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An approach between tools for the analysis of tendencies and business innovation management*

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Abstract

Currently, there is a number of tools which allow analyzing information-based behavioral patterns; in the specific case of this article, the analysis of tendencies will be highlighted not only as a tool to predict the behavior of prices in order to measure and process financial market information but also, in a wider standpoint, to take tendencies as a tool to analyze the behavior of certain elements within a specific environment and period of time. Accordingly, the article is intended to set the theoretical, conceptual, and contextual basis necessary to perform the analysis of tendencies through the combination of a monitoring system and an observatory intended to organize, quantify, process, and use information as an indispensable element to implement innovation in the business field.

Key words: analysis of tendencies; decision making; monitoring; observatory.

Aproximación entre herramientas para el análisis de tendencias y la gestión de innovación empresarial

Resumen

Existen en la actualidad herramientas que permiten analizar patrones de conducta o actuación basados en información, en el caso particular de este

artículo, se resaltaré el análisis de tendencias no como una aquella herramienta con la cual se puede predecir el comportamiento de precios para medir y procesar información de los mercados financieros; sino que, y en un sentido más amplio, se toman las tendencias como aquellas que analizan el comportamiento de ciertos elementos en un entorno y período determinado. En este sentido, se busca establecer los fundamentos teóricos, conceptuales y contextuales suficientes para el análisis de tendencias mediante la combinación de un sistema de vigilancia y un observatorio que permitan organizar, cuantificar, procesar y disponer de información como elemento indispensable para implementar innovaciones en el ámbito empresarial.

Palabras clave: análisis de tendencias, toma de decisiones, vigilancia, observatorio.

Aproximação entre ferramentas para a análise de tendências e a gestão de inovação empresarial

Resumo

Existem na atualidade ferramentas que permitem analisar padrões de conduta ou atuação baseados em informação, no caso particular deste artigo, se ressaltará a análise de tendências não como uma aquela ferramenta com a qual se pode prever o comportamento de preços para medir e processar

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informação dos mercados financeiros; senão que, e em um sentido mais amplo, se tomam as tendências como aquelas que analisam o comportamento de certos elementos em um entorno e período determinado. Neste sentido, se busca estabelecer os fundamentos teóricos, conceituais e contextuais suficientes para a análise de tendências mediante a combinação de um sistema de vigilância e um

observatório que permitam organizar, quantificar, processar e dispor de informação como elemento indispensável para implementar inovações no âmbito empresarial.

Palavras chave: análise de tendências, toma de decisões, vigilância, observatório.

Introduction

Organizations have been affected locally, nationally, and globally for the competition seen today; competition entails not only low prices or quality to survive in the market but also the innovation capacity of the companies to introduce new or improved products and/or services (Arango, Tamayo, and Fadul, 2012). Therefore, and based on the permanent technological changes observed among companies, the ones located in the south area of Aburrá Valley demand a new approach to design, planning, and implementation of monitoring systems which allow them to: 1) quickly analyze the information; 2) obtain useful results for making practical decisions; 3) gain specific characterization on information; 4) manage free-access information sources; 5) have moderate planning and execution times with the purpose of generating permanent innovation and improvement processes. As a way of gaining competitiveness and being updated in all changes seen inside and outside their geographic environment and its business environment, organizations should understand that monitoring can be used to lead their strategic and competitive intelligence lines and that, as an information management tool (Grossa, 2006), it should be thought as an integral part of their processes, in conjunction with their human talent, project management system, quality, and indicators (Delgado-Fernández et al., 2011).

Hence, the companies located in the south area of Aburrá Valley should understand that their activity and competitiveness within their market require the construction and identification of complex competition involving the development of new skills relating to observation, treatment, and analysis of information as an input towards

the decision-making process of each organization today and in the future (Garcés, 2014).. To achieve this, there are powerful monitoring tools which allow analyzing market tendencies through information management as a way of making intelligent decisions based on such information, anticipating threats and detecting opportunities (Angulo & Díez-Manjarrés, 2010).

