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The innovation of products and services: a review of the methodology for its evaluation in the organizations

La innovación de productos y servicios: una revisión de la metodología para su evaluación en las organizaciones

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ABSTRACT:

A review is made about the evaluation of innovation, where, according to the literature and regional studies on innovation, evaluating product innovation becomes a relevant activity in organizations to achieve competitive advantages and economic success. However, current studies on the evaluation of innovative products, their effectiveness and efficiency in organizations, especially those in the telecommunications sector, have been scarce and unclear. Specifically, there is the need to identify and propose variables that influence the innovation of products in organizations, with their respective scales and measures to assess them in the dimensions of effectiveness and efficiency. In such a way that it contributes directly to the increase of the effectiveness and efficiency of the process and product development, as well as to the improvement of its economic results. For this, it is proposed to apply in this research a qualitative

RESUMEN:

Se realiza una revisión sobre la evaluación de la innovación, donde, de acuerdo con la literatura y los estudios regionales sobre innovación, evaluar la innovación del producto se convierte en una actividad relevante en las organizaciones para lograr ventajas competitivas y éxito económico. Sin embargo, los estudios actuales sobre la evaluación de productos innovadores, su efectividad y eficiencia en las organizaciones, especialmente en el sector de telecomunicaciones, han sido escasos y poco claros. Específicamente, existe la necesidad de identificar y proponer variables que influyan en la innovación de productos en las organizaciones, con sus respectivas escalas y medidas para evaluarlos en las dimensiones de efectividad y eficiencia. De tal manera que contribuya directamente al aumento de la efectividad y la eficiencia del proceso y el desarrollo del producto, así como a la mejora de sus resultados económicos. Para esto, se propone aplicar en esta investigación una metodología

methodology of exploratory type through case studies.
Keywords: valuation of innovation, an innovation of products and services, variables

cualitativa de tipo exploratorio a través de estudios de casos.
Palabras clave: valoración de la innovación, innovación de productos y servicios, variables.

1. Introduction

According to the literature and regional studies on innovation, evaluating the innovation of products and services becomes a relevant activity in organizations to develop competitive advantages and achieve economic success. However, studies on the evaluation of innovative products concerning their effectiveness and efficiency in organizations, especially those in the telecommunications sector, have been scarce and unclear.

Telecommunications refers to the set of technologies that allow the acquisition, production, storage, processing, communication, recording and presentation of information, in the form of voice, images and data contained in acoustic, optical or electromagnetic signals. Technologies include electronics as a base that supports the development of telecommunications, information technology and audiovisual. Innovation is considered as a synonym of producing, assimilating and successfully exploiting a novelty in the economic and social spheres, in a way that provides unprecedented solutions to problems and thus allows responding to the needs of people and society.

Undoubtedly, the rapid development and innovation in new information technologies and telecommunications are responsible for the emergence of a new economy contributing to create what we know today as the knowledge society. The OECD (2015) estimates that, in most developed countries, more than 50% of GDP is generated based on investments in high-tech products and services, mainly in information and communication technologies. In this sense, the increasing investments in computer equipment, research and development, and technical training, highlight the growing importance of knowledge and information management in the economic development of countries.

This is how the dimensions and variables to evaluate by means of scales and measures product innovation in the global and dynamic competitive environment of today, are increasingly relevant, mainly as a result of three major trends: The intense international competition, the fragmentation of markets diverse and demanding, and rapid technological changes in organizations (Wheelwright and Clark, 1992).

The present article is structured for its development in the following subtitles: Innovation, more relevant definitions according to different authors present in the literature; types of innovation, presentation of the most representative types of innovation; valuation of innovation, where the most appropriate dimensions and variables are identified to evaluate the innovation of products and services in the organizations of the telecommunications sector; the methodology for the identification of variables, scales and measures, in this subtitle three phases are detailed: Phase 1, review of the literature; Phase 2, determine the variables; phase 3, evaluate the variables that influence the evaluation of innovation of products and services in organizations in the telecommunications sector. Finally, the conclusions of the article, acknowledgments, and references used are exposed.

2. Innovation

One of the first definitions of innovation appears in Schumpeter (1939) who analyzes the economic importance of innovation. In its definition, Schumpeter emphasizes the close relationship between innovation and invention, which are not necessarily the same concept. Innovations involve the development of inventions, the institutionalization of new production methods or the introduction of new products in the market. Recently, innovation has been defined as the conversion of ideas into products, processes or services that are successful in the market (OECD, 2007). These ideas can be technological, commercial and organizational. Therefore, it is possible to distinguish between technological and non-technological innovations. Technological innovations

involve new or improved products, services, and processes thanks to technology. Non-technological innovations consist of new forms of organization, management of the company or new behavior in the market (OECD, 2007).

