



DYNAMIC MODEL FOR THE KNOWLEDGE MANAGEMENT AND MEASUREMENT OF INTELLECTUAL CAPITAL IN SERVICES COMPANIES

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ABSTRACT

Purpose: The purpose of this paper was to design and apply a model for the management of knowledge and measurement of intellectual capital in the Banco Bilbao Vizcaya Argentaria (BBVA), Colombia's network of Commercial Banking Offices in North Bogotá, Colombia, in order to improve the commercial results of its offices.

Design/methodology/approach: To develop the conceptual model we used the soft systems methodology, and the validation and evaluation of the model was based on the integration of systems dynamics with the balanced scorecard.

Originality/value: The contribution of the model was the incorporation of 30 unpublished indicators for the measurement of intellectual capital, which established the relationship of these new indicators of knowledge with the traditional indicators of management of the basic processes of the office network.

Practical implications: The proposed model allowed the demonstration of the contribution of knowledge as an intangible asset capable of generating competitive advantages for service offices in this area. Also, it verified the importance of the processes related to the knowledge and its direct impact on the commercial results of the bank's network of offices.

Keywords: Knowledge management; intellectual capital; commercial income; balanced scorecard; system dynamics; profitability.

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INTRODUCTION

The history of mankind has been closely related to the development of knowledge. In this sense, it can be analysed from the perspective of creation and the transfer of that ancestral knowledge, linked to empiricism, which, through the advance of science and technology, have allowed us to achieve what is called the knowledge society.

The production of goods and services does not escape this permanent evolution. Thus, knowledge management (KM) has emerged as a powerful tool or strategy to facilitate the increase of competitiveness and sustainability of business organisations. Some positions put forward by different authors point to this new perspective, stating that the management approaches of Porter's competitive forces are not capable of explaining this alone, that is, how companies can achieve competitive advantage in complex and constantly changing environments (Teece, 2013). However, new approaches to the issue of resources and capabilities that generate greater competitive advantages to organisations begin to take hold.

As for the models of KM, this is in a few managerial and academic literatures; however, these are mostly generic, designed in a corporate context and based on little empirical evidence regarding their measurable impacts of tangible or intangible type. According to the OECD (2003), KM involves the use of practices that are difficult to observe and manipulate, which are sometimes even unknown to those who intuitively use and possess them.

Therefore, these reasons have motivated an interest to deepen the study of the relationship between knowledge management and the possible effects of this knowledge management on the commercial results in organisations.

FUNDAMENTALS OF KNOWLEDGE MANAGEMENT

Knowledge as a strategic resource

The different disciplines focussed on the study of organisations have been tackling knowledge management for decades from different perspectives. These have included the critical aspects of their management, adaptation to the changes and their competitiveness. In a global environment, where markets, products, technologies, competitors, legislations and societies as a whole change at a high speed, continuous innovation and the knowledge that makes innovation possible have become important sources for the survival and sustainability of competitive advantage for a company, region or society.

In this context, it is reaffirmed that knowledge, the ability to create and use it, constitutes the main source of competitive advantage of organisations. In addition, recognition of the importance of knowledge as a strategic resource and a factor of sustainable competitive advantage implies a change in the way organisations are conceived.



Dynamic Model for Knowledge Management

In the theory of organisational knowledge creation, the traditional definition of knowledge is adopted as a certain justified belief. In traditional western epistemology (knowledge theory), certainty is the essential quality of knowledge. However, it is necessary to contemplate the relative, dynamic and humanistic dimensions of the creation of knowledge. Knowledge is specific to the context: it is relational in that it depends on the situation; dynamic, since its creation is based on dynamic social interactions between individuals, groups, organisations and societies; and humanistic since it is essentially related to human activity and rooted in the value systems of people (subjective).

On the other hand, we must take into account the existence of two basic types of knowledge. Explicit knowledge, which can be expressed in a formal and systematic language and, therefore, is possible to process, transmit and store. Tacit knowledge, which has cognitive elements, paradigms, beliefs or perspectives and other elements such as practical experience, skills and informal skills that are difficult to detail. The articulation of tacit mental models is an essential factor in the creation of new knowledge. Both types of knowledge and their interaction must be considered, starting with the individual and advancing to its extension in the group, organisational and social dimension.