By analyzing the conceptualization associated to the analysis of tendencies through a monitoring tool, it can be affirmed that its implementation would allow organizing, quantifying, processing, and using information as a useful element towards the development of innovation, based on the behavior of information (tendencies) for making strategic decisions concerning vulnerabilities, threats, and opportunities of organizations (Castellanos et al., 2011). It should be noted that there is a certain relationship between the analysis of tendencies—with the use of monitoring tools with technological approach- and the development of innovation, this latter being necessary for the survival of all kind of organizations.

In the search for the inclusion of companies (located in the south area of Aburrá Valley) in these market and monitoring dynamic, it is necessary to set the means or channels to integrate the information resulting from the monitoring process in a sole place; for this reason, an observatory is a timely means or instrument to capture and strategically process information (Albornoz & Herschmann, 2006; Angulo, 2009; Barbosa, 2005; Lorenzo & Cárdenas, 2011; Moreno-Espino, Carrasco, Rosete & Delgado, 2013; Observatory Innovation, 2015); an instrument that, in our context and specifically for the support of business innovation, has only be limited to provide CT+i advance indicators in public politics nationally and locally, as in

the case of “Observatorio Colombiano de Ciencia y Tecnología – OCyT” located in Bogotá (Colombia) (Observatorio Colombiano de Ciencia y Tecnología, 2011) and CT+I Observatory located in Medellín, which was introduced by RUTA N last July 2015 (Ruta N, 2015). Despite their importance for the country and the municipalities comprising the Metropolitan Area of Aburrá Valley, these tools do not specifically perform the analysis of information used as a contribution to the development of a geographic area or a specific business sector and do not specifically fulfill the industrial or academic needs observed in the south area of Aburrá Valley to support an extremely significant issue such as innovation (Castellanos et al., 2011).

The proposal is to design a monitoring system at a higher education institution, intended to analyze tendencies by using the Observatory Instrument for the input and output of strategic information to be implemented by the companies located in the south area of Aburrá Valley.

Monitoring system for the analysis of tendencies

Evolution of Information and Communication Technologies (ICTs) has allowed having access to a significant amount of available information; access that through a proper processing can be used to gain knowledge for making decisions on any kind of activity or organization (Gándara, Mathison, Primera, & García, 2007).

A correct processing may add value to such information so that it can be strategically useful for making decisions on innovation and competitiveness. This information, as well as the knowledge people can gain from it, serves as input to strengthen the development of productive and business systems (Castellanos et al., 2011).

For the abovementioned, a number of tools - in conjunction with an adequate structure adjusted to each type of need - which allow the analysis of information-based behavioral patterns (analysis of tendencies) have been developed in the world; in this case, benchmarking can be mentioned as a tool to permanently measure and

compare business processes of an organization against processes of leaders at any place of the world, by using analysis of tendencies for improving organizational processes based on the application of successful practices (better practices of competitors) (Intxaurburu & Ochoa, 2005). This tool is mainly focused on qualitative information and has been addressed from several environments, keeping a homogeneous application (Castellanos et al., 2011).

Monitoring is another tool that helps knowing where a topic is being driven and which its potential evolution in the future could be; this tool can have different classifications. According to its form, there are two types of monitoring tools: passive monitoring (scanning) or active monitoring; according to its focus, there are other types of monitoring tools: scientific-technological monitoring; legal monitoring; cultural monitoring; social monitoring; competitors' monitoring; market monitoring; customers' monitoring; regulatory monitoring; suppliers' monitoring; among others (Ministry of Agriculture and Rural Development, 2008).

This tool, which has been operated through quantitative methods, allows the identification of tendencies in different environments by permanent, systemic, and organized collection of information which may be relevant for the decision-making process outside and inside the organizations (Gómez, 2012). This is an expression of the power of results that can be obtained with the use of this tool; even different publications show the functions and characteristics a monitoring system should have, mainly focused on the business environment. There are also companies and institutions worldwide that are devoted to specifically work in this task; despite there are general methodological proposals on how to execute a monitoring process (including resulting reports), there is not a specific methodology that includes specificities of information in each region and specific environment with concrete description and recommendations for the main sources of information in this area (Gómez, 2012).