There are other definitions of innovation in the literature that depends on the perspective adopted by the authors. For example, Tushman and Nadler (1986) define innovation as the creation of a product and service that is new to a business unit. Additionally, Damanpour and Gopalakrishnan (1998) conceptualize innovation as "the adoption of an idea or new behavior in an organization". While for Van de Ven, Polley, and Venkataraman (2001) innovation can be a combination of old ideas that is perceived as new by the individuals involved. The first conceptualization of innovation applied to the invention or product was proposed by Jewkes (1958). Other authors such as Dosi (1988), Edquist and Lundvall (1993), Freeman (1995), Nelson (1993) and Godin (2008) define innovation as "The technological component for the development of nations".

It can be concluded that most of the definitions reiterate the novelty of the creation or improvement that innovation implies. It is considered that innovation is a fundamental factor for the success of companies and, ultimately, for the growth of national economies (OECD, 2007). Therefore, the definition adopted for this article is that of the Oslo Manual (OECD, 2007), since it raises "the introduction of a new or significantly improved product (good or service). What implies the introduction of new internal practices in organizations ", also contributes to the economic and sustainable development of the regions.

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3. Types of innovation

In practice, organizations differ both in the type and degree of innovation, and in the impact, it has on the construction of competitive advantages in the market (Damanpour and Gopalakrishnan, 2001, Henderson and Clark, 1990, Tushman and Nadler, 1986; Zaltman, Duncan, and Holbek, 1973). However, Damanpour (1991) indicates that the most widespread typologies of innovation are those that use the nature of innovation or its radicality as a classification criterion. For example, the Oslo Manual of the OECD (2007) explains that if innovation implies new or significantly improved features of the service offered to customers, it is a product or service innovation, but if innovation involves new methods, equipment or knowledge or significantly improved used for the best service, is a process innovation. If innovation involves the use for the first time of new organizational methods in the business practices of the company, in the organization of work or external relations, it is an organizational innovation, but if the objective is to increase the volume of sales or the product price positioning it better in the market or improve its reputation, it is a commercial innovation.

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4. Other innovation classifications include:

1. According to its purpose, the OECD (2007) and Porter (2003) classify it into product innovation, process innovation, input innovation, and market innovation. A product innovation provides a new good or service, or significantly improved, in terms of its technical characteristics or terms of its use or other functionalities. The improvement is achieved with knowledge or technology, with improvements in materials, in components, or with integrated computing. To consider it innovative, a product must present characteristics and differentiated performances of the existing products in the company, including improvements in terms of service. Process innovation, a concept applied both to the production and distribution sectors, is achieved through significant changes in the techniques, materials and/or computer programs used, aimed at reducing unit production costs or distribution, improving quality, or the production or distribution of new or significantly improved products. The process innovations also include new or significantly improved techniques, equipment and computer programs used in auxiliary support activities, such as purchasing, accounting or maintenance. The introduction of a new, or significantly improved, information and communication technology (ICT) is a process innovation if it is intended to improve the efficiency and/or quality of basic support activity. The innovation of inputs refers to the modification of the characteristics

or use of new materials. While market innovation consists of using a marketing method not previously used in the company, it may consist of significant changes in design, packaging, positioning, promotion or pricing, always to increase sales. The variation in the method has to suppose a fundamental break with what has been done previously. Changes in positioning may consist in the creation of new sales channels such as the development of franchises, direct sales, modifications in the way the product is displayed or the sale of user licenses. The changes in promotion involve the modification of the communication using new supports, replacement of the logo, loyalty systems and the personalization of the relationship with the client. The pricing refers to systems of variation of prices depending on the demand or the options offered.

2. According to the impact of innovation from evolutionary theory (Buitelaar, 1988), it is classified as incremental innovation and radical or disruptive innovation. Incremental innovation implies small changes aimed at increasing the functionality and benefits of the company that, although isolated are not significant when they occur continuously cumulatively can be a permanent basis for progress. On the other hand, radical or disruptive innovation implies a break with what has already been established. Create new products or processes that can not be understood as a natural evolution of existing ones. It is the kind of innovation that occurs when an innovator launches a simple, convenient, accessible and affordable innovation into a market that completely transforms an industry and generates an entirely new one through a well-differentiated alternative value proposition.