The most important aspect of an organisation's dynamism with respect to knowledge is its ability to build new knowledge on a continuous basis. In this sense, the creation of knowledge is conceived as an endless process that is constantly updated.

Knowledge management as a process of generating competitive advantages

Fundamentally, the central factor in the new economy is that the process of wealth creation becomes knowledge and other intangible assets (contacts, creativity, innovation, positioning, and others), much more than capital, capital goods or other physical assets (Argote, 2015).

Knowledge management involves two relevant aspects: On the one hand the idea of management indicates in some way, the organisation, the planning, the direction and the control of processes to conform or to have certain objectives. On the other hand, knowledge manifests itself in an organisation, like any human being, which receives information from both outside and inside and must make a dynamic management to capture, perceive, recognise, organise, store, analyse, evaluate or issue a response, based on all that information and encompassed in the total information stored seeking an outcome.

In the management of knowledge, what matters most is learning. Not surprisingly, one of the most solid trends during the last decade in organisations has been the programmes of staff training and other postulates to team learning (Medina et al., 2014).

In the organisational sphere, human resources have been valued as something dynamic. However, learning ability rather than acquired knowledge is valued more. It is more important to learn, since this means knowing the knowledge, than possessing a



collection of knowledge.

According to Drucker (1994), in our time there has been a transformation in the conception of knowledge. This has changed from a situation applicable to “being” to another applicable to “doing”, that is, a situation related to the intellectual development of the person to another as a factor of production based on its utility. In this sense, knowledge becomes an instrument or means to obtain results and systemic innovation or the definition of new knowledge required, its feasibility and the method to make it effective. To which he adds that the task of making knowledge productive is a task of the administration. Therefore, KM involves its continuous exploitation to develop new and different processes and products within organisations. He adds that organisations must incorporate three systemic practices in knowledge management:

- continuously improve processes and products;
- learning to exploit success;
- learning to innovate.

Intellectual capital

The efforts being made, mainly in the business sector, to develop a methodology capable of expressing the value of the intangible assets of a company are heterogeneous and dispersed. A review of the main authors dedicated to the conceptualisation and measurement of intellectual capital gives an idea of the diversity and multiplicity of efforts that are taking place at the present time. This is why, once again, the problem of a single definition of intellectual capital emerges.

The detailed analysis of the various definitions allows us to obtain some common parameters or traits that define intellectual capital:

- intellectual capital consists of intangible assets;
- intangible assets that make up intellectual capital are “owned” by the company, possess the ability to generate wealth for the company, contain the existing knowledge in the company;
- most authors identify three areas where intangible assets that are relevant to wealth generation are to be found or will reside: in people, in organisational systems and processes, and in the company’s relationships with its environment. The assets located in each of these areas would generate what has been referred to as “human capital”, “organisational capital” and “relational capital”, respectively.

Other considerations should be made on the concept of intellectual capital, especially with regard to the relationship between information and management. On the one hand, there is a coincidence between the definitions of several authors in associating the term knowledge with the term competence (technological, organisational and human competencies), thus establishing information-management relationships with



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strategic management by essential competencies. On the other hand, there is a marked tendency to understand that, to the extent that intellectual capital gives value to existing knowledge in the company, it is a method of measurement and evaluation that is complementary and necessary for knowledge management.

METHODOLOGY FOR MODEL DEVELOPMENT

Designing a model of knowledge management and measurement of intellectual capital for BBVA Colombia's network of Commercial Banking Offices in North Bogotá required disaggregating or separating each tangible and intangible variable, taking into account the strategic factors of the organisation (goals, targets and indicators).

A cause-and-effect model was first established, which served as input for the Vensim PLE v. 6.4 software, the performance of the proposed model of knowledge management and measurement of intellectual capital could be evaluated with real data, in addition to monitoring its implementation. The proposed model is a simplified graphic representation of the strategic objectives of the BBVA Colombia organisation, which is focussed on the network of Commercial Banking offices belonging to the Territorial Bogotá North.