It is then necessary to understand that, despite the functionality of this tool, characterization and uniformity of its execution have not been

possible; for this reason, authors such as Castellanos et al. (2011) have set a supplementary classification that, according to the importance of its results and the investment in time and results, allows obtaining general, specific, and/or dynamic

tendencies. Table 1 shows such classification a classification of relevance since it shows the scope and the approach of the tools that display different focuses and purposes, despite their close relationship:

Table 1. Classification of Sub-Tools for the Analysis of Tendencies from a “Monitoring” Tool

Sub-Tools that Show Tendencies Criteria	Scanning	Vigilance	Monitoring
Execution Time	- Short	- Medium	-Long, understood as a permanent process
Degree of depth and results	- Moderate depth. -Quick and useful results for practical decision making. -General tendencies.	-Moderate-High depth. -Concrete results on emerging and falling aspects or areas; leaders of the environment and competitors.	-High depth. -Main results arise from the identification of Investment Areas and R&D, alliances, cooperation networks, organizational and commercial strategies, among others. -It determines the moment when available resources are sufficient and are well used, and current status of technology as support for the acquisition of equipment or technological transfer processes.
Execution frequency	- Sporadic. -General characterization.	- Sporadic. -Specific characterization.	- Periodic. -Specific and permanent evaluation of aspects identified in advance and with a better interest of the productive system.
Required structure (staff resources, infrastructure, information, software, among others).	-Temporary. - Management of information sources, free access generally. - Generally structured information. - Management of basic software.	- Temporary and/or fixed. -Management of information sources, paid and free access. - Structured and/or non-structured information. - Management of special and/or free software.	-Fixed; suggesting the development of management units (can be outsourced). -Management of information sources, paid and free access; with warning systems preferably. -Management of structured and/or non-structured information. -Management of information technology tools for basic and/or special analysis.

Source: Adjusted from contribution of Castellanos et al. (2011).

From table above it is possible to establish that what is known as monitoring in relation to the analysis of tendencies contains several specific categories: scanning, vigilance, and monitoring; it is necessary then the know its operation in order to clearly set its scope.

On the other hand, it is worth saying that a tendency has been associated to the study of markets intended to establish the behavior

of prices and then make purchase and sale decisions based on results. However, tendency does not only involve measurement and processing of information of financial markets; in a wider sense, tendencies are used to analyze behavioral patterns of certain elements within a specific environment and during a specific period of time. In this sense, the term “analysis of tendencies,” as set by Castellanos et al. (2011) refers to the concept

of collecting information and establish pattern, dynamics or behavior from the processing of such information.

Therefore, this tool has been useful for identifying past and present behaviors detecting significant changes that can impact on the direction of actions to be executed in the future. The analysis of tendencies allow gathering information in order to find a greater knowledge towards innovation since this allows evaluating the potential impact of a fact or change on the environment because most information necessary for capturing new ideas and new results if found within the environment and are used to generate innovation as a fundamental element for the business environment (Jiménez & Morales, 2007). Accordingly, Avendaño (2012) affirms that one cannot understand how a company can progress and think about its growth and development without incorporating innovation in the different levels of the organization disregarding the type of company; innovation is then understood as the introduction of a new or significantly improved product or process in the market or as the development of new organization and marketing techniques (OCDE, 2005); this process requires management, processing, and analysis of information in a strategic manner.

In order to analyze tendencies for innovation, a company should have the following resources: information, human asset, and methodologies; these resources allow planning, coordinating, and processing information. For this purpose, the use of the following techniques becomes necessary: bibliometrics, scientometrics, informetrics, cybermetrics, patentometrics (Valdés Torres & Soriano Santa, 2013); each of them with specific topics and functions.

Observatories

In a globalized world, innovation, knowledge, and technology are deemed important sources for a country's economic growth, for its industry, and for the support of development and competitiveness. For this reason, countries and companies worldwide have made efforts to manage their investment policies to support

science, technology, and innovation (Ohayon, Barreiros & Ghavami, 2014). However, as an attempt to guide decision makers in relation to the application of resources, some tools aimed to a set of actions intended to set a behavior through the analysis of trends have been adopted to process and spread information and knowledge in order to make decisions through a number of elements involved in organizational processes. In this regard, Ohayon et al. (2014) affirmed that "through a certain type of "intelligence" observatories allow coordinating, adding, organizing, and performing management to a wide number of data from different sources (local, national, and international) in order to assure decision making".

