FROM COGNITIVE MAPPING TO DECISION MODEL: COGNITIVE STRATEGIES

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ABSTRACT

The thinking style of an organization and it decisional process acquires the category of complex for its associated relational dynamics. Although we recognize the possibility of establishing multicriterial methods as a possible approach to problem-solving under these circumstances, it is also true that these, if not supported by a cognitive base for its design, they result in a reductionism of the relational complexity for the organization. This work proposes a methodological approach so called Cognitive Strategy (CS) which integrates the cognitive with the decisional process.

Keywords: Cognition, decision-making processes, complexity, cultural netwoks, cognitive strategies

RESUMEN

El estilo de pensamiento de una organización y su proceso decisional adquieren la categoría de complejos por la dinámica de relaciones asociada. Si bien reconocemos la posibilidad de establecer métodos multicriterios como aproximación posible a la solución de problemas bajo estas circuntancias, tambien es cierto que éstos, si no se sustentan en una base cognitiva para su diseño resultan en un reduccionismo de la complejidad relacional de la organización. Este trabajo propone una aproximación metodológica denominada Estrategia Cognitiva que integra el proceso cognitivo con el proceso decisional.

Palabras clave: Cognición, procesos decisionales, complejidad, redes culturales, estrategias cognitivas.

INTRODUCTION

Self-Organization and complexity have become recurring concepts in studies associated to decisional processes in organizations. For decades these topics were only interesting to academia and specialists in fields such as cybernetics, cognitive sciences, and philosophy. In this period, very interesting theories have been developed but with low attention paid by management experts. Now, those ideas have somehow become explicative principles (leadership, competitiveness, etc) which explain something, but cannot be explained, for diverse phenomena with which organizational structure and process are associated.

When referring to an organization in this context we are talking about cultural relational systems, in any scale, with a decisional history (Lavanderos, 2002; Lavanderos y Malpartida, 2005). The management process in this system is constituted by the group of actions that determine organizational structure and associated processes.

The decision-making process in organizations is specified by communication, driving to the analysis of the relational structure of the system on the basis of a non-predetermined strategy, where configuration and behavior are modified through the course of action.

If complexity is understood as the impossibility to reduce the decisional process to its parts, then the solution is to map the initial description to a decisional model. The initial observation stage must be understood as a configuration of distinctions and the connections between both. In this sense, knowledge generation is defined as a production configuration process. Based on this definition, the aim is to embed the configuration in the decisional model. The method underlying this process is defined as Cognitive Strategy.

Cognitive Strategy is oriented to model the process of formulating the experience which generates distinctions that configure signification and transforms this formulation into an Action Scheme. The process is developed in three stages: Cognitive, Decisional and Communicational.

COGNITIVE STAGE

Essentially, human activity is based on semiotic operations, particularly language; thus the base of distinctions as cognitive operations generates connective structures in the formulation speech with regard to a question. These structures arise from the type and number of connections

among the concepts used in an explanatory process. For the structural characterization of the speech, the saussurian approach of syntagmatic and paradigmatic relationship axes (Lahitte 1981) is used. The syntagmatic relationships are to the presence of terms or words in any series as the paradigmatic ones are to joining terms or words without specifying a particular way. The paradigmatic axis of a speech translates essential, stable, accepted and implicit relationships for a certain network.

From this, an analogy is established among the axes of the speech, the distinctions and the used relationality in the following way:

- Speech Syntagma (the distinctions from a base question)
- Thought Paradigm (the connective network among the distinctions)
- Type of used associations or terminological relationships: associative or causal.

The following are some rules or outlines which allow connecting syntagmas:

- **Attainment:** Concepts in which the presence of one of them affects the others, the connection is temporary. The simplest scheme is causality.
- **Association:** Concepts that superpose part of their meanings in the relationship.

From the above, it is established that the discursive process, from its base of distinctions, generates a configuration of concepts by means of consecutive and associative connectors. In the case of a network, for every member the type of configuration expresses the affinity degree among them when building the explanations.

