

Design and development of a Third Generation Balanced Scorecard Prototype that facilitates strategic implementation in automotive organizations

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Abstract — The present document aims to design and develop a Third Generation Balanced Scorecard (BSC) prototype with the purpose of facilitate the planning, execution and monitoring of an organizational strategy through the use of visual elements that speed up the reading of performance in the strategic execution, therefore is integrated into BSC: a strategic map with the causal relationship among objectives and destination statements, preserving the 4 original perspectives of the BSC, responsible positions and graphics that allow monitoring the gradual progress of the goals. Thus, it contributes to the implementation of a strategy within the automotive sector and to the simplification of the use of this tool. For the development of the application, key approaches and indicators are identified with the objective of provide clear and timely information in decision-making. The final result consists of a control panel that contains five destination statements supported by ten strategic objectives with their own indicators, with the purpose of consummating a strategy related with the expansion brand and markets satisfaction through the production of high quality products.

Keywords — *balanced scorecard; third generation; automotive industry; strategy*

I. INTRODUCTION

Named as the biggest engine of economic growth in the world by [1], the automotive industry stands out not only at global level but also locally, representing an important pillar for the economies of the different countries that host companies of this type, because as mentioned [2] this kind of industries play an important role in the socio-economic development for these countries.

Mexico is not the exception, nowadays is listed among the top ten worldwide positions of the countries with the highest rate of manufacture and exportation of vehicles, according to OICA data in 2020, this industry contributes 3.8% of the Mexican Domestic Product Gross (according to AMIA data), that shares the top positions with countries such as the United States, China, Canada, Japan, Thailand, India, among others.

Currently, the growth of this sector continues to rise, integrating new countries in automotive production, while trends in this market are constantly changing.

Following this scheme of accelerated changes in a highly globalized industry such as the automotive sector, the emergence of an important aspect for the development of the sector is predicted according to [3], related with the migration of automotive propulsive methods, becoming indispensable the avant-garde of the organizations to remain competitive in the sector, requiring in some cases an internal restructuring to adapt to the new market trends.

Based on the growth of these markets and their competitiveness, is crucial for companies to evaluate their structure and indicators for the purpose of their development [4], fostering an increase in the migration of traditional quality initiatives to the BSC initiative such as a system to improve the business operations and their performance [5].

Normally, within organizations there are already predefined control methods; elements and mechanisms that contribute to monitoring their performance and carrying out different activities and / or decision-making. However, the fact of their existence does not guarantee that they are strategically aligned to contribute to the organizational vision, which often ends up being translated into a lack of use of the resources and efforts made.

As the automotive sector is a field governed by various international regulations, and even by specific requirements of the various leading alliances in the sector, according to [6] the pressure exerted by these regulations influences the structures and practices of companies, generating a similar operative mechanism among the organizations that integrate this sector, owing to complying with these guidelines becomes a competitive requirement of the market.

Under these global guidelines, is standardized the introduction of various objectives and indicators throughout its production chains and its agents involved in order to comply with the strategies. All these sources of valuable information must be integrated and properly aligned for efficient decision making. Being then when the BSC tool appears,

because as mentioned in [7] the Balanced Scorecard achieves through the integration of a set of methodologies, qualitative and quantitative mechanisms to support the design of the processes, in order to implement the organizational strategy.

There are several generations and variants of this tool, the BSC in its third generation is a refined and mostly robust version, with respect to its previous generations, which according to [8], becomes in a reference point for the designation of objectives through the establishment of destination statements, increasing the efficiency in the development of the strategy.

For these reasons and due to the importance of the correct execution of the strategy for business entities, we start from the literature review extracting the fundamental elements contained in a third generation Balanced Scorecard and the main contributions of previous generations, with the purpose to design a robust prototype that allows planning, executing and monitoring the implementation of a strategy addressing the generic case of an organization in the automotive industry. Given the competitiveness mentioned above and the market dynamics, the planning and execution of a growth line is essential for the prevalence of organizations.

II. STATE OF THE ART

Carrying out a literature review related to the execution of BSC as a tool to contribute to the strategy implementation, multiple research cases are noted due to its potential in improving organizational performance and its universal applicability [9].