In order to obtain this representation, four main elements were considered: the impact of KM on the results, the contribution of KM to the client, development processes and knowledge growth. Aligning the objectives of these four perspectives was the key to creating value, and, therefore, a focussed and internally consistent strategy.

The empirical study of the research was made based on the selection of the Commercial Banking Offices belonging to the Territorial Bogota Norte in BBVA Colombia. The data for these were collected through conducting two direct surveys, carried out through the application of questionnaires designed for the collection of information. In total, 157 responses were obtained. The corresponding data sheet is shown in Table 1.

Table 1: Technical sheet of empirical research

Universe and field of study	Network of Commercial Banking Offices belonging to the Territorial Bogota Norte in BBVA Colombia.
Sample size	100% plant officials
Method of obtaining the information	Survey to determine the profile of the knowledge management and interview with the key people within the organisation to obtain data of the proposed indicators.
Data treatment	Statistical software SPSS 12, descriptive and factorial analysis. Vensim PLE v. 6.4.
Date of field work	February to November 2015.

Source: DeVised by authors

The objective of the present analysis was to verify the validity of the model. The work was developed in two phases: first, a descriptive and factorial analysis; and secondly, and as the fundamental nucleus of the empirical analysis, the evaluation of the proposed model was applied through the simulation with the tool BSC and the dynamics of systems. This was in order to verify the truthfulness of the proposed cause-effect relationships between the different strategies that compose each axis of the model (Figure 1).

In general terms, the descriptive analysis sought to establish the characteristics of the KM in the network of Commercial Banking Offices belonging to the Territorial North Bogotá in BBVA Colombia, depending on the variables of the model. With the factorial analysis using the maximum likelihood method, the initial amount of information was reduced to make a better exploration of the set of factors representative of the different axes of the model. Both analyses helped to make an initial evaluation of the KM in the network of offices under study; they also facilitated the overall view of the situation and the consideration of the variables most important for the empirical analysis. The evaluation of the KM was responsible for establishing the relationships between the strategies and the overall performance of the offices through the integration of a system of indicators. This analysis of the relationship between the strategies and the performance allowed us to quantify the contribution of KM to the commercial results of the commercial offices of the bank.

Model of knowledge management and intellectual capital measurement in service companies

The model that follows is born from a root definition that explains the contribution of knowledge management to the results of the network of commercial banking offices belonging to the Northern Territory in BBVA Colombia. It also integrates each of the stages through which it crosses the organisational knowledge and its interaction with the clients, so that the results of the knowledge management can be evaluated in the basic processes of the business units. Consequently, the model not only demonstrates the impact of KM in terms of its effect on the business results of the offices, but also contributes to increasing the knowledge assets through its management.

The model of KM and measurement of intellectual capital developed for the network of commercial banking offices belonging to the Territorial Bogotá Norte in BBVA Colombia (Fajardo, 2016), is constituted of four fundamental nodes or axis: knowledge growth, knowledge development, customer contribution, impact in the results and indicators of the model. These are all related to each other but with independent functions. The conceptual model is shown in the following Figure 1:

Dynamic Model for Knowledge Management

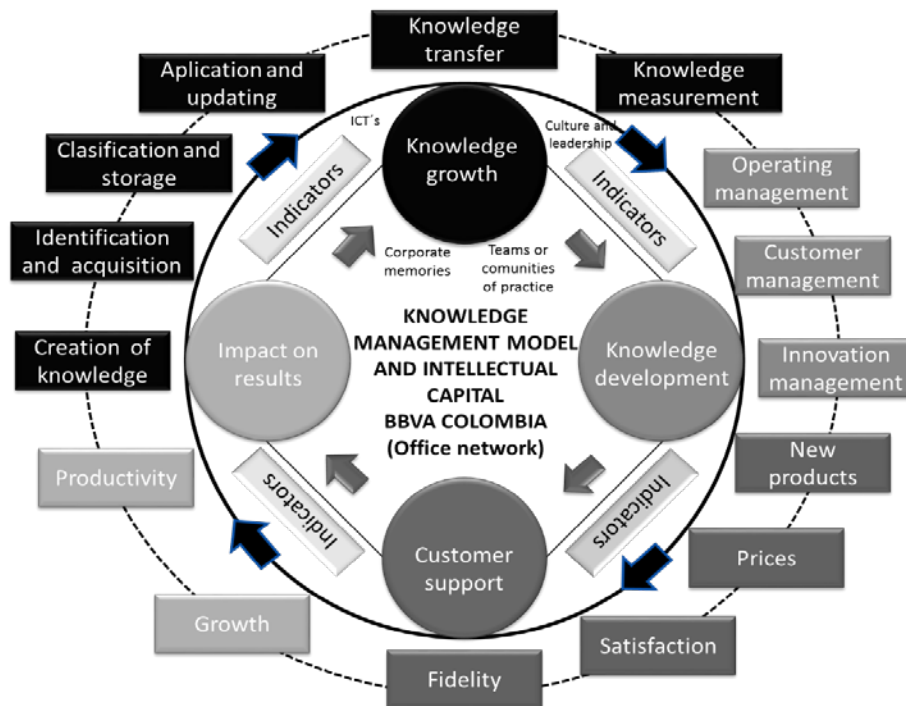


Figure 1: Model of Knowledge Management and Intellectual Capital Measurement - BBVA Colombia Commercial Banking Offices Network of Territorial North Bogotá

Source: DeVised by authors

The first axis is called knowledge growth. It is composed of six dimensions: creation of knowledge, identification and acquisition of knowledge, classification and storage, application of knowledge and updating, transfer and measurement of knowledge. In addition, this node is supported by an internal platform integrated by culture and leadership, teams or communities of practices, corporate memories and information and communication technologies (ICTs).

The second axis is called knowledge development. This is integrated by the basic processes of the offices, operations management, customer management, and innovation management.

The third axis is called customer support. It considers the results of the first two axes and evaluates the strategy of BBVA Colombia for its customers in the following dimensions: new products/services, prices, satisfaction and fidelity.

The fourth axis is called impact on results and is based on two approaches: growth and productivity. This makes it possible to measure the contribution of KM to the commercial results of the offices.

Finally, the indicators of the model constitute the unit of measure of each of the previous axes or nodes, and determines if the KM affects or not the results of the network of offices of commercial banking.

RESULTS OF MODEL VALIDITY

Initial evaluation of the KM in the commercial offices of BBVA Colombia

The field work was developed during the period February to November 2015. During that time, visits were made to the network of Commercial Banking Offices belonging to the Northern Territorial BBVA, Bogotá, Colombia.

Regarding the results obtained with regard to the acquisition of knowledge, it was found that interpersonal dialogue among official's ranks first as a strategy for acquiring knowledge in the branch network (Figure 2).



Figure 2: Knowledge acquisition

Source: DeVised by authors

Likewise, the most used strategy to transfer knowledge was the socialisation that involves sharing experiences, mental models, technical skills through language, observation, imitation and practice. In this case, the key to knowledge acquisition was shared experience (Figure 3). From this point new explicit knowledge is created from the existing knowledge.

On the transfer of knowledge, a gap was found between the training offered and what the network officials really need. From the above, the need arises for a dynamic training system that responds efficiently to the acquisition of new knowledge and the organisation's use of all the human capital that the official believes he can offer.

