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Basis for managing the development of the innovative environment of an industrial organization during its digital transformation

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Abstract. The article is devoted to the analysis and making proposals for managing the development of the innovative environment of an industrial organization during its digital transformation. The relevance of the research is associated with the acceleration of the pace of innovation development, the formation of new business models, the creation of new principles of managing companies of in various industries, as well as business processes. This necessitates the search for new ways to create economic methods for the development of the innovative environment of an industrial organization during its digital transformation. The author analyzes the theoretical basis of innovative environment of an industry organization, describes the influence of digital transformation on transformation of the innovative environment of an organization and as a result makes proposals concerning development of methodological basis for managing the development of the innovative environment of an industrial organization during its digital transformation.

Key words: mechanism, innovative environment, industrial organization, digital transformation, economic tools, methodological basis, internal environment, external environment.

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Основы управления формированием инновационной среды промышленной организации в процессе ее цифровой трансформации

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Аннотация. Статья посвящена анализу и выработке предложений по управлению развитием инновационной среды промышленной организации в условиях цифровой трансформации. Актуальность исследования связана с ускорением темпов развития инноваций, формированием новых бизнес-моделей, созданием новых принципов управления организациями различных отраслей, а также бизнес-процессами. Это обуславливает необходимость поиска новых путей развития инновационной среды промышленной организации в процессе ее цифровой трансформации. Авторы анализируют теоретические основы формирования инновационной среды промышленной организации, описывают влияние цифровой трансформации на изменения инновационной среды организации и в результате вносят предложения по развитию методической основы управления формированием инновационной среды промышленной организации в ходе ее цифровой трансформации.

Ключевые слова: инновационная среда, промышленная организация, цифровая трансформация, экономические инструменты, методическая основа, внутренняя среда, внешняя среда.

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Introduction

Digital transformation is one of the main trends changing all spheres of life of society, business and government. In terms of significant economic transformations new business models are formed, new principles of managing organizations of various industries are created, as well as some business processes are changed. There are changes in the innovation infrastructure, existing management models and government regulation. All of these affect the innovative environment of an industrial organization, which is being transformed under the influence of internal and external factors of digital transformation.

In this regard, the main hypothesis of this study is the assumption of the need to create economic methods for the development of the innovative environment of an industrial organization during its digital transformation.

Today, three years after the Covid-19 pandemic, still ongoing, it is important to note that not only was digital transformation essential before this pandemic to meet new demand by adapting and creating the offer, but it has also become an essential key to the survival of companies, especially in times of health crisis.

To date, the digital transformation of companies has been quite different depending on the profile of the company, its size, its sector of activity. Then the health crisis came, accentuating the importance of this digital transformation, and boosted the strategies already implemented in companies. Those who have been able to master the digitization of productive and organizational processes, who have been able to adapt their operations quickly and strategically, while putting human capital first, will be those who will be more competitive in a vulnerable, changing and uncertain market.

The Covid-19 crisis has caused an economic shock of demand and supply unprecedented in history. Business production, investments, trade, household consumption, institutions... everything has been affected by the sudden end to economic activity. However, despite the unprecedented situation, a strategic element has made it possible to continue

most of the activities of certain sectors of activity, in particular the tertiary sector: this is the digital transformation.

A recurring subject in business strategies for more than two decades, a majority of companies have embarked on their digital transformation, driven in particular by the increase in internet penetration rates in the world, new technologies, innovations in particular ICTs, connected objects, but also encouraged by the demand of good consumers, all of these reasons which have disrupted the market.

Digital transformation has become an essential and permanent strategy to be developed over the long term in companies to ensure proper productive and organizational functioning, to meet new consumer demands but also to offer the best customer experience to build customer loyalty.

Overnight with the implementation of containment, millions of people were forced to work remotely. The first observation was the decentralization of work. Teleworking has been a boon for the companies which have developed it, allowing the continuity of a large part of the activity remotely. According to the Acemo survey carried out by Dares, employees working from home in April 2020 represented around a quarter of employees during the first confinement. Teleworking was more frequent in sectors where its development was widespread before the crisis such as information and communication activities with 63% of employees, financial and insurance activities with 55% of employees teleworking.

According to the Acemo survey carried out by Dares in December 2020, after reconfiguration, teleworking remains important in these same sectors of activity 55% and 66% of employees respectively for financial and insurance activities and information communication. It is also remarkable in real estate activities (37%), manufacture of transport equipment (31%) other service activities (25%), capital goods (28%) and business services (34%). It is notably more important compared to the first containment in the manufacture of transport equipment (31% at the end of November against 23% at the end of April) and in transport and storage (16% against 14% at the end of April), and also less important in the private education and private health (9% against

20% at the end of April). In total, 22% of employees are teleworking¹.

Such changes in the organization of labor significantly affect the economy of companies by reducing various costs. Companies increasingly introduce information technologies into production and management processes, and this undoubtedly affects the principles of organizing innovation activities and building a company innovation system. Below we will present an overview of the theory of the issue for the deeper understanding of the theoretical aspects of developing the innovative environment of an organization and the factors that influence on it.

