

Improvement in Modern Public Management for Emerging Cities from the development of a Technological Strategy

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ABSTRACT: *The aim of this study was to determine the domain on the use of ICT in public administration to check its competitive position in this area. For this purpose fieldwork was conducted by interviewing the person in charge of enterprise systems. Its development is structured in three parts, first: an introduction explaining the research problem; second: a theoretical framework on the importance of ICT and its application in public administration; and, third, the methodology is established, analysis and conclusions are based. An analysis was realized to determine the feasibility and the importance of developing a technological tool to facilitate the implementation of strategies so that the actions, activities and tasks performed in an entity or public organization are consistent with strategies designed. This proposal is part of demonstrating the feasibility and finding needs to stimulate change within the proper execution of a strategy: make the feasibility study will open the way to personal computers help understand the strategy and advise what actions officials should prioritize to maximize the expected results within the framework of this strategy. The main findings help determine the degree of use of ICT by the public administration in Altamira is emerging, which would be dismissing competitiveness to face a globalized market; so a methodological study certifying the need to implement scorecards and strategy maps based on fuzzy systems, consisting of the representation of sensitivity and value of all types of segments within the same public institution develops.*

Keywords -Processes of change, Public Administration, Strategy Maps, Intelligent Agents, Modern Public Management, Emerging Cities.

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I. INTRODUCTION

The Sustainable Emerging Cities Initiative (ICES - for its acronym in Spanish) is a methodology based on a series of indicators, which in the first stage proposes the diagnosis of a city or conurbated area in order to plan future improvement actions; which has been developed by the IDB (Inter-American Development Bank) [1].

One of the dimensions of ICES that aims to determine the use of ICT in public administration is that of fiscal sustainability and governance, in which its main pillar are the appropriate mechanisms of government, whose main themes are modern public management and modern systems of municipal public management. To count on this, in both public and private administrations, considerable changes must be made in the processes for the proper functioning of the same.

Many changes are happening worldwide, demanding a new position on the part of public administrations, which can not be observed and let things happen with nothing to do, as this can lead to insecurity regarding the future of the administration itself public. There are some processes that come as a hurricane and do not ask for permission to enter, causing rapid instability if you are not prepared managerially for these processes of change or new strategies. The alternative, many times, is knowing how to deal with what happened trying to get the most out of the situation.

In general, when implementing the change process, generally its decision is not shared by all the officials, finding many opinions totally contrary to its execution. Many times people do not commit to change because they do not know what is going to happen, because they do not know how to act, because the new is not something defined, therefore a way of defending oneself from the unknown is by grasping the known and, consequently, denying the new.

A process of change occurs very efficiently if everyone is committed to it, while for people to commit themselves they can not be run over by the process as if they were something foreign to it, the change happens through people. And to consider people as part of the process of change it is necessary to know their values, their beliefs, their behaviors and effectively build a methodology with sufficient technology that integrates all these components. That is why considering the current popularity of information technologies, public

administrations have in their hands a powerful tool that is currently not used for the management of strategic processes or organizational changes.

Having this tool, administrations, and advanced technology such as intelligent agents and coupling a well-known management system in management, such as the Balanced Scorecard and Strategic Maps [2], can build a technological methodology that allows officials with their different values align with the new approaches or processes by the public administration, and in this way improve the indicators of modern public management and modern municipal public management systems.

The change management term is one of the most relevant aspects of the process of globalization of the management of public administrations, since both managers and the organization begin to face complex situations of change in their environment that should not be addressed in a timely manner. dispersed, but they require a minimum platform that ensures the successful change or implementation of new processes in the public organization.

However, carrying out a strategic process is not as easy as one might think at first due to the large number of elements involved; in addition to that, we must be completely sure that the public administration can absorb the changes and, very particularly, that its human resources understand its importance and commit themselves in fact to its performance, keeping in mind that it is a continuous process that we must treat it as such and not as something transitory.

Finally, we want to make it clear that as a central idea it must be considered that in order to deal with any process of change it is necessary to manage technical aspects and human aspects in an integrated manner, since without the ability to deal with human aspects, the process of acceptance of change and the adoption of the technical aspects of the change or the main object of the organizational change, in function, are much more difficult and may even have a high probability of failure.

II. OBJECTIVES OF THE RESEARCH

a. General objectives

Determine the diagnosis regarding the indicator of modern public management of the municipal government of the City of Altamira, in accordance with the ICES methodology of the IDB.

- a) Analyze the indicator Modern public management of the municipal government of the City of Altamira, in accordance with the ICES methodology of the IDB.
- b) Determine the improvement strategy of public management systems of the City of Altamira, Tamaulipas.
- c) Carry out the analysis to determine the viability of the importance of developing a technological tool that facilitates the execution of strategies so that the actions, activities and tasks carried out in a public entity or organization are coherent with the strategies designed and designed.

III. OBJECT OF STUDY

The object of the research is the subdimension Modern systems of public management of the city of Altamira, Tamaulipas.

IV. SUBJECTS OF STUDY

The person in charge of the Systems and Information Technologies Department of the Altamira City Hall, Tamaulipas.

V. ANALYSIS AND REGISTRATION UNIT

The unit of analysis will be the file of technical documentation of the area of Information Systems and Technologies of the City of Altamira, Tamaulipas.

The registration unit will be the person in charge of the Systems and Information Technology area of the City of Altamira, Tamaulipas.