Dynamic Model for Knowledge Management

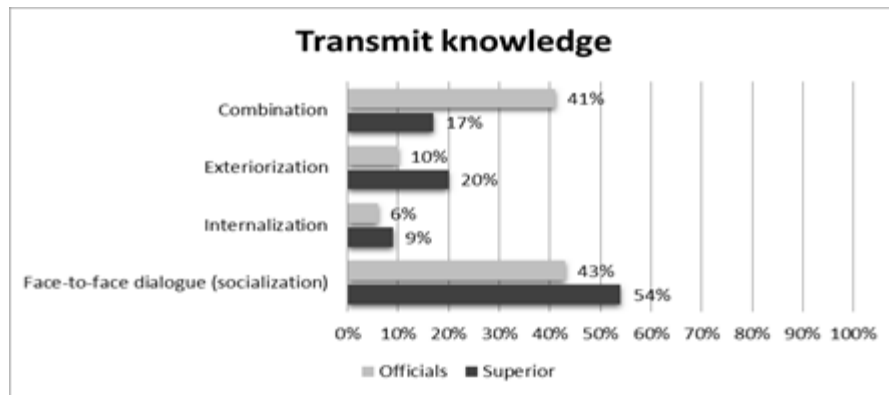


Figure 3: Transmit knowledge

Source: Devised by authors

Factorial analysis of the initial situation KM in the Commercial Offices BBVA Colombia

The results of the second part of the initial evaluation of the KM, the factor analysis, allowed the reduction of the variables of the survey used to assess the perception of the officials regarding the factors: 1) culture and leadership, 2) knowledge development, 3) information and communication technologies (ICTs), 4) development of teamwork and participation of decisions, and 5) policies and performance of offices, and determine the variables with the greatest impact on KM in the office's network.

As a consequence of the application of the factor analysis technique, it was found that KM in the office network is associated with ten factors to explain the variable, allowing the creation of ten dimensions. These are: 1) acquisition of knowledge, 2) classification, storage and protection of knowledge, 3) creation of knowledge, 4) remuneration, 5) leadership, 6) ICTs, 7) efficiency, 8) perception of training, 9) motivation, and 10) participation in decisions.

Assessment strategies knowledge management in Commercial Offices BBVA, Colombia

The purpose of the evaluation of the strategies (objectives and indicators) of KM was to measure the overall performance of the network of Commercial Banking offices belonging to the Territorial North Bogotá in BBVA Colombia, through a system of indicators of the internal support for growth and knowledge development process, contribution of KM to the client, and the impact of KM on results (results of the performance of the offices), using the dynamic balanced scorecard tool (BSC integration with the dynamics of systems).

The objectives of the four stages of the measurement system were established (Table 2), internal support, knowledge growth and knowledge development processes and external support, contribution of knowledge management to the client, and impact of knowledge management in the commercial results.

Table 2: Objectives of the measurement system

<i>Axis</i>	<i>Support</i>	<i>Objectives</i>
Knowledge growth	Internal	<ul style="list-style-type: none"> - Increase knowledge creation - Promote the identification and acquisition of knowledge - Enhance the protection of knowledge - Increase the application of knowledge - Ensure transfer of knowledge - Measuring the growth of knowledge
Knowledge development	Internal	<ul style="list-style-type: none"> - Projects to improve products and/or services - Improve the quality of service - Improve customer service processes
Contribution of knowledge management to the client	External	<ul style="list-style-type: none"> - Increase sales volume - Increase customer satisfaction - Increase customer loyalty
Impact of knowledge management on business results	External	<ul style="list-style-type: none"> - Increase profitability

Source: Devised by authors

The simulation of the present model (Figure 4) analysed two scenarios: 1) without KM practices, and 2) with KM practices.

Initially, the Projects in Execution variable (Figure 5), presents a very similar behaviour during the first months under the two simulated scenarios. However, as the practice of strategic and functional management of knowledge begins to mature within the commercial offices, a dynamic is generated that allows the incubation of new ideas and initiatives that will ultimately improve and optimise the customer service process.