3. According to the origin of the innovation, Malaver and Vargas (2004) classify it as external innovation and internal innovation. Here, to take the concept of innovation to its maximum and most effective expression, it is fundamental to achieve mechanisms that allow internal and external ideas to work collaboratively so that companies can apply what is being developed in the network and the network. world to your fundamental business idea. Thus, external innovation is incorporated from the outside, developed in another location, transferred or implemented. While internal innovation is generated from the ideas of the members of the organization, or through an organized program of research and development.

In terms of the importance of each type of innovation, Stanton, William et al. (2007) and O'Sullivan and Dooley (2009) agree that the most relevant type of innovation is that of products and services, since it represents the introduction of something new for the organization, directly impacting its processes and market type. at the same time adding value to clients and contributing to the development of knowledge of organizations and the region.

In conclusion, a characteristic common to all innovations is that to be identified as innovations they must be introduced in the market, as is the case of product innovation, or they must be applied in the company's operations in the case of innovations of process, method of organization and marketing (OECD, 2007).

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5. Innovation Assessment

Evaluating innovation arises from the general interest and social welfare that results from the introduction of new and/or improved products and services. This interest has been strengthened thanks to the remarkable production of studies on the social and economic effects of technological change (Solow, 2013). Also, given that policies need to be based on empirical evidence (OECD, 2007), valuing innovation becomes a relevant activity so that policies in organizations are effective. To assess scales and measures are required, in this sense, the scales and measures of innovation become necessary to understand the variables of innovation and their relation to the economic development of the countries (OECD, 2007).

Notable efforts to standardize the definitions, scales, and measures of innovation were made by the Organization for Economic Cooperation and Development (OECD, 1992). Including the completion of the first standardized innovation survey in the countries of the European Union (EU). The Oslo Manual stimulated the evaluation of innovation as a

process from its first edition, encouraging the collection of data and variables that could support the construction of scales and measures to evaluate product innovation through its correlation and comparison, so that they can be useful to countries for analysis, especially to policy developers (Marins, 2001).

However, currently few studies compare the innovative performance of the countries based on the indicators developed under the guidelines of the Oslo Manual and on a smaller scale of the Bogotá Manual (2001). Most of these studies are limited to comparisons of developed countries, as in the OECD studies (2007) or comparisons of countries belonging to the same geographical region. For example, Anlló, Suárez, and De Angelis (2009) and the World Economy Research Institute (2013) point out that there is not yet a regular publication of detailed and combined results of innovation surveys developed inside and outside the EU. At the same time, there is a lack of studies that compare the innovative performance of countries located in different regions or that are in different stages of development (Anlló et al., 2009). Additionally, Godin (2008) identifies that the state of the art in the evaluation of innovation indicators still relies heavily on traditional data from scientific and technological activities.

There are studies that propose dimensions and variables to evaluate innovation in products and services such as those addressed by Alegre et al. (2006a), Blindenbach, Driessen et al. (2010), Cooper and Kleinschmidt (1995), Griffin and Page (1996), Hsu and Fang (2009), and Storey and Easingwood (1999). Among these, the method proposed by Alegre et al. (2006a) and Hannachi, (2015a) where they propose that through scales and measures, the dimensions (effectiveness and efficiency) and a set of variables, evaluate the innovation of products and services in organizations and thus contribute to improving their performance and economic results (OECD, 2007). Table 1 shows a detailed summary of the authors, the most commonly used criteria and measures to assess innovation.

Tabla 1
Authors, criteria and measures

Authors	Criteria	Measures (dimensions)
Griffin y Page (1997)	Financial performance, technical performance; customer performance	Fp: Financial performance, Tp: technical performance; Cp: customer performance
Alegre et al (2006)	Product performance, operational performance and product efficiency, respectively	Ece: efficacy; Eca: efficiency
Hsu Y Colmillo (2009)	Financial performance, technical performance; client performance; market performance, product performance	Fp: Rendimiento financiero, Tp: rendimiento técnico; Cp: rendimiento de cliente; Mp: rendimiento de mercado; Pp: rendimiento de producto
Storey Y Easingwood (2009)	Sales performance; cost effectiveness; heightened opportunities	Sp: sales performance; Pr: profitability; Eo: enhanced opportunities
Blindenbach et al (2010	Product performance, operational performance	Pp: product performance, Op: operational performance