VI. DELIMITATION OF THE RESEARCH

- Given the characteristics of the research and the indicators of the subdimension of the modern systems of public management, only the study was carried out in the Municipality of Altamira, Tamaulipas.
- The interviewer was directly the main author of this document.
- The interview was conducted during the second quarter of 2016.

VII. RESEARCH PROBLEM

What will be the strategy to improve the processes of public administration, based on the diagnosis of modern public management of the municipal government of the City of Altamira, in accordance with the IDB's ICES methodology?

VIII. STATE OF THE ART AND THEORETICAL FRAMEWORK

According to the Boston Consulting Group, currently the strategy of a company, in most cases, does not generate the expected results, due in large part to the resistance to "change" of people [3]. Therefore, in every public organization every time a person executes a strategy, they hope to do it correctly, since, when a strategy is conceived, several aspects are involved, such as time and cost, among many others. that is expected that at the time of implementation there is the least risk of not doing it as designed.

During the last quarter of the last century and in the beginning of the present, many aspects of revolutionary changes have been addressed within the public organization [4], however the joint analysis of what can be called strategic direction and evaluation of performance (also known as management evaluation), has resulted for significant signatures; in terms of obtaining results of their management, obtaining that all these events, motivate to seek, increasingly, the progress of public management with different sociological methods as from the beginning of the administration has been tried.

This research seeks to propose a new methodology in public administration and, if necessary, modify its initial guidelines; The aim is to propose different tools that try to unify the relational aspect (human) with the systematic (processes, computing) and that contemplate the characteristics in public administration mentioned in the previous paragraph, such as bureaucracy, control units, control systems, etc. ., aligning all these components with the adopted strategy in an integrated manner, that is, developing a pilot tool for a specific department, which in the end can be adapted to the entire public organization, develop their strategy adopted hand in hand with high technology such as they are intelligent agents, resulting in a new methodology for managing public administration strategies.

The tool in management that is considered is adapted to the proposed methodology, is the Balanced Scorecard (BSC) - Integral Control Tables (CMI) and the Strategic Maps, disseminated by R.S. Kaplan and D. Norton since the early 1990s and in the USA. It has already been applied in more than 50% of large multinationals [5]. Now, what we are trying to do with this work is to raise and develop the way in which this tool congenies and fits with artificial intelligence tools, such as fuzzy sets, so that it can perform even better in the field of Public Administration, and, To boost the dynamism and communication of the proposal, it is proposed to implement recent technology such as "intelligent agents" and Recommender Systems.

R.S. Kaplan, in the early 80's with his colleague, Cooper Robin, generated a revolutionary way to manage costs at the business level, created ABC costs "Activity Based Costing" or what in his translation would be "Cost Based on Activities", as the name implies, is a cost system that was based solely on activities and processes and not items as was normally done, which would allow the company to detect the most expensive and most critical activities [3].

At the beginning of the 90s Professor Robert Kaplan and D. Norton in their process of specialization in the matter of costs, realized that a tool was needed that could summarize all the information regarding the company, both in the financial, costs, as in other aspects of the organization, in order to better manage the total management of the company, resulting in the BSC, a tool that provides managers with the tools they need to navigate towards a successful competitive future [6].

In the course and development of this new management tool, it was created the need to have another, but this time one that allowed to see the information first hand to be able to record in the balanced scorecard, that is why at the beginning of This new millennium, Robert S. Kaplan and David Norton defined SM "Strategic Maps" or "Strategic Maps", as a tool to efficiently communicate the strategy of the company [4].

Starting from the fact that management control begins with the vision and strategy of the company, and the scorecard is a method of controlling the business, however, the descriptive nature of the scorecard frequently leads to new ideas about the company's vision and a reconsideration of its strategy [6], it is stated that it is a difficult system to measure in exact or mathematical terms due to its cause-effect design [4]. For this reason, it is decided that a system of diffuse matrices can measure these subjectivities. The preparation of the scorecard will confirm the proposed strategies, although in the scorecard process these strategies will be expressed in more tangible terms of goals and key factors for success.

The scorecards are receiving special attention with numerous BSC model development projects, scorecards and integral scorecards, especially affecting the commercial areas, production-logistics and general management apart from the traditional financial ratios of the financial management

For the creation of said scorecards and strategic maps, especially when the assessments of the incidences of causes on the effects are included, models that allow these subjective relationships are required.

Likewise, when knowledge about customer, sales, geomarketing, and other data related to the relationship with the public is required, and its economic or social value for the public institution, models are required to calculate new information such as: value for users, perception of quality of service, subjective opinion, and other correlations between data in the database that a priori seems to have no relationship between them but that hide valuable information for the eyes of senior management and advice from administration, that is why the use of fuzzy models for the development of this project is confirmed once again.

So the state of the art, is an incessant development of the scorecards, which demands of great investments in Datamining projects to create the models that support said scorecards. So the state of the art presented is that of Datamining, its limitations for the generation of useful models for a long time in addition to its difficulties to be maintained given that they require scientific personnel that also understand the public administration or private enterprise in depth, following with an analysis of fuzzy subsets that will be fundamental in the formulation of models for the creation of strategic maps and ends with a brief explanation of the impact of the network of networks or as the Internet is normally known, since it will be a channel of diffusion, at internal-organizational level, of the proposed model.