Dynamic Model for Knowledge Management

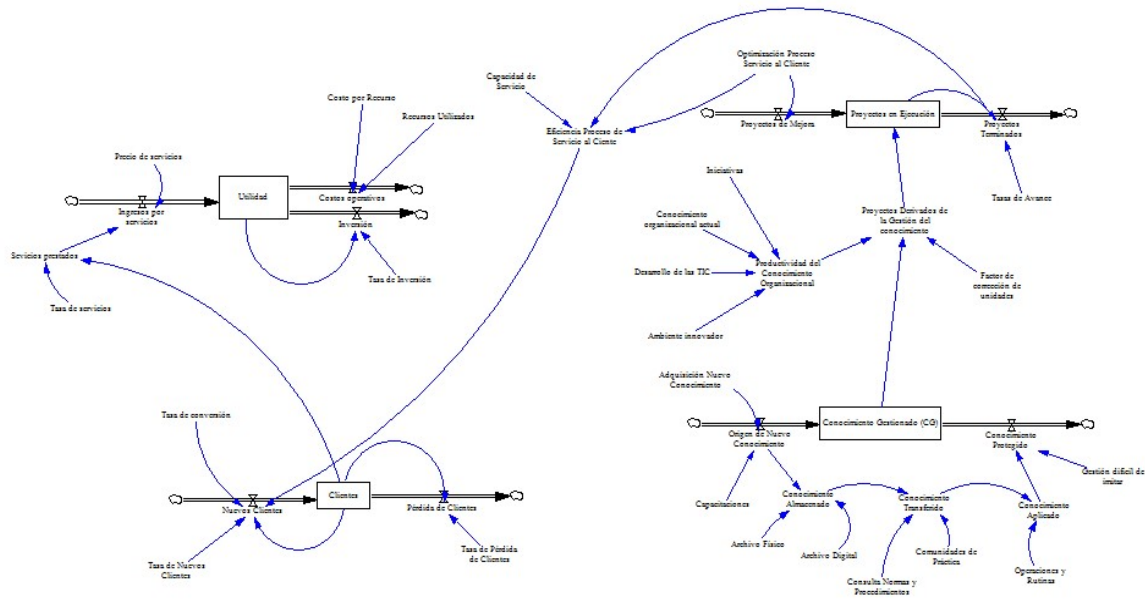


Figure 4: Flow diagram and levels in the model of knowledge management and intellectual capital measurement - BBVA Colombia Commercial Banking Offices Network of Territorial North Bogotá

Source: Devised by authors

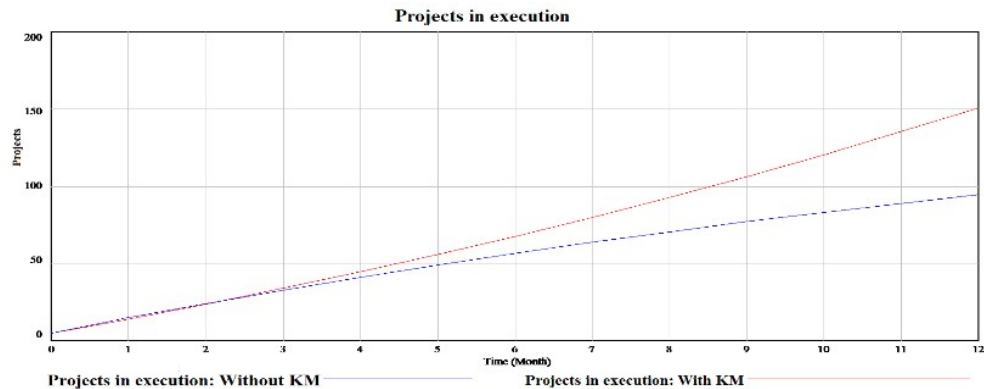


Figure 5: Projects in execution variable in the model of knowledge management and intellectual capital measurement - BBVA Colombia Commercial Banking Offices Network of Territorial North Bogotá

Source: Devised by authors

As for the Clients variable (Figure 6), this indicates a much faster growth with practices of strategic and functional management of knowledge than previously. This was as a result of the initiatives of improvement and optimisation of the process of service to the client in the commercial offices of the bank that were generated from KM. Initiatives to improve and optimise the customer service process acquire greater value for the organisation when, as a result of their implementation, they are loyal to customers and therefore increase the bank's customer base.