Various authors have adopted and implemented the BSC to contribute to a better implementation of the strategy, such is the case of [10] who achieved to generate an inclusive framework including the perspectives proposed by the BSC, to identify opportunities and threats, contributing thus in the selection of an appropriate strategy that will contribute to the development of export markets for auto parts in Iran. Thus, he complemented the use of this tool with others, such as Dynamic Systems and Game Theories to predict the behavior of the markets, denoting in this case with respect to this document, the importance of the inclusion of all dimensions to formulate a robust and integral BSC. An example of the contribution of this tool in the improvement of an organization through the use of the perspectives of BSC, is given by [11], who using the BSC in conjunction with Data Envelopment Analysis (DEA) constitute a set of measurements to evaluate the performance of automotive dealers and subsequently using the perspectives of the BSC to identify opportunity areas existing in the process, contributing to the growth of automotive dealers.

In these cases mentioned, we can note the important contribution that the identification and use of adequate perspectives can give us, which will help us to integrate all the agents involved in the development of our organization, thus is considered in our prototype a space for assigning these approaches and through

their consideration achieve the establishment of lines to follow (destination statements).

Based on the destination statements that act as guide lines to achieve the purposes of the organization, it is necessary traduce them in related goals and objectives that allow us to align efforts, a sample of how important the relationship of the objectives is, can be found in the work of [4], who in 2006, addressing the logistics area in a company of the automotive sector, analyze the existing objectives and processes to redesign and align them with the organization's strategy through the use of a BSC, promoting an information framework for more efficient decision making, reducing failed decision making and highlighting the areas of opportunity for each perspective. Therefore, considering the impact that has the alignment of the objectives, within the prototype presented has been reserved a space to define the relationships between our statements and their objectives, identifying thereby the activities that is necessary to monitor to achieve our statements.

Once this relational aspect is assured, it is essential to prioritize the objectives that we will integrate into our BSC, the importance of this prioritization is denoted in studies cases such as [12], who adds to the application of a BSC in an industry of the sector automotive, a Fuzzy AHP system to identify the performance indicators of an organization in all its perspectives, which contribute most to decision-making and allow the generation of proposals for the improvement of the key organization's processes. This is not the only case in which efforts have been made to establish a framework of key indicators aligned with the strategy for obtaining robust information, since in a Malaysian automotive industry, [5] in 2012, the BSC is used to develop a strategic measurement model with key indicators that assist in the improvement of organizational development and promote the creation of internal initiatives for better performance. These cases represent a clear example of the necessity to integrate action initiatives that can be evaluated and are designed to contribute in the achievement of the key objectives and therefore to reach the statements raised at the beginning, a fundamental element considered within this prototype, since it is necessary to involve all the members of the organization defining their support lines for the achievement of the strategy.

Based on the integration of information collected in all dimensions of the company, is constituted a prototype that symbolizes a reference for decision-making. [13] also approaches an industry in the automotive sector in its after sales system, generating a structured system of measurements aligned with the strategy, through the application of the Balanced Scorecard to create an information network that covers all levels of the supply chain, thereby ensuring compliance with strategic and operational objectives that have an impact on improving customer service.

Through these research cases exposed, we can first observe the universal applicability of the tool, since it has been applied in various companies in the automotive sector, and there are also countless cases of its application in other sectors, although in this

document they are specially described cases of its implementation in industries of the automotive branch, either in general to the organization as a whole, or in specific areas of this ones. Being through these implementations of the Balanced Scorecard and its methodology, how the measurement systems have been strengthened with more efficient indicators, objectives that are mostly aligned and the inclusion of the different perspectives, which has resulted in an increase in the performance of several of the organizations addressed, as well as a contribution regarding assertiveness in decision-making.

Under these references, the opportunity is generated for this research to contribute to the proposal of a structural framework and specific approaches that can favor the implementation of strategies of organizations of this type, bringing together elements of structural planning, execution and monitoring that strengthen the development of the organizational vision.

Is important to consider that the strategies can vary from one organization to other one, because the interests and functional modes are property of each one. However the globalize markets always create trends and necessities that need to be accomplished by the companies to assure their competitiveness, based on this reason the development of this framework is made considering generic aspects of this kind of industries.

III. METHODOLOGY

The starting point for the realization of this document is the literary review. It is necessary to bear in mind and understand the specific characteristics and functionalities of the Balanced Scorecard in its third generation, in order to formulate a functional prototype, which once the context to be addressed (automotive sector) has been identified and defining the appropriate approaches to deploy the strategy, allows the application of this functional prototype to the context, defining a set of statements, objectives and general indicators that can contribute to the implementation of a strategy. In Figure 2, the methodological scheme to follow is shown.