Datamining is a set of statistical techniques or Artificial Intelligence with the aim of discovering knowledge in databases, generally looking for patterns of causal relationship. Currently the typical processes of Datamining are focused on obtaining predictive models of user behavior using a set of initial data to obtain said model.

After the system automatically builds the predictive model it can make predictions based on new sets of data that enter the system. To fulfill its objective, Datamining uses several statistical techniques such as logistic regression (one of the most used methods to obtain propensity indexes and which is based on the comparison of two populations, one that has suffered the event whose probability is to be measured. and another that does not), methods of generating decision trees (such as the ID3 method), or more recently the techniques of neural networks so that, based on learning patterns, they generate non-linear classifiers with large interpolation capacities (good behavior in the face of lack of accurate information) but with no extrapolation capabilities.

Another widely used Datamining technique is Clustering whose objective is to find groups of users that present similarity, what we call "profiles". This technique is especially used in multidimensional analysis and uses the concept of Euclidean distances to determine the affinity of a user to the cluster. As a result of the use of these data mining techniques, cross-decision support systems (which use information from various sources) are not particularly accurate and tend to generate noise and / or incompleteness in the information offered to the decision-maker. For example, a director of public administration may decide to establish a new service for foreigners because his pattern of behavior indicates that he has high mobility, but does not have the information corresponding to his total environment, so the director's decision may be wrong .

There is another line of research that studies the modeling of users. A user model is an internal representation in a computer system of the person using the system. These models allow to know better who uses the Recommender Systems and Direct Marketing (RMD).

The models contain the characteristics of the user (that is: interests, preferences, skills, knowledge) [5]. For the acquisition and management of these models there are two basic approaches: a monolithic view with the user model integrated in the user adaptation application; and a vision based on an autonomous user model that involves the development of user model servers (see, for example, Kaplan and Norton [5] for a complete state of the art in these systems). Likewise, there are mainly three perspectives that classify the techniques to build user models: 1) Manual construction versus automatic construction, generating respectively static and dynamic user models; 2) construction based on user knowledge versus construction based on user behavior, the first based on the closed representation of the user and the second based on the representation of the user itself as a model using machine learning techniques; and finally 3) the explicit construction from the data provided by the user versus the implicit construction of the user model extracted from the user's behavior in his interaction with the system.

In the field of economic sciences, the concept of decision is one of the most used terms [4]. So much so that, for many, the main occupation of a Business Administrator is making decisions. Deciding is always a human action, that faced with an external event (information) must identify the future states of that event and establish the possible courses of action that respond to the fulfillment of the established goal. The terms human and future action indicate that every decision-making process presupposes subjectivity and uncertainty.

Every decision maker aims to favor the evolution of future economic-business magnitudes by focusing on the appropriate variables in the required intensity [4]. In order for the evolution of the system to be the desired one, decision-making must be based on models that represent reality and allow it to be analyzed, studied and predicted.

However, the models that the Economy and the Business Economy have traditionally used have been based on the certainty or the randomness of the data [4]. The facts and economic relations uncertain and difficult to measure have been ignored or transformed into certain or random by means of arbitrary assumptions. This has led to the formalization of a modified reality, adapted to the mathematical models, instead of constructing models that explain and adapt to the real facts, being the instrument that has imposed the conditions.

In the search for solutions to this problem appeared the concept of diffuse subset introduced by Lotfi A. Zadeh in 1965, giving rise to the theory of fuzzy subsets based on fuzzy logic [4]. Fuzzy Logic is nothing new, although its origins go back to 2,500 years BC. [7] Aristotle already considered that certain degrees of truthfulness and falsity existed and Plato had worked with certain degrees of belonging.

In the eighteenth century George Berkeley and David Hume described that the core of a concept attracts similar concepts. Hume believed in the logic of common sense, in the reasoning based on knowledge that people acquire in an ordinary way thanks to their experiences in the world.

Emmanuel Kant thought that only mathematicians could provide clear definitions and that, therefore, many contradictory principles had no solution [8]. For example, matter could be divided infinitely and at the same time could not be divided infinitely.

The current of pragmatism founded at the beginning of the century by Charles Sanders Peirce, was the first to consider "vagueness" [8], rather than false or true, as a way of approaching the world and human reasoning. The term Diffuse applied to logic and to the theory of sets and systems comes from the expression fuzzy sets (fuzzy sets) coined by Lofti A. Zadeh [7], brilliant Iranian electrical engineer nationalized in the United States, professor at the most prestigious American universities, doctor honoris causa of several academic institutions.

After the publication, in 1978, of Zadeh's basic theory of fuzzy controllers [9], other researchers began to apply fuzzy logic to various processes, such as, for example, the control of processes in a steam control system. One can also highlight the application, in 1980, of this technique to the control of rotary kilns in a cement factory.

One of the countries where the fuzzy systems have had the most success has been in Japan. Companies like Fuji Elec. & TIT have developed fuzzy control applications for the water purification process, Hitachi with a fuzzy control application for the Metro in Sendai City or Matsushita with a fuzzy control application for the hot water supply unit for domestic use.

Due to the variety of its applications, Fuzzy logic seems to be introduced in all sectors [10]; control of complex industrial processes, design of artificial devices for automatic deduction, construction of electronic devices for home and entertainment use, diagnostic systems, and decision systems among others. This fact is becoming increasingly evident if one observes the large number of industrial patents of mechanisms based on fuzzy logic issued for at least a decade and a half.

