Information technology models for the adaptation of the production processes

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Abstract. For an organization it is important to have clearly the objectives, goals and purposes of its business and that all people who are related to it have the same clarity of how the organization works and where it wants to go, for this there are management tools such as the balanced scorecard that along with the control panels can get to have an articulation and better knowledge of the processes that exist within it. A review of the state of the art of the management tool is made to know its components and be able to design a model that fits the experimental farm of the Universidad Francisco de Paula Santander, Ocaña, Colombia, attached to the “Facultad de Ciencias Agrarias y del Ambiente”, to support the administrative process of the same. The balanced scorecard will be taken into account, which is a management tool based on indicators that facilitate the monitoring and achievement of farm objectives, helping the organization to meet its objectives, bearing in mind that the balanced scorecard has 4 important approaches to the process: client, internal processes, innovation and training. For the development of the investigation a methodology with a quantitative approach will be handled where it is tried to know the handling of the processes and to adapt them to the models of government of technologies of the information, with the objective to diagnose and to determine the key indicators of the productive processes of the farm of the university contributing to the continuous improvement.

1. Introduction
The government models are applied to an organization or company to achieve the proposed goals and objectives, taking advantage of resources to the maximum, optimizing results and minimizing risks, for this there are several government models which is a review of state of art of the balanced scorecard methodologies integrated with the control panel to adjust a model design according to the characteristics and processes of the experimental farm of the university also counting with the nursery, which produces different plant species, management techniques, for the quality reproduction of plants.

“La Granja” of the Universidad Francisco de Paula Santander, Ocaña, Colombia, located in the institution's cotton headquarters, has more than 100 hectares with its headquarters in Cesar; the farm manages livestock and productive projects with different species: cattle, pigs, goats, rabbits and poultry. Within the campus are developed projects framed in biosafety and animal bioethics.

The projects have action plans for their respective activities, but we want to design a balanced scorecard to articulate all the strategies in a single tool that shows or reports the movements of the decision-making processes, contributing and articulating the different professions such as technology and agriculture in a single purpose, but for this we must have clarity in the tools such as the balanced scorecard and control panel for an adequate design.
2. Developing

The origins of the “cuadro de mando integral (CMI)” arise in the 1990s when the company “KPMG” funded a study on "performance measurement in the company of the future", developed by the belief that existing methods that depended on financial valuations, were not giving the expected results to the needs of companies, as the measurements hindered the capacity and ability of them, in the process of value creation, a study conducted by [1]. In 1993 the CMI evolved from the measurement system, to a system capable of communicating and aligning the companies with the strategies defined leaving behind the traditional methods [2].

Balanced scorecard (BSC) or CMI, based on work done for a semiconductor company. [1] see the balanced scorecard as an administrative system. It encompasses more than the financial perspective [3] see Figure 1. [1] created a model with four perspectives for the strategic direction of an organization which includes the financial perspective, the economic part of the company, the internal process of the business, the processes that must be improved, the clients, to whom the service is directed, and innovation, learning and development.

![Figure 1. Perspectives of the Balanced Scorecard [3].](image)

Another important model in this research is the control panel that [4] defines as "a set of indicators whose periodic monitoring will allow to have a better knowledge of the situation of the company or sector backed by new information technologies”.

At first glance, it can be said that the balanced scorecard and the control boards can be the same, but in fact, they have their differences. One of them is that the control board is oriented to the diagnosis, while the balance board equilibrium is oriented to the alignment of the company's objectives. Therefore, the two models do not compete with each other. They can be complemented by the choice, design, and appropriate implementation of a model in accordance with the specifications of a company [4].

In addition to the principles of [1], the term dashboard is used as a set of tools that support the processes of the organization that generates indicators key performance indicators (KPI) or performance indicators [3].

According to [5] implement a control panel which comes precisely with the objective of compiling the technical and strategic data, presenting them in an easy to use the platform and using a series of
graphics and financial tools, to facilitate the manager in making decisions. It is important to note that, in addition to compiling and presenting the data, the control panel gives the possibility of comparing several parameters of the nuclear area with those of “mirror” of the companies, which allows a clear comparison and easy efficiency of the company with others from the same industrial sector. In this way, the effectiveness of the control panel is visible as a management tool and can be used by any company, public or private, and even by entrepreneurs who want to improve and optimize their management through the use of their indicators and goals.

**Figure 2. Differences of BSC and control board.**

In the Figure 2 the dashboard serves an organization to have controls and make decisions about a particular event, the balanced scorecard reflects the strategies that must be taken in the organization according to the objective of the same [4].

