innovators	467 (13.45%)	9 (0.26%)	79 (2.28%)	178 (5.13%)	487 (14.03%)
EU-13* total observations	3471	3471	3471	3471	3471
Romanian innovators	100 (18.76%)	-	13 (2.44%)	61 (11.44%)	131 (24.58%)
Romanian total observations	533	533	533	533	533

Source: Author's calculations with data from https://ebrd-beeps.com/ for the year 2013
EU-13 includes observations for Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Sloveni and does not include observations for Cyprus and Malta due to lack of data.*

Innovation capabilities are related to the innovation processes of the company which is measured by the firm's ability to efficiently use new products, processes and knowledge. Sattayaraksa and Boon-itt (2016) found that transformational leadership improves the innovation culture, organisational learning and new product development. Arranz et al. (2019) argues that organisational innovation seen as innovation capability is a mediator between resources and the performance of the company. In this vision, a company achieves a greater level of performance if it transforms resources in organisational changes, innovation in products and processes and OI is generated from resources. OI can be interpreted as a necessity to create a new organisational change.

Sattayaraksa and Boon-itt (2016) argues that organisational learning and innovation culture fully mediated the effect of transformational leadership to the new product development process. Torres and Augusto (2019) found that a path to achieving

improved performance is influenced both by the complementarity of product innovation and organisational innovation and the mix of manufacturing flexibility with either organisational innovation or process innovation can generate a higher product innovation.

Carneiro Alberto (2000) defines the Knowledge Management as consisting of:

- the ability to motivate;
- knowledge as a strategic instrument;
- intellectual capital;
- the measurement of knowledge development.

Iskandar et. al. (2017) reffers to the knowledge creation preocess as it involves the creation of new tacit and explicit knowledge and which is a continual interaction of the flow of knowledge between indiviuals, groups and organisational structures.

Carneiro Alberto (2000) defines Knowledge Development Strategic Decisions as:

- Investments in the development of knowledge;
- Modern Information Technology;
- Knowledge implication of employees;
- Motivation of innovative ideas;
- Motivation of competitive efforts.

The purpose of the Knowledge Management Systems (KMS) is a tool to assist the company in capturing certain knowledge from employees when they leave the organisation and KMS tools converts tacit knowledge to explicit knowledge (Iskandar et al., 2017). KMS represents information systems that helps to collect data, process it, better internal organisation of the company and creates competitive advantages. Companies using KMS have better knowledge control, they can reuse knowledge, they can make faster and more efficient decisions, they can better organise their internal learning processes, they can better transfer knowledge between internal departments or to other structures of other companies. Iskandar et al. (2017) shows that there is a close connection between KMS and the adoption of new technologies. The introduction of new technologies in a company implies a high volume of knowledge that requires the use of tools for knowledge management.

Conclusions

The paper shows that the combination of manufacturing flexibility with process innovation and organisational innovation will generate an improvement to product innovation.

The importance of the paper resides in underlining the strong relationship between product innovation, the level of the technology and new knowledge management systems. Future research might consider other sources for new or improved product developed from own ideas or which influences the development of new technologies.

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