The popularization of the Internet has opened a challenge in the adaptation of hypermedia content. If the traditional, static, hypermedia approach consisted in giving the same content to all users, adaptive hypermedia systems are presented as an alternative approach in which the objectives of each user, preferences and knowledge are used in the interaction. These hypermedia contents cover, in this sense, any type of application: from information systems, to recommendation systems and electronic commerce. In coincidence with the agent technology, it would be necessary to highlight user models aimed at electronic commerce as well as the area of interface agents and in educational systems.

IX. METHODOLOGY

a. Type of research

The research is of feasible type, since it will be oriented to the study, elaboration and development of an application that automates and optimizes the management and improvement of processes as a strategy that allows to improve the processes of public administration, from the diagnosis of the Management of the municipal government of the City of Altamira, in accordance with the ICES methodology of the IDB.

In reference to it Blanco [11], states that a feasible project will be oriented to propose the solution of a practical problem, requirements or needs of an organization. This type of research refers to the formulation of methods, models, plans, policies, programs, processes, systems or technologies. Hurtado [12] states that project research, also called feasible project, aims to propose, expose, present, plan, formulate, design, project, this type of research which consists of the preparation of a proposal or a model, whether they are inventions, programs or social needs.

b. Research level

According to Arias [13], the level of research refers to the degree of depth with which a phenomenon or object of study is approached. The present research is of comprehensive level that according to Hurtado [12], it studies the event in its relation with other events, emphasizing in general the relations of causality.

According to the approach, the research is comprehensive, because it seeks to know the fundamental structure of all methods and transactions related to the control and management of the related processes of the municipal government of the City of Altamira, in accordance with the ICES methodology of the IDB, from the diagnosis of modern Public Management, in such a way that the current situation of the same is understood, so that its characteristics and properties can be specified for its subsequent automation and optimization.

c. Research Design

The research design is the general strategy adopted by the researcher to respond to the problem posed. In terms of design, the research is classified into: documentary, field and experimental [13].

Considering the above, the present research is based on a field design because the data collection of interest was done directly, that is, the reality where the events occur and then analyze and define their characteristics and finally propose perform the analysis to determine the viability of the importance of developing a technological tool that facilitates the execution of strategies so that the actions, activities and tasks carried out in a public entity or organization are coherent with the strategies designed and designed, and in this way try to improve communication strategies and modernize management systems in public administration.

d. Population and Sample

Arias [13], defines the population as the set of elements with common characteristics for which the conclusions of all research will be extensive.

In this sense, the population that was taken as object of study comprises the municipal government of the City of Altamira since in this city council the use of the project to be developed will be possible. As it is known, the quantity of the population is said to be finite. In this case constituted by the City Council of Altamira, Tamaulipas; and more specifically in the area of information systems and technologies of said municipality.

As the population refers to a single person in charge of the area of information technology of the City of Altamira, Tamaulipas, the interview is carried out to that person, so it is not necessary to calculate a sample.

e. Techniques and Instruments of Data Collection

Hurtado [12] mentions that the selection of data collection techniques and instruments involves determining by which means or procedures the researcher will obtain the information necessary to achieve the research objectives.

During the analysis of the proposed strategy, the following data collection techniques were used:

Observation: according to Arias [13], observation is a technique that consists of visualizing or capturing by sight, in a systematic way, any event, phenomenon or situation that occurs in nature or in society, based on objectives of pre-established research. In the current research, the technique was simple or non-participatory, which is what is done when the researcher observes neutrally without being involved in the medium or reality where the study is being conducted [13].

Table 1 Subjects and study indicators

| III. Sostenibilidad fiscal y gobernabilidad | | | | |
|---|--|-------------|---|---------------------------------------|
| # Temas | # Subtemas | # Indicador | | Unidad de medida |
| 5 Gestión pública moderna | 5.1 Procesos modernos de gestión pública del presupuesto municipal | 97 | Existencia de un presupuesto plurianual | Sí/No y años |
| | | 98 | Remuneración del personal sobre la base de un sistema de indicadores de desempeño | Sí/No y porcentaje del personal |
| | 5.2 Sistemas modernos de gestión pública del gobierno municipal | 99 | Existencia de sistemas electrónicos para el seguimiento de la gestión de la municipalidad | Sí, electrónico/ Sí, manual/ No |
| | | 100 | Existencia de sistemas de adquisiciones electrónicos | Sí/ Sí calificado/ No |

Source: taken from IDB [1]

Without a doubt, the direct observation at the scene of the events was of great help in determining the existing problem, evaluating the areas that could be subject to possible changes and establishing the minimum requirements necessary to analyze the viability of the proposed strategy.

Unstructured interview: this type of interview is defined by Arias [13], as the modality where there is no guide to previously prepared questions. However, it is guided by pre-established objectives, which allows defining the subject of the interview. This was applied to the population on which the research was based, mainly to obtain the basic requirements for the design of the strategy, using user stories as the main tool. In this case, it was carried out in accordance with the IDB's ICES Methodological Guide [1], considering sub-item 5.2 and indicators # 99 and 100; as can be seen in table 1.

f. Data Analysis Techniques

For the understanding and interpretation of the results under study, a content analysis was carried out, which can be used in descriptive reasearchs to make a diagnosis and group significant contents of a series of interviews, conversations or observations [12].

The information collected is mainly constituted by the flow of activities within the area of work and the user requirements for strategy viability analysis, from the direct observation of the activities carried out (for the case of the flows of the processes or activities), and unstructured interviews, expressed in terms of user stories (which allowed identifying the basis of the user's requirements).