Based on the methodological scheme shown in Figure 2. Once the conceptualization is made and the main characteristics are identified, we proceed to design and formulate a framework that give us the opportunity to align, define objectives and measure them through the use of a selected group of indicators, and finally after of be developed make the interpretation of its impact in the strategy implementation in an automotive industry.

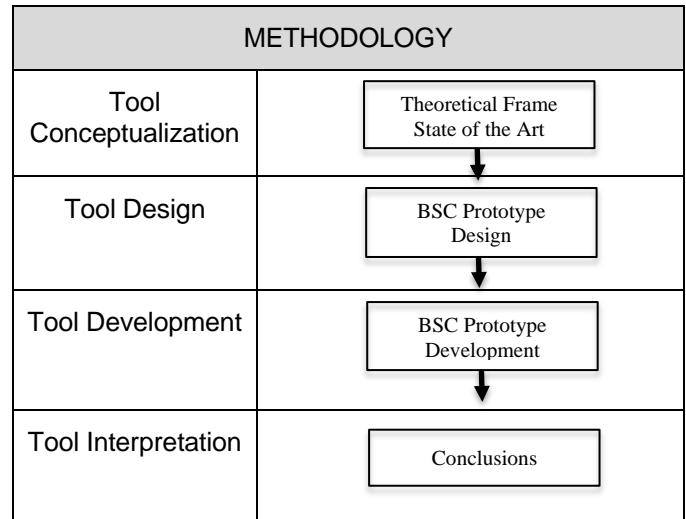


Figure 1. Methodological Research Scheme

IV. RESULTS

Using the aforementioned methodology, the reviewed literature is considered to proceed with the formulation of a functional prototype of the Third Generation Balanced Scorecard.

Taking into account the characteristic features of this generation and with the purpose of solving the practical difficulties when implementing this tool within some organizations. It is prioritized in the definition of the Destination Statements, which will reflect the future state to which the organization aspires, now the strategic objectives become a consequence of the definition of these statutes and will obey them to contribute to their achievement. Based on this, the following flow is generated to elaborate its development, as seen in Figure 2 and which is transfigured in the prototype illustrated in Figure 3.

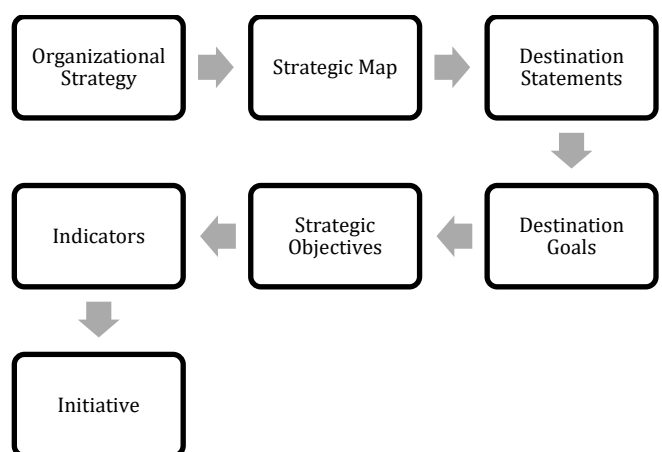


Figure 2. Third Generation Balanced Scorecard development Flow..