The specific methodology for this kind of modeling is based on the Cognitive Map concept (Ackerman et al. 1995), a system that charts the reasoning line of the observer as concepts and connections (Figure Nº 1), where rectangle S_i represent the syntagmatic line, connectors the paradigmatic line; arrow connectors the attainment and simple connectors the association; P_1 is the question that rules the context and S_5 is the potential attractor. From this structure, it is possible to carry out different types of analysis, for example: attractors of speech, terminal elements, opening elements, and concept centrality. With this, it is possible to find out that some concepts of the reasoning centralize and rule the connectivity of ideas and concepts, so that they allow to characterizing the cognitive type of the speech. The cognitive map accounts for the paradigm from where the observer builds its own observation. This technique allows to structure, analyze and generate meaning for different types of problem. Cognitive mapping can

be developed directly in an interview, allowing the observer to construct and argue, as the problem arises.

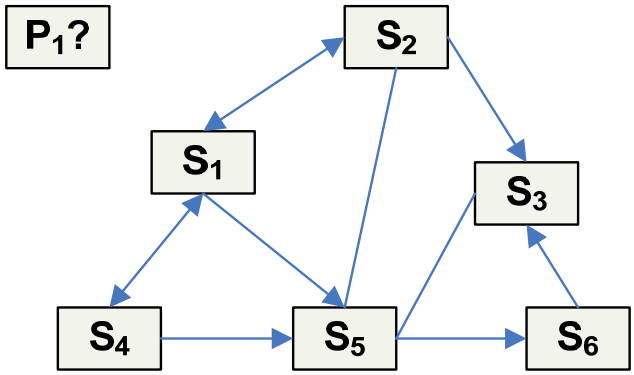

Figure Nº 1. Example of a Cognitive Map. P_1 is the general question, S_i are the syntagmas and the arrows the kind of connections.

The narrative structure is developed as a cognitive map, from concepts (within the scope of decision-making problems inside the organization), as well as their connections. The map structures are compared, trying to establish significant differences among speech structures. The criteria used to evaluate if there are differences among speeches is focused in the conservation of the "attractors" of the generated structures and in the presence of semantic circuits. An attractor is a concept that guides and centralizes the construction of explanatory ways or argumentation; it is obtained from the calculation of centrality of the elements that compose the cognitive map. The Centrality Analysis prioritizes the connective density around syntagmas and its connectivity domain; the aim is to show the presence of centrality elements that rule the reformulation ways. The transition from cognitive stage to decisional stage is based on the attractor, which is transformed into a decisional aim.

DECISIONAL STAGE

In its cognitive stage, the reformulation process generates tension points or attractors which must be solved before they can be used as explicative principles or elements of communicational closure. The result of this process is a prioritization of the alternative courses of action, as well as the criteria to solve the attractor. We will define this as the explicative-decisional configuration.

The explicative-decisional configuration can be established on the basis of the analysis of a three level hierarchy where the objective or the decision's objective is at the top, followed by a second level (criteria) and a third level (alternatives). The factors are organized affecting the decision gradually from the general (highest level) to the more specific (lower levels). The structure must reflect the importance of the elements in a given level with respect to some or all of the elements in the level immediately above it. Once the structure is complete, the process to establish the priorities is quite simple. The specific methodology for this modeling type is based on the Analytic Hierarchy Process concept (Saaty, 1994).

DECISIONAL MODEL CONSTRUCTION

The general model is constructed formulating a **central target** (from the atractor) and a set of **alternatives** of solution (that must belong to the same logical source but not be included one in other one). Then, one proceeds to develop the contents for 4 pre-established **criteria**, which are defined briefly:

- **Political**: It is the "doctrine" that faces the line of control and address, sustaining the chore of the company.
- **Economic**: Disposition and use of the resources with which it puts itself in share on the Political Criterion.
- **Social**: Effects and consequences that take place in the relations to the interior and in the environment of the unit or organization.

- **Technical**: Methods, Hardware and Skills to organize, to use and to support the three previous criteria.

These four criteria are located in the first hierarchic level. Each one must be defined as being the context of the atractor.

