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An analysis on the application of the Strategic Planning model based on Systems Engineering

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***Abstract*—*The objective of this work is to present an analysis on the application of the systems engineering approach to the elaboration of strategic planning. An evaluation of the proposed model was carried out in three organizations, in comparison to the traditional models of strategic planning. With the analysis it was verified that the strategic planning process that incorporates the systems engineering approach, is more comprehensive than the traditional model. With this, it is expected that this model produces better results, than the traditional strategic planning model.*

Keywords*—*Strategic planning, Strategy, Systems engineering.

I. INTRODUCTION

The objective of this work is to present the results of the application of the strategic planning approach based on Systems Engineering in three organizations.

Strategic Planning can be defined as:

- Strategic Planning is the continuous process of systematically and with the greatest possible knowledge of the future contained, making current decisions that involve risks; to organize systematically the activities necessary to implement these decisions and, through organized and systematic feedback, to measure the outcome of these decisions against the expectations fed (Drucker, 1984).
- Strategic Planning is the managerial process of developing and maintaining a workable fit between an organization's objectives, skills and resources and the opportunities of a continuously changing market. The goal of Strategic Planning is to shape the business and products of a company so that they enable the desired profits and growth (Kotler, 2000).
- Strategic Planning is a process of formulating organizational strategies in which the organization and its mission are sought in the environment in which it is operating (Chiavenato&Sapiro, 2003).

Strategic Planning is related to medium- and long-term strategic objectives that affect the direction or visibility of the organization. But, applied in isolation, it is insufficient, because we do not only work with immediate and operational actions: in the Strategic Planning process, all the strategic, tactical and operational plans of the organization must be elaborated in an integrated and articulated way.

Planning should maximize results and minimize deficiencies, using principles of greater efficiency, effectiveness, and effectiveness. They are the main criteria of management. In short, strategy points the way. Strategic Planning tells you how to walk in it.

Strategic Planning lacks the tools to shape strategies once the strategic objectives have been defined. In Systems Engineering, on the other hand, after establishing the requirements of the stakeholders, several functional and physical modeling tools are applied, in order to conceptually shape the product or system to be developed, as stated above. As both disciplines have important tools for analyzing and defining actions, the most appropriate ones can be used in each situation, thus making a broader approach to achieve the desired result. In fact, the concern should be with the concept and not with the tools themselves.

Three definitions are commonly used for Systems Engineering:

- A logical sequence of activities and decisions that transform operational needs into descriptions of system performance parameters and the preferred system configuration. (MIL-STD-499A, 1974)
- An interdisciplinary approach encompassing the technical effort to evolve and verify an integrated and balanced lifecycle solution in a people, product, and process-based system that meets customer needs. (EIA Standard / IS-632, 1994)

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- A collaborative interdisciplinary approach that stems, evolves and verifies a balanced solution to the life cycle, in which it satisfies customer expectations and meets the public's acceptability. (IEEE P1220, 1994)
- A collaborative interdisciplinary and multidisciplinary approach to derive, evolve and verify a balanced solution / system throughout the life cycle that satisfies stakeholders' expectations (Loureiro, 1999).

Systems Engineering is generally used for the development of complex products or systems. One of the goals of Systems Engineering is to show that the system is designed, built and operational, and that this system fulfills its purpose of cost effectiveness, in the best possible way, considering performance, cost, time and risk.

II. LITERATURE REVIEW: A SYSTEMS ENGINEERING APPROACH FOR ORGANIZATIONAL STRATEGIC PLANNING

This chapter presents the strategic planning approach based on systems engineering, proposed by Andrade (2008) and reported by Andrade and Loureiro (2017).

Figure 1 provides a detailed view of the proposed method for the elaboration of Strategic Planning.

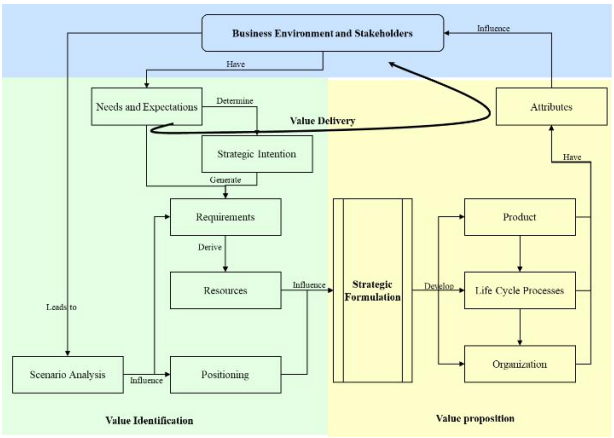

Fig.1: Organizational strategic planning
Source: Andrade (2008)

To implement the method, it is necessary to use tools appropriate to each phase of Organizational Strategic Planning, according to Andrade (2008) and Andrade and Loureiro (2017). These are described in the following subtopics:

- Stakeholder needs and expectations: Product, business processes and organization may have common stakeholders. The objective of this stage is to obtain a list of stakeholders, as complete as possible, in order to know the needs, expectations and interests of the stakeholders.
- Strategic conception: The strategic concept is divided into five stages, namely: organization business determination, organizational mission statement, organizational vision design, identification of the organization's core ideology and identification of business processes.
- Strategic Knowledge Management: Strategic knowledge management consists of a management information system that constantly monitors the internal and external environment of the organization. This information is consolidated in an internal and external diagnosis, in the construction and analysis of scenarios, in the analysis of risks and, finally, in the consolidation of strategic knowledge.
- Strategic objectives: The strategic objectives must be generated from the needs and expectations of the stakeholders and the strategic conception, in addition to being influenced by the result of the strategic diagnosis, coming from strategic knowledge management. After validating the strategic objectives, the critical success factors of the organization must be identified. Also, the goals and goals must be deployed downwards, that is, from top to bottom.
- Strategic formulation: The strategies must be elaborated from the specific objectives, from the consolidation of the requirements of the stakeholders and the critical factors of success. With this, we ensure the development of sustainable strategies that meet the needs of all stakeholders in the organization, in the business processes and in the product offered by the organization. For each of the specific objectives, an action plan must be made, which will indicate the actions necessary to achieve each objective. At this point, too, there must be an evaluation of the actions that need to develop the competence of the people of the organization.
- Strategy implementation: The strategic formulation is very important, however, it almost always comes up against implementation. Putting the organizational strategy in motion depends, fundamentally, on its implementation. If the implementation is not executed with care, the strategy, however well formulated, will not succeed. Strategic implementation requires the commitment of everyone within the organization. After the implementation of each planned action, the person responsible for the implementation of the action should standardize

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the way the activities of the organization are executed, in face of the new requirements or specifications.

- Strategy verification and validation: Strategic objectives and strategic action plans should be evaluated continuously and not only after their implementation. In this step, we will have two types of evaluation: verification of the implementation of the strategic actions included in the action plans and validation of the results achieved, after the implementation of the strategy. If the result demonstrated after the implementation of the strategy is not as expected, strategic reassessment should be performed.

III. ANALYSIS OF THE APPLICATION OF THE PROPOSED MODEL

With the use of a Systems Engineering approach to elaborate Strategic Planning, the result may be better than that presented in traditional approaches. This demonstration will be carried out by the analysis of the Strategic Planning process, using the traditional method, carried out by three different organizations, being a company producing special actions, an organization providing consulting services and continuing education and financial services and a public sector organization aerospace. All the organizations studied are Brazilian.

In order to carry out this comparative analysis, interviews were conducted with professionals from the organizations mentioned and also consult the materials related to the strategic planning made available by these professionals.

Table 1 presents a comparison of the items in the Strategic Planning process of the three organizations analyzed, compared to the proposed method.

Table.1: Comparison between the models studied and the proposed method

Proposed Method		**Traditional Strategic Planning**		
		Case 1	**Case 2**	**Case 3**
Identification of Stakeholder Needs and Expectations	Identification of Stakeholders	Partial	Partial	Partial
	Identification of Stakeholder Needs	Partial	Partial	Partial
Strategic Design	Determine the Business of the Organization	Yes	Yes	Yes
	Organizational Vision Conception	Yes	Yes	Yes
	Identify the Organization's Central Ideology	Yes	Partial	Partial
	Identify business processes	No	No	No
Strategic Knowledge Management	Perform External Diagnosis	Yes	Yes	Yes
	Perform Internal Diagnostics	Yes	Yes	Yes
	Build and Analyze Scenarios	No	Yes	Yes
	Conduct Risk Analysis	No	No	No
	Consolidation of Strategic Knowledge	No	No	No
Establishment of Strategic Objectives	Consolidation of Strategic Objectives	Partial	Partial	Partial
	Critical Success Factors	Yes	Yes	No
	Unfold Objectives and Goals	Partial	Yes	Partial
Strategic Formulation	Planning of strategic actions	Partial	Partial	Partial
	Skills Development Plan	No	No	No
Strategy Implementation	Implementation of Strategic Actions	Yes	Yes	Yes
Strategic Verification and Validation	Follow up of the Action Plan	Partial	Yes	Partial
	Result Evaluation	Partial	Yes	Partial
Strategic Reappraisal	Strategic Evaluation and Reassessment Plan	No	No	No

Case 1: Service Provider
Case 2: Iron and steel industry
Case 3: Public Organization of the Aerospace Industry
Source: Andrade (2008)

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With the application of the present analysis it is verified that the proposed Strategic Planning process, which incorporates the Systems Engineering approach, is more comprehensive than the traditional model applied in the three cases studied. With this, it is expected that this model produces better results than the traditional Strategic Planning model.

IV. FINAL CONSIDERATIONS

It was demonstrated that if a Systems Engineering approach is used for Organizational Strategic Planning, according to the proposed method, its final result will be better than the result obtained with the application of the traditional methods, according to the evaluation performed, in which they were analyzed critically the results of the Strategic Planning carried out by three different organizations in comparison with the proposed method.

With the demonstration of the method it was possible to verify the existing gaps between the traditional method and the proposed method.

It is suggested for future works to apply the proposed method in companies of different sizes and sectors of the economy, to allow the corroboration or validation of the proposed method.

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