Contribution to the understanding of explanatory factors for the decision-maker problem within the framework of economic intelligence

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ABSTRACT

In an economic intelligence (IE) context, the decision-maker is more and more interested in changes of him complex environment. To help him face these situations, we propose a decision-maker model based on a set of parameters that describe the decision-maker's behavior as regards a problem. These parameters are related to the decision-maker as an individual, to the organization and the environment to which it belongs. The model of the decision-maker presented in this paper, thanks to its support for the decision-maker, allows the watcher to better understand a concrete problem posed by a given decision-maker and thus allows the watcher to seek for and to produce analyses of the most relevant information.

Key words: Economic intelligence, decision-maker, watcher, individual characteristics, cognitive style, explanatory factors, stakes.

I. Introduction

Today, the economic intelligence (EI) activity takes a particular importance with the current tendencies, in particular within the globalization of the economy and the appearance of new communication and information technologies. Whatever are the specific causes, the amplification of this activity meets perceived needs of the actors.

The EI is defined by the Martre group report [14] as "a set of coordinated actions of retrieving, processing, and distribution of useful information for economic actors in order to exploit it". The EIis in addition defined by Michel [17] as "a set of concepts, of tools, of methodologies, and of practices allowing connections in a relevant way of various knowledge and information from the point of view of the control and the development of dynamics of the economy". These two definitions show the EI role in any organization, which can be summarized by the access to relevant information and its exploitation in order to clarify the strategic decisions.

By the EI definitions, we realize that in the process of EI, one not only collects information and stores it, but the information is put in prospect, given a meaning, and especially it provides aids for strategic decision-making. The EI concept becomes obvious mainly when it is a question of studying the processes implied in the production of interpretable indicators for decision-making that is based on internal and external information of the organization [8].

Three steps are to be taken into account in the process EI. The first one, *i.e.* the observation and the listening step, consists of weak signal detection. By observing his environment, the actor is generally able to detect these signals and transform them into problem that is measured in term of stakes. After the observation and listening step, the second step consists of giving meaning to the informational appearances within their context. Thus, this step consists of information retrieval, analyzing, and interpreting. Therefore, the information is no any longer an intermediate consumption; it becomes "a vector, *i.e.* a force for structuring and instigating productive system that it provides" [15]. The last step concerns the information integration in the process of decision-making. EI is thus a systematic way to acquire, analyze and exploit internal and external information of the company [2].

The process of EI is based on human and informational resources, and the technologies of information processing.

The human resources: in an EI process, we can distinguish several actor types such as the decision-maker, the watcher, the organization partners, and the members of the staff. Each in its own way is responsible and contributes, to listening to the environment. In this paper, we are interested mainly in the decision-maker and the watcher. It is what C. Bourion calls the "actors" [6]

- The decision-maker: there are many definitions of what a decision-maker is. David and Thiery [8] defined the decision-maker as "the person that is capable of identifying

the problem to be solved in term of stake, of risk, and/or of threat which weighs on the company". In this paper we consider a decision-maker as a social actor, an observer that is well placed in its internal and external environment, and it is thanks to this position that he is the best placed to detect the unpredictable stimuli of the environment.

– The watcher: he is often defined as the information specialist, a fundamental intermediary between the decision-maker and the required information.

Informational and documentary resources: they are diversified, abundant, internal and external to an organization. For these reasons, it is necessary to capitalize them and to extract from them the most relevant indicators.

Methodological and technological resources: These resources relate to the organization and the information processing techniques within an organization.

Therefore, EI implies a strong mobilization of the human resources, information and communication processing and analysis, directed towards an objective.

Our conviction is that information as well as resources necessary in the EI process depend initially on how the watcher understands the decision-maker problem. This comprehension depends on the degree of explanation of the decision-maker problem. Therefore, we propose an approach to help the decision-maker produce a better description of his problem and the watcher for a better understanding of the problem. This can be done by the definition of a model representing information about the decision maker's characteristics.

Our work is situated at the initial stage of decision-making process. In other words, we are not interested in the process of information retrieval to solve a problem, but rather in the translation of the weak signals detected by the decision-maker into a problem that is measured in term of stakes.

Thus, in a first section, we present briefly the state of the art on the explanatory factors of a decision-maker problem. This study will allow us to explain the importance of a decision-maker modeling through his profile and to define from this modeling some useful parameters for our model development. Finally in the second section, we present our decision-maker model.

II. Explanatory factors of the decision-maker problem

What are the necessary devices to know the request and to evaluate the real needs of a decision-maker?

1. Why we wish to model the decision-maker

The analysis of the satisfactions of the actors' needs, particularly those of the decision-maker, is at the heart of the process of professionals of information and communication. We consider that the satisfaction of the decision-maker's needs remains dependent not only on the comprehension of the problem by the decision-maker itself but also on the decision-maker's degree of explanation of that problem. In addition, the satisfaction of the decision-maker's needs depend on the level of comprehension of the watcher. We consider the most significant step of an EI process to be the one of problem explanation and comprehension between the decision-maker and the watcher. So a bad explanation of the problem will guide the watcher into a bad direction and eventually a great gap will appear between the real decision-maker's need and the anticipated useful indicators in the process of decision-making.