According to the analysis of the data, and taking into account the IDB's ICES Methodological Guide [1], taking into account the corresponding indicators, we find that there are no electronic systems in place to measure compliance with the municipality's objectives and goals; the progress and results of municipal management are carried out manually; In addition, the municipality does not have an electronic system to carry out procurement and contracting; results that, in relation to the ICES guide of the IDB, can be seen marked in the gray cell, in Table 2.

Table 2 Results of study indicators

| Description | Reference values | | |
|---|--|---|--|
| There are electronic systems in operation to measure compliance with the objectives and goals of the municipality | There is an electronic system that measures the progress and results of municipal management | There is a system that measures the progress and results of municipal management, but it is manual | There is no accountability system that measures the progress and results of municipal management |
| The municipality has an electronic system to carry out acquisitions and hiring | There is an online electronic procurement system open to the public that, as a minimum, disseminates the calls to tender and the results of public tenders | There is an electronic procurement system but it does not disseminate the results of public tenders | The municipality does not have an electronic procurement system |

Source: Based on the ICES methodology of the IDB [1]

X. ANALYSIS FOR THE DEVELOPMENT OF A TECHNOLOGICAL METHODOLOGY OF STRATEGIC COMMUNICATION

a. Motivation to carry out the reasearch

In the economic aspect, as noted in the state of the art, the strategy of an organization does not generate the expected results, in large part, due to the resistance of its personnel to "change", therefore, every time a person executes an action to carry out the strategy, conceived within the public direction, is expected to be carried out correctly and at the right time to apply it.

When people are not aware of how important it is to perform the actions planned correctly and in the time foreseen for them, the management of the strategy is hindered, and therefore a bad result. This is why the following premise of the Boston Consulting Group of 2002 is the one that will support the project in general:

"Most people are not in a position to see the need to make changes in politics and in the organization until long after the optimal moment for action has passed." [6].

Regarding the technological aspect, the motivation for the development of the research is based on advances in strategic maps with Fuzzy information or diffuse information, allowing to relate elements that configure strategic processes, that is, all processes are based on primary elements, such as causes, and, secondary elements such as effects. These elements in turn make up a strategic map called by Kaplan [2]. Also in the specialization in cutting edge technology such as intelligent agents, technology that allows quickly and reliably manage information systems, control, etc. For the above and taking into account that now more than ever the needs of public administration is increasing, we have visualized the "space" that is considered that with

the knowledge and technological advance can be "filled" and obtain great results that benefit to the public administration, in accordance with the ICES methodology of the IDB, in the following areas:

Dimension III: Fiscal Sustainability and Governance

Pillar: Adequate government mechanisms

Topic: S. Modern public management

Sub-topic: S.2 Modern public management systems of municipal government

The project, in addition to the ability to automate the process, will provide a greater impact on strategic improvement through the definition and implementation of intelligent agents capable of learning and recommend the best actions to the official. According to the above, it is time for public administrations to become rich in service to the public, in management controls in all those aspects that private organizations lead, considering also the updating of the modern public management systems of the municipal government.

b. application areas

The domain of this research is in the management sector, in the aspect of strategy guidance, in this case in public sector companies, can also be applied to domains such as: changes in public organizations to adapt to the needs of the social, economic and political environment; as well as in organizational adaptations such as: outsourcing and reinternalization; the agentization, the management; modifications of the human resources policy to public administrations: management and training; management by competencies; the evaluation of human resources; the role of the public manager; mobility among administrations; the introduction of information and communication technologies in public organizations. Also in adaptations to government, administration and citizenship. Interaction between political offices and public managers in the process of defining the problem, deciding, implementing and evaluating public policies; key activities of public managers. Positioning of public organizations in relation to citizens and users of services: service letters, complaints mechanisms, etc .; electronic services aimed at citizens and entrepreneurs: effectiveness, efficiency and transformations of public organizations in the design of these services.

c. The problem

In the analysis it has been detected that, in a public organization while performing the actions conceived for the execution of the strategy in the public company, by the personnel both at a higher level and at a lower level, work will continue without sufficient alignment with the public strategy adopted. Likewise, as long as there is still an incompatibility between a computer and a user to make the computer help to correctly execute a strategy, it will still not be sufficiently aligned with the public strategy adopted. At present, there is a great nonconformity with the performance of a strategy in the public company [3], from its origin to its end, since, for now, the machines do not have the "intelligence" enough to understand and implement a strategy, much less serve as a support to the user or employee of the organization. So we have visualized a "problem", which is expected to resolve with this research, obtaining a new methodology that integrates the human aspects that are needed for all processes and the technical and technological aspects that these processes demand.

d. Justification

Public institutions are creating strategic plans by projecting firmly with medium and short-term objectives. This context now, more than ever, obliges the public authorities to create strategic plans, which are framed within the general strategic plans. However, there is no culture of change [6]; consequently, these strategies are not applied as they were conceived, and in many cases, they are not accepted causing unnecessary delays, therefore the results that were expected are not obtained. The urgency is that these plans must be executed, and executed well, because the financing of public administrations depends on these strategic plans and the results obtained from them and above all that these results are given in the time that has been determined for the results. In this research a possible solution is proposed, to make the officials of the public institutions, in this case the public administrations, realize that there are optimal and / or critical moments to carry out the actions [2] that lead to the success of the strategy proposed and that if it is not done at that precise moment, the costs of these strategies can rise considerably.