Literature review

The Industrialist has conventionally been viewed in economic analysis as the fundamental character in the innovation process that characterizes modern economies. Most often breaking with standard economic theory, this perspective has been mainly developed by the evolutionary tradition to explain, through the role of knowledge, the link between innovation and economic development. However, this approach to the function of the entrepreneur, which is directly inspired by the analyzes of Schumpeter [Schumpeter 2004], more often than not masks another, that of Marshall, who, by basing himself on a different conception of knowledge, on the contrary, makes it possible to establish that the principle of connection between innovation and economic development involves the role of the entrepreneur in the organization of industry.

Some interior and exterior effects can absolutely or damagingly impact the change of innovations. Conventionally, the exterior environmental factors showed as training the innovation environment are: the structure of the market, the extent of the corporation, the degree of absorption of the manufacturing, the fences to access and exit, and the macroeconomic issues, between others. According to Marshall [Marshall 1996], "the innovation environment thus denotes to all the political, economic, social and cultural factors which stimulate or hinder innovation".

According to Marshall, the organization of production has two dimensions: one relating to the

firm, which he qualifies as an "internal" organization, the other relating to inter-company relations or to industry, which he defines as an "internal" organization. qualifies as an "external" organization. If the first dimension explains the birth of increasing returns, the second allows it to study of the potential for increasing returns to come. The entire problematic then is how to coherent these two dimensions.

Marshall is considering two solutions to solve this problem. The primary is the best known, it is based on the notion of representative firm, but also on the use of the distinction between internal economies and external economies. This attempt, however, consist to an impasse because Marshall does not accomplish to "resolve" his static approach to value and his dynamic conception of industrial development. The next solution, although more unclear, can nonetheless be found in the way in which Marshall studies the role of the "manufacturer" or "the entrepreneur" [Barreiro & Ravix 2008].

According to Knight, the problem of uncertainty in economics stems from two phenomena: on the one hand, productive decisions must be estimated before they are made and the results cannot be predicted with certainty; On the other hand, the needs to be satisfied are future needs and their prediction is also uncertain. It follows therefore that "the producer must estimate (1) the future demand which he is trying to satisfy and (2) the future results of his operations in order to try to satisfy that demand" [Knight 2005].

All of these forms the innovative environment of an industrial organization. So we define what it is.

Theoretical points about the term "Innovative environment" of an industrial organization and methodological basis

According to M. Castells' research, the "innovation environment" is "a set of relations between production and management, based on a social organization that is generally aimed at generating new knowledge, new processes or new products" [Castells 2010]. At the same time, the author understands the innovation environment not as an exclusively external environment of the organization, but as the interaction of economic entities during the creation of innovation.

According to the dictionary [Innovacionnaya e`konomika 2012], the innovation environment is a combination of the internal and external environment of the participants in the innovation

1 Transformation digitale en temps de COVID-19. By Gabriela Gublin Guerrero. *BSI Economics* : [website]. Open access. URL: <http://www.bsi-economics.org/1240-transformation-digitale-en-temps-de-covid-19-note>. Publication date 01/21/2021.

process. At the same time, the internal environment includes the components of innovation potential (resources and opportunities for their use), and external factors include market institutional structures those promote innovative development.

Lapko 2012; Matyukhin 2016; Chursin 2020; Kirova 2021], etc. the components of the innovation environment include external and internal factors. We will present the main components in the Fig. 1 and add the factors of digital transformation to traditional components.

According to the scientific works [Kondrashov &

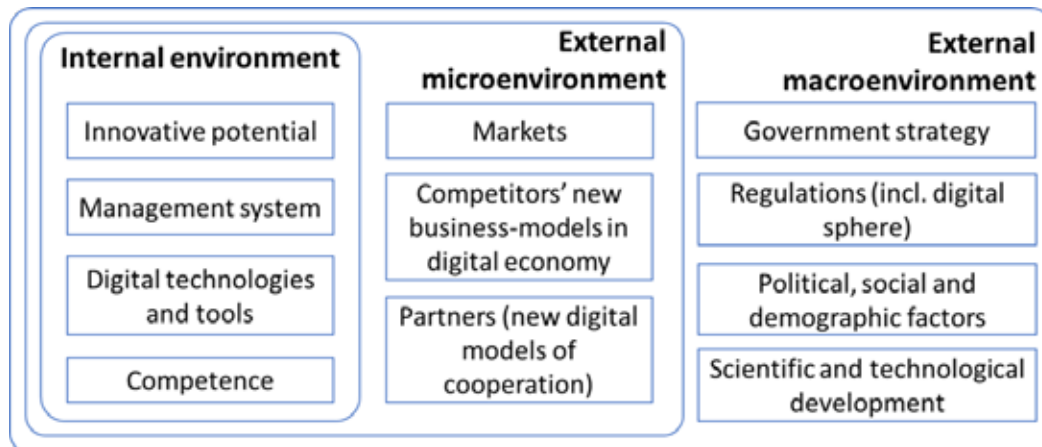


Fig. 1. Main components of the innovation environment of an industrial organization

Source: own elaboration

So, the digital transformation influences on transformation of innovative environment of an organization. This idea is discussing below.