Accordingly, and after knowing the function of observatories, it is important to know this instrument since its own origin; this instrument is being spread and used worldwide in public and private sectors.

Despite its origin has been associated to astronomic observatories, its origin dates back to the 18th century (Albornoz & Herschmann, 2006) but there are other observatories with a different function since the 70's and 80's addressed to social and economic matters in Europe (Phélan, 2007). According to Barbosa (2005), these periods have come marked by a number of economic and financial aid provided by member countries of the European Union where "one of the main objectives of observatories, when emerged, was to supervise compliance with norms, as a kind of control and supervision instrument." Walteros (2008) stated that "observatories are a European phenomenon with a relatively recent origin, created to perform an observation and monitoring role".

According to Martins (2007), the expansion of observatories has resulted from the spread of Internet and World Wide Web. Besides, Phélan (2007) mentioned the work of Soja and Urca (1991) (start of observatory expansion), stating that "observatories are a tool used to collect, prepare, an analyze data and economic, social, and territorial information, with the purpose of observing urban conditions and current transformations and facilitating the

decision-making process.” In this text, Soja and Urca refer to the role of observatories for data processing, integration of information from different sources for the interpretation of the most significant facts, and creation of “specific indicators” (Phélan, 2007).

Several aspects highlighted by Soja and Urca were revalidated three years later at a Conference held by UNESCO in Morocco. The idea of observatories as a supporting tool for the decision-making process was expressed in such event entitled “Development Observatories and Environment: An Information and Decision-Making Tool.” One of the conclusions in such initiative shows that the main reason to create an observatory is to provide products that can meet users’ demand and can be used to support the decision-making process, quoting the indicators, among other products (UNESCO, 1994). After this reflection, the first contemporary observatories were intended to manage information through indicators; a fact that highlights the work addressed to those who are looking for specific and synthetic relevant information. It is worth saying that creation and use of indicators imply methodological developments but do not exceed the strictly informational character of observatories at that time (Leopoldino, Selig, Netto, and Helou, 2013).

Quantitative and qualitative growth of the “movement of observatories” does not stop and has increased during the first decade of year 2000 in the European continent and other regions. Madsen (2008) mentioned 25 observatories created in South America, Nicaragua, and Mexico and established that 84% of them have been operated since year 2000. Botero and Quiroz (2010) analyzed 26 observatories in Medellin City (Colombia), and found that 88% of them were created in 2001 and have been in full effect until 2000. Schommer, Moraes, Nunes & Claudino (2011) studied 20 Brazilian social observatories and found that all of them were created from 2006 (65% between 2009 and 2010).

Damas and Christofolletti (2006) remarked that observatories are “a recent emergence to be exploited.” That is, observatories are going through a process of evolution and

conceptual maturity. Martins (2007) affirms that observatories show different standpoints, purposes, activities, and conceptual descriptions. Their simple role of information collector and data and indicator repository is not longer their principal focus and their action horizon has changed but keeping within a process of permanent construction and definition (Martins, 2007). Modern observatories exhibit a multifunctional feature and their profile is structured from the association of variables needed for the decision-making process (Rebouças & Cunha, 2010).

Observatories are divided into two groups (territorial and thematic observatories) (Santoro and Xavier, 2009). Territorial observatories refer to the action within a specific geographic zone, generally a country, a city or a region. Thematic observatories (or sector observatories) are focused on facing specific areas of social, political, and economic life, without space restrictions. However, some observatories combine both characteristics and work on a specific theme within a specific territory (Santoro and Xavier, 2009).

It is clearly seen that in a society more and more information and knowledge are produced and consumed and observatories have been spreading worldwide, and typological diversity has been set as one of their main characteristics. There is not a unique observatory model; there are some differences concerning origin, theme, goals (objectives), methods, products and services, organizational structure, work scope, administrative responsibility, funding sources, development stage, among other points (Albornoz y Herschmann, 2006).