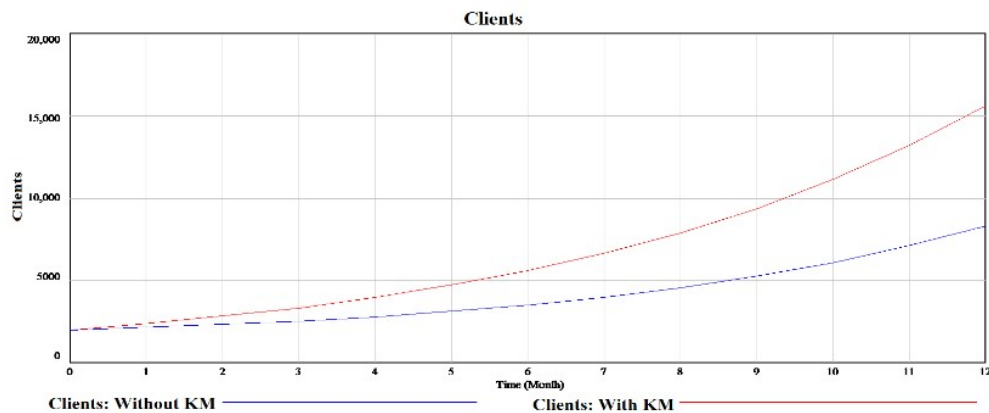


Figure 6: Clients variable in the model of knowledge management and intellectual capital measurement - BBVA Colombia Commercial Banking Offices Network of Territorial North Bogotá

Source: DeVised by authors

Finally, the variable of our interest Utility (Figure 7) presents a significant growth behaviour under the scenario with practices of strategic and functional management of knowledge. This allows us to corroborate the hypothesis of the present investigation, where we affirmed that if the knowledge within the network of Commercial Banking Offices of the Northern Territory in BBVA Colombia was generated in a systematic, structured, organised and controlled manner, it could allow the development of organisational capacities that would contribute to the improvement in the commercial results of these business units.

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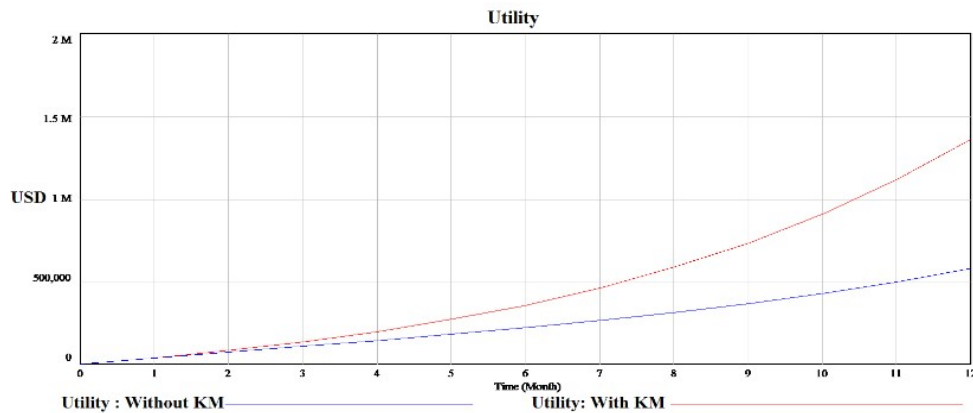


Figure 7: Utilities variable in the model of knowledge management and intellectual capital measurement - BBVA Colombia Commercial Banking Offices Network of Territorial North Bogotá

Source: Devised by authors

CONCLUSIONS

The empirical study allowed us to characterise the way in which knowledge and intellectual capital are managed in the Network of Commercial Banking Offices of the Northern Territory in BBVA Colombia, to analyse the determinant factors related to KM and IC, and to determine the existing causal relationships between KM and IC with the contribution in the business results of the business units.

The application of the methodology carried out in the present investigation as the design and validation of the measurement instruments (surveys and questionnaires), the validation of the model through statistical means and the integration of the tools between BSC and dynamic balanced scorecard to evaluate their performance, allowed us to demonstrate that the practices of KM, together with the proposed indicators for the measurement of intellectual capital, help to manage the most important asset in any organisation, and that has a relationship with the increase of the commercial results.

Finally, the novelty of the model is the incorporation of the proposed indicators for the measurement of intellectual capital. This establishes the relationship of these new indicators of knowledge with the traditional indicators of management of the core processes of office networks. It is also the integration of BSC, systemic thinking and systems dynamics in the analysis of the medium-term effects of the contribution of KM in the function of the commercial results of the bank's commercial offices, becoming a useful tool and powerful support for decision-making in changing environments.

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