Hannachi (2015)	Details of dimensions and variables for the evaluation of Innovation of products and services in organizations	Fp: Financial performance, Tp: technical performance; Cp: client performance; Mp: market performance; Pp: product performance, Op: operational performance; Ece: efficacy; Eca: efficiency; Sp: sales performance; Pr: profitability; Eo: enhanced opportunities

Source: Hannachi (2015)

Description of the measures listed

Fp: Financial performance, the achievement of the financial objectives outlined, including profitability, recovery period, sales, profits, global profitability and return on investment.
Tp: Technical performance, level of adequacy of the product.
Cp: Customer performance, degree of acceptance of the product by the consumer, satisfaction.
Mp: Market performance, as measured by national market share, foreign market share, revenue, the accuracy of market forecasts.
Pp: Product performance, the commercial result of a project of innovation, quality, competitive advantages and launch on time is evaluated.
Op: Operational performance, reflects how the innovation project was executed.
Ece: Efficiency, evaluates the success of an innovation.
Eca: Efficiency, evaluates the effort made to achieve that success.
Sp: Sales performance, consists of revenue, market share, and growth in sales against targets.
Pr: Profitability, is measured by the level of benefits and profits against objectives.
Eo: Window of opportunities, in new product categories and new markets.

In general, all measures directly influence the innovation of products and services, since they provide fundamental information to measure the efficiency and effectiveness of innovation in the market and the degree of consumer acceptance.

At the level of the city of Medellín, it has been identified that the growth of the base of the organizations of the service sector has a high dependence on the development, growth, efficiency and innovative success of the products that can be generated by the organizations of the sector of the telecommunications (Chamber of Commerce of Medellín, 2011). However, limitations and gaps in the knowledge and use of instruments that allow evaluating the innovation of products and services in the organizations of the city, especially in the telecommunications sector, are currently identified. This makes necessary and manifests the identification of these instruments, so as to enable the efficient evaluation of product innovation, since at present innovations are not clearly identified and valued in such a way as to allow them to understand and verify their dynamics; only some behaviors are empirically sensed (Cámara de Comercio de Medellín, 2011). This hurts the competitiveness and growth of organizations, preventing them from actively contributing to the development and progress of the region, and what is even more serious, has significantly delayed their participation in the global context of innovation in products and services (Bank World, 2006).

In conclusion, there are currently few studies that compare the innovative performance of countries based on standardized indicators, most of the studies are limited to comparisons of developed countries or comparisons of countries belonging to the same geographical region. There is still no regular publication of detailed and combined results of innovation surveys developed within and outside the EU or of studies comparing the innovative performance of countries from different regions or at different stages of development.

The state of the art in the evaluation of innovation indicators is still based on data from scientific and technological activities. Limitations and gaps are identified in the knowledge and use of instruments that allow evaluating the innovation of products and services in the organizations of the sector, especially in the telecommunications sector. This generates a negative impact on the competitiveness and growth of organizations (Sepúlveda, Garcés, Echeverri, Gallego, Araque, Silvera, Simancas, Villareal, Boss, 2017).

Therefore, in cities focused on the services sector, it is important to advance in the identification and evaluation of the variables that influence the innovation of products and services in organizations in general and especially in organizations in the telecommunications sector. Identifying their activities of the development of products and services, the characteristics of these activities, as well as the current difficulties to evaluate their innovative activity, the dimensions for said evaluation with the appropriate variables, also, of their scales and measures.

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6. Methodology for the identification of variables, scales, and measures to evaluate the innovation of products and services

Identify the variables, scales and measures that allow evaluating the innovation of products and services in organizations, requires, in principle, qualitative research of an exploratory type that gives answers to "What" and "Which" are the most appropriate in each context, managing to identify characteristics, properties, and techniques for gathering information to assess the variables. Here, a case study is proposed as a methodology to develop these activities.