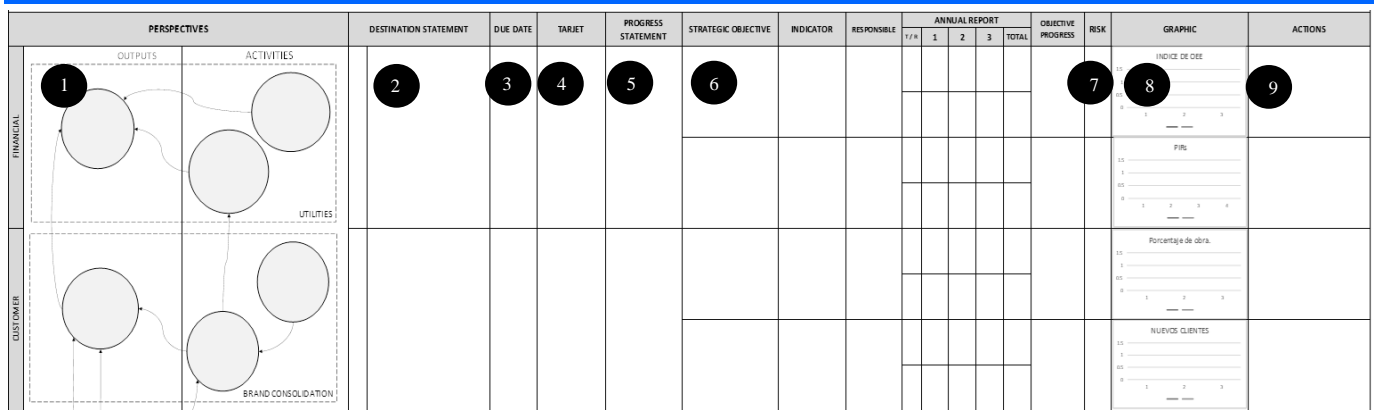


Figure 3. Prototype of Third Generation Balanced Scorecard..

According to the prototype illustrated in Figure 3, we can highlight the following elements:

1. Strategic map. Describes the relational analysis between destination statements and objective, under two approaches: Activities (process inputs) and Outputs (destination statements), without forgetting the integration of perspectives, for which a space is designated in the first column.

2. Destination Statements. They represent the priority of the organization and the guidelines that will govern its performance for the achievement of the organizational strategy.

3. Deadlines. They are the target term for the completion of the goal, they can be synchronous or asynchronous, independent or dependent.

4. Goals of the Declaration. It is the quantitative objective of the declaration, help us to evaluate the performance in the fulfillment of the destination statement. Will be the goals that dictate the emergence of new strategic objectives, created with the intention of achieving the declarations. It is worth mentioning the possibility that some objective contributes to one or more statements.

5. Progress of the Declaration. As a visual element of the dashboard, a declaration performance monitor is included, which will allow us to evaluate the status of compliance with it.

6. Strategic Objectives. The following columns are used to define the different objectives with their respective indicators, managers, goals, and progress monitoring.

7. Level of Risk. Due to the multifunction and complexity that the objectives may have, it is necessary to bear in mind the risk factor of each one of them; either because of their level of difficulty, level of performance or impact on the statements.

8. Graphics. As a visual element, this section is added to obtain a reference of the historical behavior of the objective.

9. Actions. Inheriting this element from the second generation, the space is preserved for the designation of activities that contribute to the achievement of the objectives, since these will be the operational reference to achieve the declarations.

With reference to this design, it results to obtain a framework that can be focused on an organization of the automotive sector. For this purpose, the generic

organizational strategy presented in Table 1 is considered to model the development of the Balanced Scorecard prototype. Likewise, the approaches shown (Table 1) are proposed for the development of the statements and objectives that could contribute to the development of the organizational strategy.

ORGANIZATIONAL STRATEGY	
"Satisfaction of current and future auto parts markets by providing quality products"	
PERSPECTIVE	APPROACHES
Finantial	Sales Quantity
	Market Expansion
	Productivity level.
	Supply optimization
Customer	Products performance.
	Customer Service
	Claims reduction.
	Presentation of the product.
Internal Processes	Response times.
	Waste reduction
	Process stability.
	Equipment efficiency.
Growth and Knowledge	Environment security.
	Staff stability.
	Trainings.
	Work environment.
	Staff skills
	Internal procedures.

Table 1. Approaches proposed in an Automotive Branch Organization

Considering these approaches, we proceed to the development of the Third Generation BSC prototype shown in Figure 3. Thus, the approaches shown above in the table are reflected in the destination statements, and deploying them through the use of various objectives and indicators that will facilitate a follow-up in the implementation of the strategy and in the generation of a robust and comprehensive source of information for decision-making, as illustrated in Figure 4.