Results of the influence of digital transformation on transformation of the innovative environment of an organization

Market and industry are used to the term "digital transformation and innovation" as a key term to show organizational evolution influenced by digital technologies. Though, a clear meaning has not been usually approved, all the scientific articles are however agreed in communicating that digital transformation makes a radical change in organizations [Burki 2018]. For Lucas et al. [Lucas 2013], the evolutions concern correcting corporate procedures, making new organizations, changes in organization/client relations, markets, employer experiences, and the number of clients, and lastly, the impact of disruptive technologies. By adding, the acceleration of digital technological development, joint with the growing globalization of related economies, is growing the innovation cycles of products and services, and producing new corporate models, whereas changing the functioning and structural environment for businesses and clients.

Therefore, businesses from all commercial sectors are exploring and investigating with new conducts by means of digital tools and technologies within their organizations. New digital technologies, such as data analysis, digital communication, connected

objects, intelligent systems, and user experience through digital technology, are being useful in all areas of activity, with various conventional businesses [Pagani & Pardo 2017]. Besides, some scientists have experimented the advantages of digital technology in organizations [Bertrand 2001; Leipzig 2017; Bedell-Pearce 2018; Subramaniam 2019; Dethine 2020], and that organization which have started their digital transformation are more competitive and thus able to more simply adapt to changing environment conditions.

Nevertheless, despite the importance devoted to this phenomenon, some organizations, are harassed to participate in an intelligible global digital transformation process. The incorporation of digital technology needs funds and changes in organization's internal performs, which occasionally necessitates the application of new internal organizational strategies as well as the development of new skills. Industrial organizations usually invest in digital technologies, operating in resourceful method, so far without resulting any real global digital transformation strategy. This method, which emphasizes on a temporary vision, occasionally results in investment mistakes, and frequently in incremental development rather than in the progress of a deep change that make the most of value creation related with digital transformation of the whole organization.

To increase profit and be competitive in the

market, Industrial organizations generally use PLM and ERP, those are two tools for improving business operating methods. Historically intended for large groups, this software is now essential for intermediary companies who want to remain competitive. These are major assets in a process of improving performance and optimizing costs and resources. The capabilities and scope of intervention of these tools remain unclear for manufacturers, and the boundaries between their functions are not always clear.

However, their roles and objectives are different and complementary: ERP optimizes the use of company resources and PLM facilitates the development and marketing of innovative products.

We must notice that An ERP ("Enterprise Resource Planning") is enterprise resource management software that helps streamline manufacturing and supply chain processes. He is particularly involved in the management of finance, human resources, purchasing, manufacturing, sales, logistics and stocks.

PLM software enables the centralization of product information and the management of associated processes throughout the product lifecycle (design, development, manufacturing, services). It promotes collaboration between teams and reduces the time to market for products.

ERP and PLM tools do not have the same goal. ERP focuses on physical goods and the flows they cause within the company: logistics and financial flows. PLM focuses on the management of the product lifecycle. It centralizes information in a common repository to guarantee its availability and traceability.

Thus, we can see that the innovative environment of an industrial organization is changing dynamically as a result of the introduction of digital technologies and digital management tools.

As a result, industrial organizations need to have new economic tools and mechanisms for managing the development of the innovative environment of an industrial organization based on increasing its innovative activity through digitalization.

Discussion and proposals concerning development of methodological basis

At the same time, the contribution of new information and communication technologies to development processes and territorial dynamics through the introduction of digital transformation is

today at the center of many debates, both about the mastery of technology and information. The nature of the arguments put forward largely depends on the interpretive schemes proposed and the underlying assumptions about development processes and more generally the interrelationships between the technical and the social. This innovation enabled the infrastructural revolution, which now allows the sustainability and the modernization of regional infrastructures of your kind.

In fact, companies need to be more and more competitive because of the changing environment. To achieve that goal, companies should change their approaches for managing innovation by adding new methods. In this case, we need to develop:

- the system of indicators for assessing the level of development of the innovative environment of an industrial organization, considering digitalization.
- the method for assessing the level of development of the innovative environment of an industrial organization.
- the method for managing the stimulation of innovation in the digital transformation of an industrial organization
- the mechanism for managing the development of the innovative environment of an industrial organization based on increasing its innovative activity through digitalization.

The combination of these tools and mechanisms will allow industrial organizations to manage the transformation of the innovation environment in the conditions of digitalization effectively.

Conclusion

To reply to the contests of the digital economy, companies need not only tools for the development of digital technologies, but also methods for efficient digital business modeling. The organized method that we showed in this article is one step in business transformation. Nevertheless, more investigations and practices are needed. Therefore, additional investigations are essential to create methodologies that allow, depending on the needs of the business and the strategic priorities of the company, given its digital progress, to choose the suitable technologies and digital value conception factors that will allow the company to efficaciously perform digital business transformation.

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