The decision-maker, who wants to control his environment, must start by understanding the identifiable stakes of the environment, evaluating them, and measuring them in term of profits and loss. It is indeed fundamental for a decision-maker to install mechanisms of signal detection before the imminence of an event that will prevent him from reacting. Once these signals are detected, the decision-maker translates them into a problem to be solved. The emergence of this problem is a result of the combination of several factors related explicitly or implicitly, to the event so that it becomes comprehensible by the watcher. The translation of the signal into a problem is explained in the following section.

The role of the watcher concerns the comprehension of the problem presented by the decision-maker while trying to be as close as possible to the mental representation that the decision-maker has of his problem. The translation of this problem into indicators can facilitate the process of information retrieval. Therefore, the watcher has to exploit the knowledge he has about the decision-maker.

The figure 1 shows the position of the two actors, *i.e.* the watcher and the decision-maker, and their roles within the organization. The decision-maker, as an observer of the environment and who is sensitive to the weak signals, translates his observation into a problem expressed in term of some parameters, which have to be comprehensible to the watcher. This later, with his knowledge on the decision-maker, first exploits the parameters transmitted by the decision-maker and then goes toward the step of filtering of thematic information.

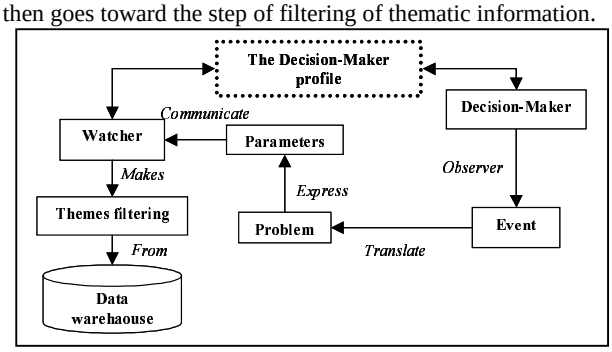

Figure 1: the appearance of a problem and its realization steps in a framework of IE

2. The knowledge on the decision-maker

The evaluation of the request and the requirements in information for a decision-maker raise some questions: What do we know about the decision-maker? What are the factors that can contribute to the explanation of the decision-maker's behavior? What is a problem for a decision-maker? What is the real need involved by a problem? … To answer these questions, our work is based on the definition of a problem observed by the decision-maker through the parameters that can be used to describe the problem.

What is a decision problem? As we presented above, the decision-maker is exposed to a set of events that he must interpret in order to provide them with some meanings. These events, as shown in the figure 2, take place at the lowest level in the hierarchical information system.

All the events do not the same level of interest for the decision-maker. Therefore, the problem depends on the meanings given to these events by the decision-maker. Several authors presented

the translation of the event or the signal to a problem as the result of several conditions. Agre in [1] proposed three conditions for this translation:

- A non desired situation due to the dissatisfaction of the decision-maker often explained by a divergence between the expectations and the reality,
- A subjective situation related to the importance attached to this divergence and thus the will to reduce it,
- An appearance of the difficulties to reduce this divergence.

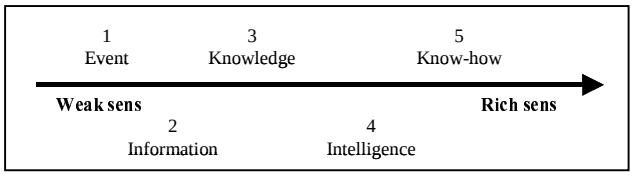

Figure 2: information levels

Two conditions were proposed by [13] to ensure the translation of the event or the signal to a problem:

- The expression of a wish to remove the differences between the expectations and the reality, in other words, the motivations,
- The resource provision and the capabilities to solve the problem.

We believe that the translation of the event or the signal to a problem depends especially on the stake related to this event. We present this translation through the following conditions:

- An event carrying a stake (potential profits or losses);
- A will for intervention. In the context of EI, we suppose that the decision-maker is sufficiently motivated to solve the problem;
- A capability in term of resources and means for the necessary intervention.

Decision-maker activity characteristics: Hales [10] summarized the activity of a decision-maker through the following tasks:

- Representation of the organization in the outside world,
- Maintaining the contact network,
- Information reception and transmission,
- Disturbances management,
- Resource allocation,
- Negotiation, and
- Control of subordinates.

So the decision-maker's activity is not limited to the decision activities, as Mintzberg shows in [18]. He considers that there are three principal roles that describe the decision-maker activity, which are the decision roles, the interpersonal roles, and the information related roles.