As soon as there were defined the contents of 4 criteria, the sub-criteria are constructed for each one. In this way, the political criterion is sustained in 3 sub-criteria: political-economic, political-social and political-technical. The contents of the sub-criteria are constructs integrating the definitions of the central criteria. This procedure recurs for 3 remaining criteria. Of the previous thing, there is obtained the scheme of the Figure Nº 2

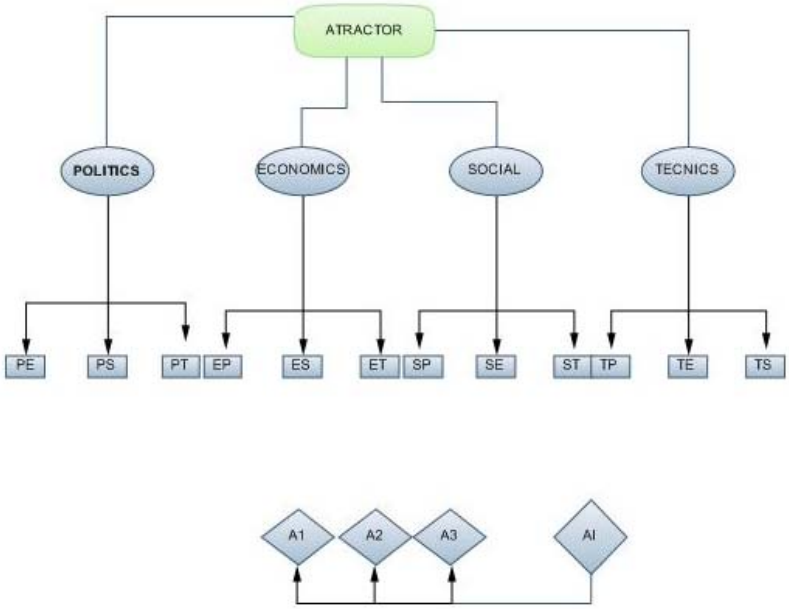

Figure Nº2. Hierarchic initial configuration with 4 principal Criteria, subcriteria and the alternatives of solution.

As soon as the general model was constructed, one proceeds to his evaluation as the Process of Hierarchic Analysis (AHP) mentioned previously. Like example, there appears a resultant configuration of the procedure of evaluation (Figure Nº 3)

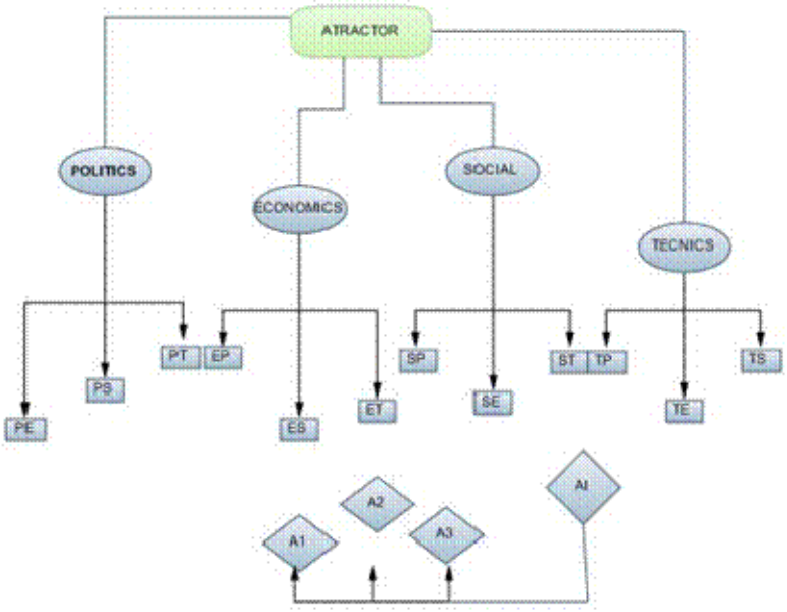

Figure Nº 3. Hierarchy valued configuration.

COMMUNICATIONAL STAGE

The communication stage is defined as the construction of the narrative from explanatory routes. These are the result of the valued criteria and the prioritized alternatives (hierarchics). This way, the explanation develops in a descending way, from the criterion that obtains the biggest value (and the corresponding sub-criteria) up to that of minor value (Figure Nº 4).