According to Yin (2009), the case study is an empirical investigation that studies a contemporary phenomenon within its real-life context, especially when the boundaries between the phenomenon and its context are not evident. A case study investigation successfully deals with a technically distinctive situation in which there are many more variables of interest than observational data; and, as a result, it is based on multiple sources of evidence, it benefits from the previous development of theoretical propositions, which in this thematic corresponds to the identification and theoretical determination of the variables, to the collection and analysis of data (Yacuzzi, 2005) . The methodological procedure proposed to be followed for the realization of this type of case study includes the following three phases (Alegre, Lapiedra and Chiva, 2006, Hannachi, 2015b, Yin 2013):

Phase 1: Review of the literature

The review of the literature must be dynamic, feeding back the research as it progresses, including the following steps:

a) Case Selection: The selection of cases becomes important for the theoretical construction, the number of cases to be studied in research is not defined, according to Eisenhardt (1989), there is no ideal number of cases. In each situation, the researcher must choose the number of cases that allows him to obtain relevant data for each organization.

b) Design of Instruments: The case study requires the formalization of the tasks, instruments, and procedures that will be executed. The case study protocol becomes the document in which the research design materializes (Martínez, 2006). Semistructured interviews, where the interviewer displays a mixed strategy, alternating structured questions with spontaneous questions, allows for comparisons thanks to the detailed part of the responses of the different interviewees, while the free part allows delving into the specific characteristics of the interviewee, This allows greater freedom and flexibility in obtaining information pertinent to the problem. These interviews are aimed at the experts involved in evaluating the innovation of products and services in the company under study. Additionally, the works of Alegre et al. (2006a) and Hannachi (2015a) allow proposing variables that influence the innovation of products and services in an

organization.

Phase 2: Determine the variables

a) Obtaining the data: Yin (2009b) recommends the use of multiple data sources and compliance with the triangulation principle to guarantee the internal validity of the research. This allows us to verify if the data obtained through the works of Alegre et al. (2006a) and Hannachi (2015a) and the different sources of information are related to each other (triangulation principle) (Martínez, 2006).

b) Tabulation and interpretation of the data: The tabulation of the data obtained from the primary and secondary sources tabulate using an office spreadsheet tool using functionalities such as dynamic tables. Likewise, computer tools will be used for semantic analysis such as Atlas.ti, whose objective is to facilitate the qualitative analysis of, mainly, large volumes of textual data and subsequently its interpretation as detailed by Fernández (2006).

Phase 3: Evaluate the variables

a) Global analysis: Consists of the constant comparison of the literature with the data obtained for the codification of the same. For the analysis it is recommended: The use of codes to organize the collected data (Strauss and Corbin, 2002), for the transcriptions and field notes, to make repeated readings (Easterby-Smith, 1991), finally, a constant comparison must be made between the concepts suggested by literature and the codes and categories that emerge from the data collected (Glaser and Strauss, 1967).

b) Theoretical construction: Once the previous stage has been developed, an analysis of the information is carried out, with the purpose of interpreting the relationships found between the variables established based on the theoretical framework (Variables) and the codes and categories obtained in the global analysis Trying to explain why such relationships exist leads to an understanding of the phenomenon studied (Conceptualización (Martínez, 2006)). The interaction between the conceptual framework and the dynamics of the research provides the opportunity to generate theory and knowledge (Cepeda, 2006).

c) General conclusions and implications of the research: carried out the global analysis and the theoretical construction with its possible refinements and corrections, the general conclusions of the study are obtained and the results are reported. That in this type of research corresponds to the variables that influence the innovation of products and services in the organization, with their respective scales and valuation measures.

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7. Conclusions

A characteristic common to all innovations is that to be identified as innovations they must be introduced in the market as is the case of product innovation, or they must be applied in the operations of the company in the case of innovations in processes, methods of organization and marketing.

Few studies compare the innovative performance of countries based on standardized indicators, most of the studies are limited to comparisons of developed countries or comparisons of countries belonging to the same geographical region. There is still no regular publication of detailed and combined results of innovation surveys developed within and outside the EU or of studies comparing the innovative performance of countries from different regions or at different stages of development.

The state of the art in the evaluation of innovation indicators is still based on data from scientific and technological activities. Limitations and gaps are identified in the knowledge and use of instruments that allow evaluating the innovation of products and services in the organizations of the region, which generates a negative impact on the competitiveness and growth of organizations.

Therefore, in cities oriented to the services sector it is important to advance in the identification and evaluation of the variables, scales and measures that influence the innovation of products and services in organizations in general and especially in

organizations, to identify their own activities of the development of products and services, the characteristics of these activities, as well as the current difficulties to evaluate their innovative activity.

Through the case study and based on the work of Alegre, Lapiedra and Chiva (2006) and Hannachi (2015), the variables that influence the innovation of products and services in an organization of the telecommunications sector in Medellín, Colombia, are identified, in addition to the scales and measures to assess them. In this type of research case study is used, this methodology allows to develop a holistic and contextualized analysis taking into account the complexity of the system of variables that make up the problem.

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