That the research supports the change in the process of the City Council of Altamira, in such a way that, in addition to the strategy, the modern systems of the municipality are developed, among which are: the electronic system that measures the progress and results of the management municipal; and the online electronic procurement system open to the public that, at a minimum, disseminates the calls to tender and the results of public tenders; and in that way, complete the requirements of the ICES methodology of the IDB.

e. Proposals

Regarding the general objective, it is proposed to carry out a feasibility study that determines the importance of developing a technological tool that facilitates the execution of strategies so that the actions, activities and tasks carried out in a public entity or organization are coherent with the Strategies designed and designed. This proposal is part of demonstrating the feasibility and verification of the needs to stimulate change within the correct execution of a strategy: make the feasibility study open the way for personal computers to help understand the strategy and advise what actions officials must prioritize to maximize the expected results within the framework of such strategy. In relation to the scientific-technological objective, it is intended to verify the need to create a multi-agent system to facilitate the implementation of the strategic plans of the Municipality of Altamira, Tamaulipas. It will be implemented implementing dashboards that synthesize the information collected and visualized in strategic maps that, helped by artificial intelligence techniques, will finally allow the expected results of a correct execution of said plans to become reality. Specifically, a methodological study will be developed that certifies the need to implement scorecards and strategic maps, based on diffuse systems, consisting of the representation of sensitivity and value of all types of segments within the same public institution. The dashboards are useful tools for the analysis and decision of top management of both public institutions and private companies.

f. Social impact

The impact of research in the information society is the availability of dashboards and strategic maps for the public function for every administration, organization and company so that senior officials and politicians can make decisions more easily and more quickly, In turn, they can integrate the staff of the public institution with the achievement of the strategy supported daily by said strategic maps and scorecards, which will allow public employees to prioritize the actions with a better perception.

g. R & D lines to undertake

i. Dashboards with Fuzzy Systems

The dashboards in general are created from models used for recommendation and generated from Datamining techniques, which are very specific, therefore not very general, difficult and expensive maintenance to guarantee their results. In this research, it is intended to develop strategic control charts and maps based on fuzzy logic models that do not exist in the state of the art or the market and that are also going to be easy to maintain general and very suitable to be exploited on a large scale in the public function.

ii. Strategic Maps based on Fuzzy Systems

Unlike the scorecards, the strategic maps are considered totally new, since they have been introduced to the business world since 2004, for this reason this revolutionary method based on fuzzy systems will be a theme that will feed back the state of the art of the maps strategic and in general the area of decision making.

iii. Smart Agents in Recommendation tasks

This technology is available to provide synthetic information that controls, refines and recommends in real time a large number of users (up to thousands), based on strategic maps and scorecards, allowing to facilitate and improve the executions of the strategies adopted in the public entity, in addition to giving the best benefits in terms of success in the recommendations for the treatment of citizens.

iv. Technological Novelty

The main functional novelty is to validate the need to have a strategic map based on Fuzzy-Logic systems of cause-effect incidents for the public administration that visualizes the strategies allowing prioritizing activities and their respective classification, in this way computers can understand agent technology strategies which will serve to recommend the best actions for officials. The main technological novelty will be to confirm the need to have a technological methodology that forms self-maintained generic models with the ability to represent the strategy at each point of the public organization or any segment of these entities, to facilitate communication and control of the strategies. Other technological innovations are the high scalability that will be demonstrated with these dashboards and strategic maps based on Fuzzy-Logic systems.

Then, in the feasibility study will validate the need to implement intelligent agents, specifically advisors, to this reasearch so that the responsibility of correctly applying the strategy of the public institution is shared by people and machines, the latter as a facilitating tool of the task to be performed. It is expected in the future, that the machines understand the strategy of the public institution and refine, correct or recommend to the users the actions coherent with the strategy, based not only on diffuse systems but on different kinds of systems [14]. The structure of this system can be seen in Figure 1. Finally, the creation of a computer platform that facilitates the implementation of the strategic plans of any Public Institution will be proposed. It will be implemented implementing dashboards that synthesize the information collected and visualized in strategic maps that, helped by artificial intelligence techniques, will finally allow the expected results of a correct execution of said plans to become reality. This platform will allow executing institutional strategies in a more efficient and effective way developing strategic maps and scorecards so that any computer of a public institution

that has installed the platform reads, interprets and recommends the actions to follow to achieve the objectives of strategic planning conceived, whose platform can be seen in figure 2. This concept is a step forward, since by integrating this recommendation system with the site itself through the inclusion of more recommenders, the system will manage in the best possible way the strategies conceived by the organization; where these agents monitor the user's habits in such a way that the relevance of the recommendations made by the site to the employee can be increased.