Other authors define it as the set of indicators whose periodic scope will allow to count on a greater knowledge of the environment of the company, its design begins with the identification of key areas, that is to say, those relevant subjects to monitor and whose constant negative situation would impede the continuity and the progress of the company [6].

Well-distributed indicators for the perspectives described, in order to measure the objectives established in the organization's strategic map, accompanied by alarms that can be in colors or numbers indicating the level of success or negative level of the decision-making process [7].

2.1. Types of control boards
The control panels make it possible to carry out a real-time diagnosis of everything that happens in the organization and warn about the level of fulfillment -indicators- of goals, for generate improvement actions [8]. Given the different needs of the companies, four generic types of boards can be applied: operative control board, executive control board, strategic control board, integral control board [9].

2.2. Indicators key performance indicators
Some authors define it as a dimension that expresses the behavior, performance or impact of a process, which when compared with some reference allows to detect the behavior and progress of the process [10]. They are key performance indicators that are determinant to quickly analyze the progress of the business which allow decisions to be made [11].

2.3. Keys to identify the indicators key performance indicators
Define a business process in advance, define the objectives and performance required in the business process, define the quantitative/qualitative measure of the results and it is recommended to compare them with the objectives, adjust processes or resources to achieve short-term goals [12].
To implement the control boards you must have, in addition to the bases, certain elements to carry out this work. There are three questions that are fundamental and have to be clear: What Information? To whom? How to present the information? [12].

National background: The control panel is an important source of information; most of the instruments in a control panel will have some kind of warning. An example of this is an indicator represented by a red light or by an alarm that sounds when something goes wrong [13].

The radar function in the control panel represents the practice of a company to proactively detect cost-related issues and other financial information in order to support the management of achieving the strategic objectives of the company. Accounting provides information, not only about where the business is located but also about where it is going and the associated risks [13].

According to [14] a control panel was structured in the form of a flight simulator game of the type used by sterman, this type of modeling increases the understanding of the environment, since it allows players to experiment and explore different solutions strategic. The model and control panel of the flight simulator were built through powersim studio 10 software.

With the balanced scorecard, a strategic management tool was developed to help the company's mission. And the strategy is transformed into precise metrics. So the balanced scorecard expresses the common vision of an organization out [15].

The central hypothesis of the balanced scorecard states that the generation of profitability for shareholders is based on the creation of value for clients, which depends, in turn, on performance in critical processes to generate this value, based on the human, structural and technological capabilities of the organization. This dynamic is developed through the cause-effect relationships between the four perspectives of the model. These are discussed in the following section [16].

It is important to emphasize that a control panel is the way to present the indicators, they must contain eye-catching graphics that attract the reader's attention, are easy to understand for those who observe them, and show all the information that you want to measure or evaluate in an organized way [17].

2.4. Perspectives of the balanced scorecard
The perspective financial. Indicators are indispensable for assessing business performance. Just they can inform the managers about the company’s capability of creating value and allow them to check whether any employed measures contributed to the creation of value. Their main shortcoming is the fact that financial information reflects the results of managerial decisions made in the previous period and that their evolution is influenced by a number of factors that cannot be specified [18].

The perspective of the client. The organization identifies its clients and the market where it will compete, this represents the sources that will provide its income and the goal of the company's objectives [19].

The perspective of processes. In the case of the company competing in cost, indicators of productivity, quality and process innovation are likely to be important. Success in these dimensions affects not only the customer's perspective, but also the financial perspective, due to the impact they have on expenditure headings [20].

The perspective of learning and growth, according to [14], describes how the human resources, technology and climate of the organization are combined to support the internal processes of value creation. The cited authors consider the three elements mentioned as intangible assets and explicitly state that the perspective of learning and growth focuses on the significance of the assets in question, as the basis of the organizational strategy.

The implementation and development of the balanced scorecard produce changes in the scientific and professional as changes in the approach and organizational management. We can define the balanced scorecard as a new strategic management approach, since, in addition to overcoming the modern information systems, it also overcomes some of the limitations found in the known management control systems, as a consequence of the high level of projected uncertainty. Normally we find that organizational decisions are taken from the analysis of financial indicators, with this view of the short term [5].
2.5. Factors promoting the success of balanced scorecard

Among the important factors are clarity of mission, vision, values, and strategy; staff training to adapt to the changes that the balanced scorecard brings; and automation of it. Finally, the following aspects were classified as support factors: integration of the balanced scorecard as part of the management system, self-assessment systems (for example, quality systems) linked to the balanced scorecard and final completion of the measurements and the total model thereof [16].