Table 2 below shows different territorial observatories that fulfill their mission to keep CT+i indicators of a specific territory updated.

Table 2 shows that national or territorial observatories are focused on indicators and cooperation and show a lower interest in the support of innovation in practical terms and transfer of knowledge.

In relation to sector or thematic observatories, there are different types in the country and worldwide, including areas such as work,

Table 2. Focus of Territorial Observatories

ORGANIZATION	COUNTRY	FOCUS						
		INDICATORS	COOPERATION	NETWORK	DEVELOPMENT OF SKILLS	INNOVATION SUPPORT	INTERACTION WITH INDUSTRY	STUDIES TRANSFER OF KNOWLEDGE
Ministry of Science, Technology and Innovation	Brazil	X	X			X		X
National Commission for Scientific and Technological Research	Chile	X	X				X	X
Colombian Observatory of Science and Technology	Colombia	X	X					X
Integrated Information System on Scientific Research, Technological Development, and Innovation	Mexico	X		X				X
Observatory of Scientific and Technological Prospection	Argentina	X	X				X	X
National Observatory of Science, Technology and Innovation	Venezuela	X	X	X		X		X
Ibero-American Network of Science and Technology	England	X						X
Institute of Documentary Studies on Science and Technology	Spain	X	X				X	X
Observatoire des Sciences et des Techniques	France	X	X	X	X		X	X
Planning, Strategy, Evaluation, and International Relations Office	Portugal	X						X

Source: Adjusted from Ohayon et al. (2014).

technology, science, commerce, health, human rights, sports, ICTs, environment, volcanology, sustainable development, public policies, road security, crime observation, child welfare, and some others; despite they have a different focus, most of them share a principal objective: to collect timely and reliable information to be on the cutting edge and make timely decisions (Albornoz & Herschmann, 2006; De Souza and Silva, 2005; Phélan, 2007; Schommer et al., 2011). They also share some specific objectives, including the generation and the analysis of information which allow them to identify opportunities and threats in relevant topics and scientific, technological, and innovation advances.

As a way of having a clear definition of an observatory, Table 3 below shows a classification according to the concepts found in scientific literature.

From the conceptual classification relating to observatories (Table 3), a coincidence has been found with Angulo (2009) affirming that there is not a clear definition; observatories show different and inaccurate definitions since from the authors cited above, 5 of them have defined it as an instrument that provides strategic information intended to identify threats, opportunities, and trends and to offer support for the decision making process in a specific industry within a region, a country or worldwide, in the search for a better development and competitiveness; 4 of them have defined it as an organizational structure created to execute a specific function. Some other authors have defined it as a tool or methodology used to observe trends. For the specific case of this revision, the elements seen as instrument and organizational structure are taken and combined with a monitoring tool to perform an analysis of trends and support the generation of innovation at companies under study.

Table 3. Observatory Definitions (concepts found in scientific literature)

AUTHOR AND YEAR	DEFINITION			
	INSTRUMENT	TOOL	METHODOLOGY	ORGANIZATIONAL STRUCTURE
Maiorano, 2003				X
Sepúlveda	X		X	
Patiño, 2007				X
Phélan, 2007				X
Walteros, 2008	X			
Trzeciak, 2009	X			
Botero & Quiroz, 2010	X	X		
Enjuto, 2008				X
Barrios, Torrelli, Bergonsi, & Balhs, 2006	X			
Gregorio, 2007			X	

Source: Own preparation from revision of literature.

Conclusions

Several observatories and monitoring systems are found today; they are seen as specific observatories according to their objectives and the environment in which they develop. For this reason, this is an important project that will allow having a very clear and strategic objective for companies: to contribute to the development of innovation.

Conceptualization and thematic clearness of monitoring system and observatory (tools) are fundamental for their analysis, management, and implementation since such clearness is needed to structure a platform to combine them and give them a strategic functionality for the higher education institutions and companies.

This is intended to make the combination of a monitoring system and an observatory real and operational. This combination is seen as a new field to be explored with a good opportunity to perform collaborative work between a company and a higher education institution.

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