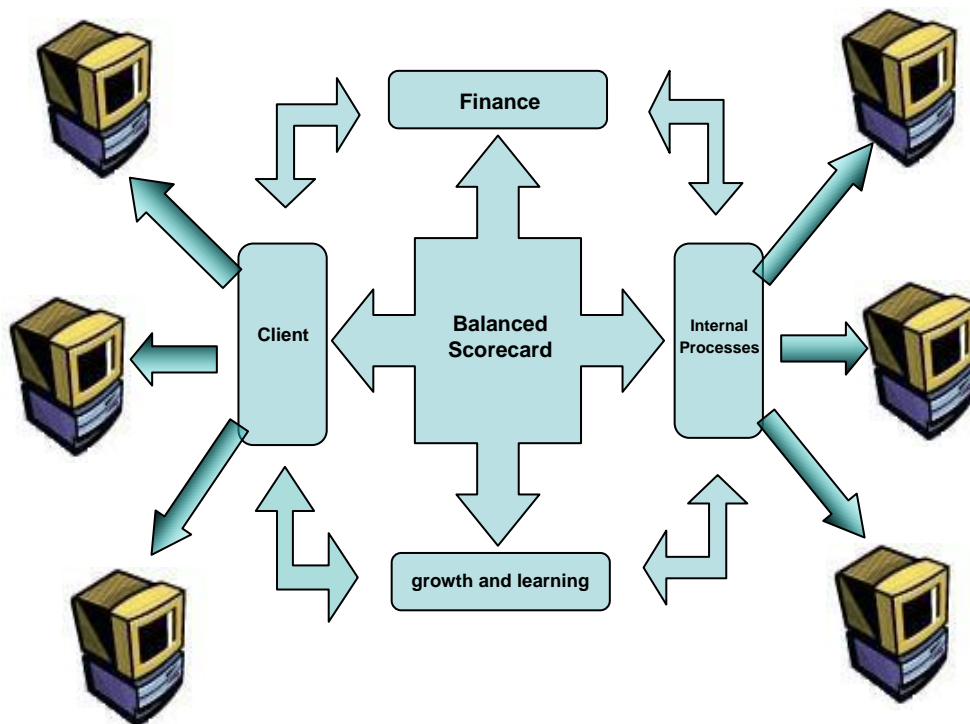


Figure 1 Fuzzy-Strategic Maps System Diagram to be applied

Source: self made

The platform will have, at least, the following particular characteristics:

Accuracy: The FSM system must be able to function accurately and completely at all times, despite changes in behavior in the strategic planning of companies and public institutions and their interactions with the organizational environment.

Understanding-Clarity: Using Artificial Intelligence techniques, Dry-Test simulation environments will be developed to allow the study of strategy incidents within public organizations prior to their implementation.

These artificial intelligence techniques will be based on the theory of diffuse subset systems adapted to the company's environment. The FSM capacity will be completed by capturing the critical routes of the strategies from other domains, using technology of physical agents to introduce this information in real time in the computers of the institutions, generating knowledge with new unexpected characteristics.

Speed: The FSM system must be able to function quickly and completely at all times, despite changes in behavior in the strategic planning of companies and public institutions and their interactions with the organizational environment.

Scalability: It is essential that the FSM system to be developed behaves satisfactorily in real conditions of the business environment. For this it is necessary, firstly, to study the computational complexity of the existing algorithms and modify them in such a way as to guarantee a linear response time with respect to the number of actions to be carried out, in scenarios with tens or hundreds of millions of interactive agents. On the other hand, it will be necessary to examine different hardware and software architecture possibilities in order to find the one that best guarantees the scalability requirements of the project and finally it will be necessary to define performance measures and design a test plan (benchmarks) and simulations that allows to compare different approaches and to control at all times of the development of the project the efficiency of the system.