PERSPECTIVES	DESTINATION STATEMENT	DUE DATE	TARGET	PROGRESS STATEMENT	STRATEGIC OBJECTIVE	INDICATOR	RESPONSIBLE	ANNUAL REPORT				OBJECTIVE PROGRESS	RISK	GRAPHIC	ACTIONS
								T/F	1	2	3				
FINANCIAL	"Through technology innovation and new models development, increase the productivity and customer satisfaction level and by consequence improve the level of sales"	2023	Sales Level +1.5%	74.00	Increase the OEE metric in order to increase the organization utilities.	OEE Metric		1	2	3	4	85.33	M		1. Reduce the scrap levels through continuous improvement. 2. Reduce downtime and line stoppages. 3. Performing preventive and predictive maintenance.
								1	2	3	4	66.67	H		1. Introduction of new technologies to gear a new inspections. 2. Attention by Auditors for prompt response and negotiation. 3. Random product audits. 4. Control of Cok to suppliers.
CUSTOMER	"Strengthen and position our brand to attract new customers and expand our markets possibilities"	2023	Market Occupation +5%	1.00	Open a new plant to improve the supply chain and logistics service.	Construction Progress		1	2	3	4	85.00	H		1. Contracting a construction supplier. 2. Creation of new supply flows to customers. 3. Hiring and training of new personnel.
								1	2	3	4	33.33	H		1. Development of new functional categories. 2. Creation of an attractive business plan. 3. Audit approach.
PROCESS	"Use of new technology frame to achieve a successfully launch of new modes"	2023	New Modes Introduction +7	4.00	Include the last technologies in our products in order to improve the performance efficiency.	Quantity of Technology Engineering Changes		1	2	3	4	33.33	H		1. Carrying out benchmarking. 2. Investigation of future trends. 3. Prototype development. 4. Prototype tests. 5. Prototype commercialization.
								1	2	3	4	57.14	H		1. Overview of new contracts. 2. Make outreach plans. 3. Implement engineering changes.
KNOWLEDGE	"Taking advantage of the knowledge acquired, implements a new work dynamics system based on empowerment to promote a better communication and encourage the participation in the improvements"	2023	Kaizen Implemented 60	13.00	Install communication boards in all the production lines to improve the communication and the specific needs quantities.	Quantity of Boards Installed		1	2	3	4	84.62	M		1. Staff training in filling out and reading boards. 2. Designation of roles. 3. Designation of responsibilities. 4. Evaluation of effectiveness.
								1	2	3	4	75.00	M		1. Designate tables and satisfaction surveys. 2. Anonymous complaint box. 3. Create psychological support. 4. Create new communication channels.
KNOWLEDGE	"Invest in staff training and new technologies to maximize organizational competitiveness and improve the production dynamics"	2023	Mastered Skills 85%	69.28	Schedule a greater number of trainings to improve staff preparation	Quantity of Trainings programmed		1	2	3	4	66.67	M		1. Programming of courses to cover cognitive needs. 2. Inclusion of the productive needs of the organization in the selection and application of the knowledge acquired during training sessions.
								1	2	3	4	71.90	M		1. Gradual implementation of new equipment. 2. Training in the operation of new equipment. 3. Monitoring of equipment behavior.

Figure 4. Development of Balanced Scorecard.

In this exemplification we can appreciate specific destination statements, therefore, the objectives (which act as process inputs) have become more selected according with the destination statements, simplifying the strategy map (with reference to a second generation one). Then periodic monitoring becomes necessary, since now the established destination statements are prioritized, based on which the selected objectives can be modified, strengthened or updated.

Based on this third generation design, we appreciate notable benefits in the development and implementation of the strategy, since they are supported directly and from the beginning in the statements, which will be deployed through the various objectives, thus contributing in two important aspects:

1. The cascading deployment of the statements through goals and objectives at all organization levels, now all its members are participants and aware of the state that is intended to be achieved.
2. Alignment of efforts through statements. This methodology allows us to define the objectives taking as reference the statements, it promotes that all the efforts and initiatives that are undertaken contribute directly towards that established goal.

Thus, an organization in the automotive industry can optimize its resources and implement them having greater certainty that they will be contributing to the end dictated from the beginning.

The proposed dashboard also includes a segment dedicated to monitoring to help the organization evaluate trends in the performance of its objectives, identifying factors that could be affecting (and thus avoiding them) or contributing (and thus seeking them) to the implementation of its strategy. Lastly, this monitoring will be reflected through the graphs in the prototype, thus facilitating the reading of organizational performance and contributing to the definition of appropriate initiatives that address the status of the implementation of the strategy.

V. CONCLUSIONS

Product of an evolutionary process, the Third Generation Balanced Scorecard offers us a robust and integrating mechanism that translates and dictates the lines of action that the organizational elements have to follow-up to achieve the strategy.