The objective of the balanced scorecard is to transform the organization’s objective and strategy into tangible indicators, as these represent the balance in the perspectives presented [18].

2.6. Factors affecting balanced scorecard

Among the obstacles that threaten the success of the implementation of the CMI are: lack of commitment, limited support from top management, shortcomings in the formulation and understanding of vision and strategy, difficulties in identifying strategic objectives and cause-effect relationships, loss of project sustainability due to resistance to change, difficulty in obtaining data on performance, and absence of connection between the CMI and the organization’s reward system [16].

2.7. Benefits of the balanced scorecard

It helps to evaluate and analyze different performance areas, makes an abstract vision a reality, helps to synchronize the strategy with all the sectors and processes involved in the company.

Risks: a little elaborated model and without the collaboration of the management is wet paper and the effort will be in vain, if the indicators are not chosen with care the CMI loses a good part of its virtues because it does not communicate the message to be transmitted [21].

2.8. Successful cases of the application of the balanced scorecard

The analysis shows how the guisosa food group has renewed its strategy, going from being a producer and distributor to the sales channel, to being a distributor to the end customer, becoming a competitor of those who, until that time, had been its customers [22].

Quipux is a software development company founded on October 13 of 1995, with the purpose of building a software to automate the processes of the “Secretaria de Transito y Transporte” of the municipality of Rio Negro, Antioquia, Colombia, according to the requirements of automation and sending information from the Ministerio de Transito y Transporte de Colombia [23].

In the project "application of balanced scorecard in the management process of the company E.I.R.L. textile processes", in Peru implemented the BSC resulting in: 10% increase in sales, Improved internal communication of staff delivery compliance of the product, Increased productivity, after implementing the BSC was obtained a higher % in profits of 9.29%, increasing 4.1% more [24].

On the other hand we have the control boards or dashboard is a registration, control and monitoring tool that was applied to the development plan in force 2012-2015 of the municipality of Tibasosa, Boyacá, Colombia, finding that: there are shortcomings in the evaluation of some indicators, since there was no clear knowledge by the employees in charge of the process [25].

Another successful case of the implementation of a dashboard is obtained from the group “Orquestador de Colpensiones” where they managed to minimize several risks immersed in the operation of information technology as well as the importance of monitoring business processes by two groups: net operations center (NOC) and “Orquestador de Tecnologia de la Información” [26].

3. Methodology

The descriptive method is a narrative, numerical and/or graphical interpretation, well detailed and exhaustive of the facts that are studied. The descriptive method seeks to have initial knowledge of the reality of the facts, of the direct observation of the researcher, and of the knowledge that is obtained by reading or studying the information provided by other authors. It is a method whose objective is to expose with the greatest methodological rigor, significant information about the reality under study with the criteria established by the academy [27]. Descriptive studies seek to specify the properties,
characteristics and profiles of individuals, groups, communities, processes, objects or any other phenomena that are the subject of a descriptive study to submit to an analysis [28].

The observation method has been a great help for qualitative studies, it is an old method where all situations are observed, and information is collected on the facts presented to get an analysis of them, then give a solution or improve a process. We must distinguish the different types of observation. In some occasions, casual or occasional perceptions are made, checking the facts as they occur spontaneously, without prior notice; another type of observation is one that uses express and manifest hypotheses [29].

The quantitative method is attributed to a positivist, hypothetical, deductive, particularistic, objective, results-oriented and natural science vision. That is, there is a strong component of elements and techniques to the measurement of these and the need for empirical verification of the social facts, imitating the natural sciences. The qualitative paradigm is ascribed to a phenomenological, inductive, holistic, subjective vision of the world, oriented towards the proper process of social anthropology [30].

4. Results
After the process of reviewing articles it was defined that the balance scorecard can be adapted to the needs of the processes that occur in the experimental farm of the Universidad Francisco de Paula Santander Ocaña, Colombia, since it allows to align the objectives of the company, likewise it is possible to implement the control panels that are oriented to the diagnosis of a set of indicators. The two models do not compete with each other, but rather articulate the most relevant indicators of the company by creating the balanced scorecard design according to the process of the mode.

5. Conclusion
With the review of the state of the art of the balanced scorecard and control panel, it is concluded that they are models that can be put together to improve decision-making in real time and be able to direct the company to its stated objectives. For that reason, it is expected of this research to develop a model that adapts to the processes of the experimental farm of the Universidad Francisco de Paula Santander.

It must be considered that for the adaptation of new strategies or the acquisition of new technologies, the organization must adapt to the new changes or the way of doing the processes to be able to observe the correct implementation of the model and the improvements of the processes.

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