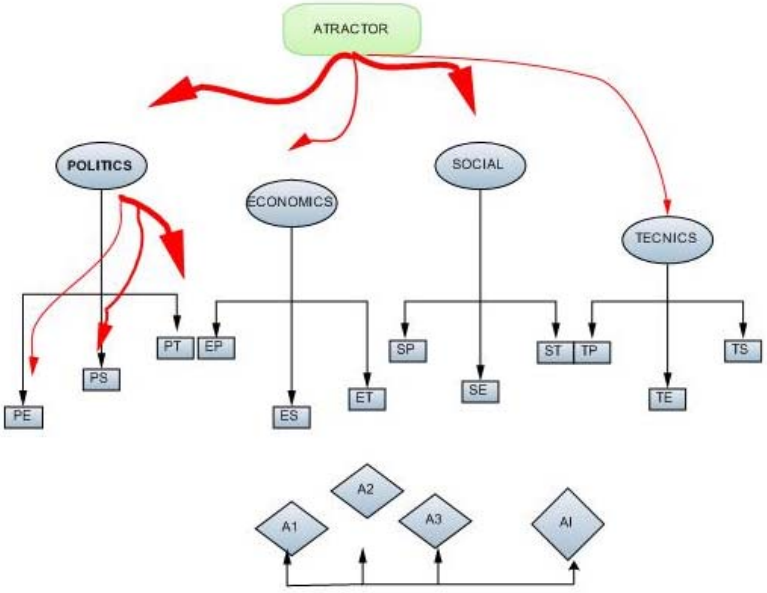

Figure Nº 4. Explanatory routes extracted from the valued configuration

In this case the construction of the the atractor explanation implies that the political and social criteria are primary. If we begin for the political criterion, which continues is the politician - technician, then the social - politician and finally the economic - politician. Once finished this one, it follows with the social criterion and its subcriteria and this way successively in accordance with the values obtained by every criterion. This way, the semantics of the decisional strategy are constructed, from valued indicators, which allow his joint and coherence.

Communication in this model is related to the organization, the structure and the context of the communicational system and not to the operation of the parts. It responds to a conception of eco-auto-poiesis, meaning the reproduction of the relational organization, and the coupling with other types of structures with which it relates as surroundings or entorno distinctions (Lavanderos & Malpartida, 2001). The idea of an emission that expresses an idea or thought can implicitly transmit other ideas and thoughts, not identical to the ones it intends to transmit. The method at this stage has to do with the explicative routes that emerge from the Analytic Hierarchy Process, which acts as a guideline for the formulation communication. This guideline is a landmark that must be present if reference is made to the process of mapping the

formulation. At this stage it doesn't matter how they connect as long as the connection elements or guidelines are maintained.

CONCLUSIONS

The Cognitive Strategy (CS) allows to understand not only the step of the narrative plane to the plane of the action but simultaneously to choose the best route. In contrast to the multicriteria methods for them alone, the CS allows to arise the explanatory principles or paradigms from which the problem is established. This principle in general operates in an underground way, since they are accepted like universal.

CS is not invasive, it is constructed from the culture of the network, the consultant has a guide roll and it is active neither in the generation of criteria nor in that of alternatives. CS is based on the type of relationship that organizes or defines the network's identity.

CS is an approach to the idea of systemic complexity, based on the eco-semiotic relationships that constitute the organizational network (Lavanderos 2002; Lavanderos and Malpartida, 2001, 2005) CS captures the process of distinctions that generate sense for the organization without reducing to persons or nodes. This way, management from CS is established as the process that reinforces the signification configurations that orient a recursive decisional process, determined by the general eco_semiosis of the organization. The recursive interchange of signification between the members of the organization conform semiotic circuits which evolve with each new exchange, in order to generate new possibilities of configuration.

An organization is defined as "relational processes, semiotically organized from the culture" (Lavanderos op.cit), then the decisional process is tightly linked to the notions of use of the language as a base operation. Each node in this network is closed with respect to each other, but at the same time contributing to the ensemble of the network on the basis of the construction of signification. The members of the organization constitute a closed network, where the signification patterns the distinction configurations that establish the decisional process. This means that the decisions, actions and behaviors of the network are "applied" to these same decisions, actions and behaviors. CS allows to open and to share the meanings associated with the decisions improving the networks of communication.

At present the Cognitive Strategies are being applied as base for the design of a strategy that allows a radical change in the innovation of the Chilean mining industry.

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