Through the development of the proposed prototype in consideration of the aforementioned approaches, we can observe how by including different perspectives, the different dimensions of the organization begin to be integrated; starting with a solid base for staff development, with objectives focused on the preparation and competitiveness of its members without forgetting their satisfaction with the work environment in which they are working, emphasizing the internal processes that is where the operation of the organization is generated to meet the expectations of its customers, for this, the performance of its production processes is closely observed through different indicators used in the sector, until the monitoring of customer perception and satisfaction

with the goods they are receiving, which will have an impact on the last and perhaps most important objectives of the organization, the financial ones, since depending on customer satisfaction, their consumption and loyalty will be directly affected, bringing with it the fulfillment of sales objectives, which will represent income to develop the competitiveness of the organization.

In the case of an organization in the automotive industry, the use of this tool allows the company to work on specific lines (destination statements) on the basis of which the objectives are designated, thus generating a greater impact on the implementation of the strategy, these Statements can be defined by a multidisciplinary management team to be later deployed in the organization. With this, an organization in this field can invest its resources in specific initiatives, having the certainty that through its adequate development they will reach the state to which they aspire.

Due the focus and functionality that this tool has, the Balanced Scorecard proves to occupy a highly beneficial role when implemented in any organization, since it contributes to one of the main purposes of the same, which is its growth, which is reflected by the formulation of some certain strategy.

Day by day, organizations continue to evolve like a response to new market demands and making use of new technological trends, despite this, the validity of the Balanced Scorecard as a tool continues to remain afloat as a great opportunity to optimize the operation of the organization in favor of its improvement because it has a great virtue that is flexibility and adaptability to organizations, which allows it to continue fulfilling its notorious function, a function that will always be essential for any organization regardless of its size or nature, which is the planning and execution of the organizational strategy.

VI. REFERECES

- [1] OICA, «International Organization of Motor Vehicle Manufacturers,» Octubre 2020. [En línea]. Available: <http://www.oica.net/category/economic-contributions/>.
- [2] B. Saberi, «The role of the automobile industry in the economy of developed countries,» *International Robotics & Automation Journal*, 2018.
- [3] C. S. Herrera, «Sector automotor: retos y oportunidades,» *El Financiero*, 27 02 2020.
- [4] E. Müller Sabóia, L. C. Duclós, C. O. Quandt y A. Souza, «Strategic management indicator for internal logistics: a proposal based on the Balanced Scorecard for an automotive sector company,» *ABEPRO*, 2006.
- [5] F. H. Nurul, O. Baharudin, I. Syed, S. Mad Ithnin y I. Nurdiana, «STRATEGIC BALANCED SCORECARD SYSTEMS FOR MALAYSIAN

- AUTOMOTIVE INDUSTRY,» *Management Research Journal*, 2012.
- [6] W. Chee Yew y B.-i. Sakun, «The influence of institutional norms and environmental uncertainty on supply chain integration in the Thai automotive industry,» *ELSEVIER*, 2008.
- [7] F. Acuña Carvajal, L. Pinto Tarazona, H. López Ospina, R. Barros Castro, L. Quezada y K. Palacio, «An integrated method to plan, structure and validate a business strategy using fuzzy DEMATEL and the balanced scorecard,» *Expert Systems With Applications*, 2019.
- [8] G. L. a. I. Cobbold, «Development of the 3rd Generation Balanced Scorecard,» *2GC Active Management*, p. 19, 2002.
- [9] R. S. Kaplan y D. P. Norton, «Putting the Balanced Scorecard to Work,» *Harvard Business Review OnPoint*, 1993.
- [10] K. Ghasem, J. Seyyed, A. Farhad, A. Amir y S. Hammed, «Formulating the supply chain strategy of automotive industry in Iran using balanced scorecard, system dynamics and game theory,» *AIMI Journal*, 2017.
- [11] T. Youchao, Z. Yang y K. Roohollah, «Service performance evaluation using data envelopment analysis and balance scorecard approach: an application to automotive industry,» *Annals of Operations Research*, 2016.
- [12] M. Ozlem Senvar, O. Vayvay, E. Kurt y S. Hloch, «Propriation of Balanced Scorecard Measurement Indicator as a Process Management Approach Via Fuzzy AHP: Case Study in Automotive Industry,» *M.O. Senvar*, 2014.
- [13] P. Giardelli, N. Sacconi y L. Songini, «Performance measurement of the after-sales service network - Evidence from the automotive industry,» *ScienceDirect*, 2007.