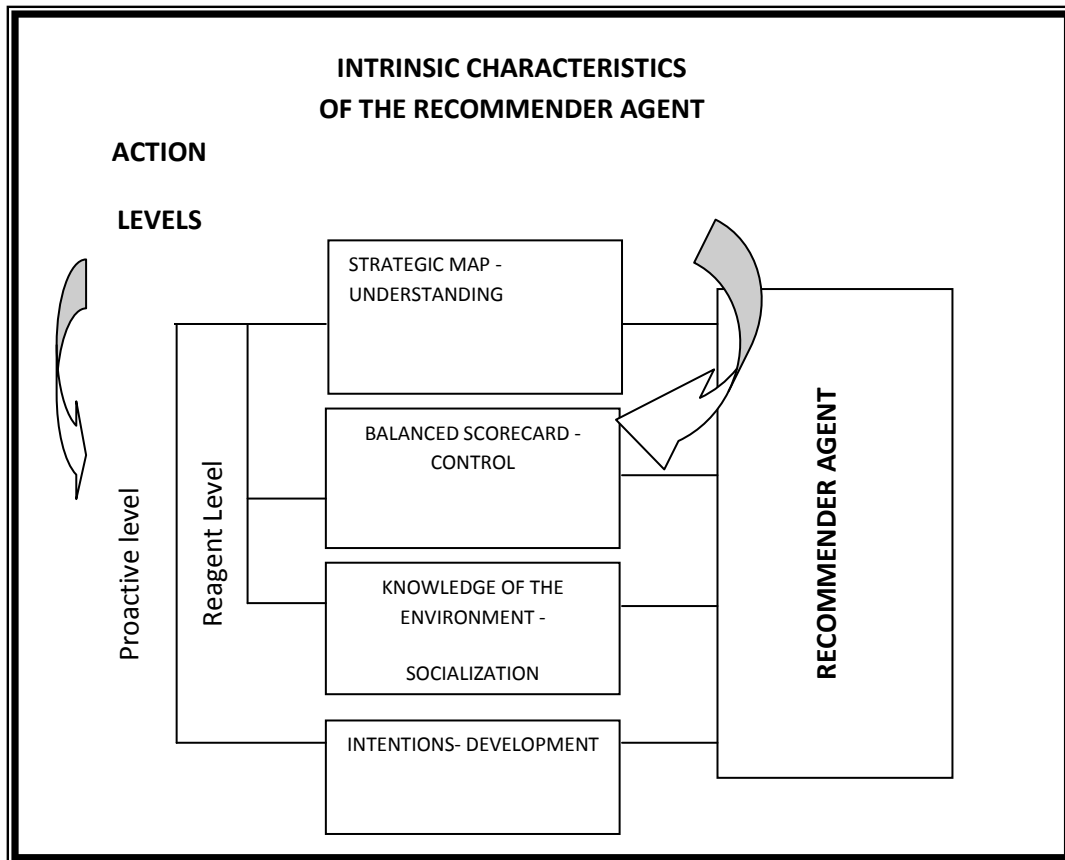


Figure 2 Profile of the Recommender Agent

Source: self made

XI. METHODOLOGY

The methodology that is proposed to be carried out is, in principle, to start with an exploratory study that corresponds to understand from its beginnings or beginnings the philosophy-methodology of the Balanced Scorecard and Strategic Maps. Afterwards, we will work with the type of analytical study, on the subject of fuzzy subsets, which are based on the causes and effects, allowing us to determine the untested relationships, making it easier to classify the actions to follow so that one or more causes reach the desired effect, which in other words, is to achieve the determined objective. And finally, the technological platform will be developed that is able to generate a strategic map and make the computer capable of reading the database that it finds in the public administration ready to carry out the pilot test, thus, the recommender agent will be able to read interpret if the official performs the assigned tasks and correct actions to achieve the desired goal or final effect, then the system can perform reactively refining and recommending actions to follow to achieve the final objective or strategy to be taken, or the opposite can be performed proactively, recommending to the official parallel activities that can achieve in a certain way that objective sought. These stages are followed by implementation and possible feedback to improve the process, as shown in Figure 3.

These stages are followed by the implementation and possible feedback to improve the process.

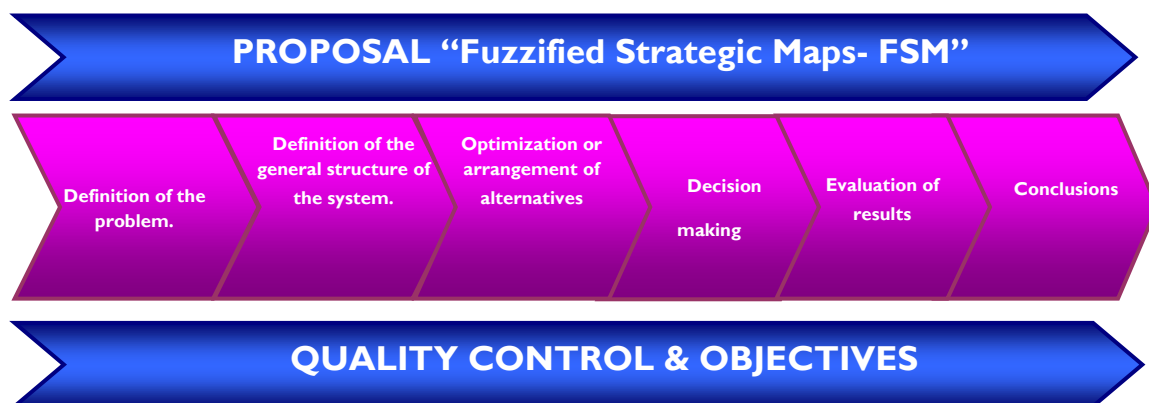


Figure 3 Fuzzified Strategic Maps Proposal - FSM

Source: Prepared by the authors

XII. CONCLUSIONS

The present research exposes an analysis for the development of a technological methodology of strategic communication that will be implemented in the processes of change in the public administration using strategic fuzzyfificados maps and intelligent agents, specifically for the City council of Altamira, Tamaulipas. The main contributions as a result of the research at the end of it will be:

Command Frames Based on Fuzzy Information

- Meters of perceived sensitivity to the strategy by the employee within the public organization
- Segment sensitivity meters within the organization.
- Concept viewers and tracking of their evolution towards strategic objectives

Strategic concept tables

- Value models associated with control meters of the evolution of the strategy.
- Management of public administration through the programmed strategies.

Strategic maps generated from the scorecards using the diffuse subset methodology

- Meters of perceived sensitivity to the strategy by the employee within the public organization
- Concept viewers and tracking of their evolution towards strategic objectives.
- Viewers of the best stratified options to execute the strategies.

Smart agents in recommendation tasks

- Generate messages of recommendation, refinement or correction of strategies for the employee or user of the computer. Platform apt to process interactions of blurred subsets and generate scorecards and strategic maps.
- This will allow the generation of strategic maps and scorecards based on fuzzy systems, which will visualize the strategy in all sectors of the public company, as well as the automatic feeding of useful data for decision-making in public administration and the top management of companies.
- Technification of management and communication of strategies within the organization will facilitate the adaptation and execution of strategies in the public organization, which will allow it to be a proactive entity based on the strategy.

With all the above, the research will support the change in the process of the City of Altamira, so that, in addition to the strategy, the modern systems of the municipality are developed, among which are: the electronic system that measures progress and results of municipal management; and the online electronic procurement system open to the public that, at a minimum, disseminates the calls to tender and the results of public tenders; indicators set by the ICES Methodology of the IDB.

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