- **The decision roles**: We consider that *decision* is the principal role of the decision-maker. This later, according to [19], is at the same time a contractor who must initiate the change to improve the organization, a regulator that has the capacity to respond to the pressures and the threats, a negotiator within sight of the resources and the information selected, and also a distributor of resources in the organization;
- **The interpersonal roles**: The decision-maker is a symbol that represents the organization, a leader who can manage and motivate the personnel. He plays also the role of an intermediary, an officer that interacts, thanks to his position with the outside world to build his own external network of information.
- **The information related roles**: The decision-maker is an active observer that scans his environment to collect and spread information. He is also the spokesman who has the right to communicate company's specific information.

In the context of EI and throughout our work, we admit that the decision-maker plays the roles proposed in [18] and [10].

III. Decision-maker model

Modeling a decision-maker means for us the way of representing him according to a problem. We propose in this section a model of the decision-maker (DMM) offering a source of knowledge on the decision-maker. This source will play a significant role in the dialogue between the watcher and the decision-maker. We consider in fact that this dialogue is fundamental in the resolution of any decision problem.

Tchenar considers in [19] that "the central elements in any user system are the mechanisms that allow the representation and the exploitation of the assumptions on the user". The assumptions can relate to the objectives, the cognitive style, the individual characteristics, the beliefs, etc. In this section, we present the principal parameters related to the decision-maker according to a problem. These parameters are related to the individual, to the objective, to the environment, and to the organization. We also illustrate the contribution of our work with an example.

1. Decision-maker factors

In spite of its Marketing orientation, Filser presents in [9] a typology of the consumers, based on the individual characteristics in the context of his research on the consumer behavior. He classifies these characteristics as follows:

- Socio-demographical characteristics: *age, sex, income, training level, etc.*
- Psycho-graphical characteristics: *personality, value, etc*.
- Psychological characteristics: *need, motivation, implication, etc.*

We believe that a consumer is a type of decision-maker and therefore with similar behavior with the decision-maker. As a result, we adopted some consumer parameters as individual characteristics for the description of the decision-maker. First, all the characteristics related to the decision-maker's identity and objective are taken into account. We consider in this case that the objective of the decision-maker is translated into a need. We tried to identify the causality relation between the various parameters with emphasis on the cognitive aspects. As shown by Baile in [4], the cognitive aspects allow explaining the individual differences. We place emphasis on three cognitive aspects: the cognitive styles, the personality features, and the experiences.

- **The cognitive styles**: It is a concept largely used in management. It shows the individual differences. According to Hayes and Allinson [11], "the cognitive style has an influence on the way in which the individuals scan their environment to collect information, on the way they organize and interpret this information, and on the way they integrate their interpretations into the mental models which guide theirs actions". With regard to these elements, two cases can arise: either an analytical cognitive style, or a pragmatic style.
- **The personality features**: The personality is defined as "a set of cognitive and emotional structures preserved by the individuals to facilitate the adaptation to the events to the individuals and to the decisions" [7]. In short, Filser defines the personality features as stable characteristics,

which differentiate an individual from another [9]. In this work, we adopted the personality features according to [7].

- **The decision-maker experiences**: The experience is expressed in term of number of years of the decision-maker as a historical description of his former problems. Our assumption is that there is a strong link between the experience of a decision-maker and his cognitive style and thus of his capacity to transform the weak signals into a problem.

2. Organization factors

Anandarajan and Al. in [3] identified three determining factors related to the organization. Among these factors, we adopted only the one that is related to our problems which is the characteristics related to the task. These characteristics are integrated into our DMM and are described by: **the object of the environment** detected by the decision-maker, **the signal**, i.e. the meaning that the decision-maker gives to the detected object, and **the assumption** of the decision-maker on the signal.

3. Environment factors

We have chosen two environment types identified in [5] for the description of the environmental factors of a decision-maker problem:

1. The immediate environment that affects the organization in a direct way and that contains the **customers**, the **providers**, and the **competitors**.
2. The global environment that includes the **social**, **economic**, and **political** environment. We also add the organization's **image** parameter that can be useful for the explanation of the decision-maker's behavior.

4. Our decision-maker model

Our decision-maker model is presented as follows:

- **Decision-maker model**
  - **Objective**
  - **Individual characteristics**
    - **Cognitive style** *(analytical, pragmatic)*
    - **Personality features** *(sociability, persuasion, empathy, predominance, oneself regard, creativity, achievement need, power need)*
    - **Experience** *(history)*
    - **Identity** *(last name, first name, age, ...)*
  - **Organization parameters**
    - **Stakes** *(environment object, signal, assumption)*
  - **Environment parameters**
    - **Immediate environment** *(customers, providers, competitors)*
    - **Global environment** *(social, economic, political, scientific)*
    - **Competence** *(knowledge, know-how)*

In this model, some parameters are static while others are dynamic. The static parameters are those related to the **identity** in the individual characteristics. All the other parameters are dynamic. The stakes associated with the problem is determined by the environment parameters: the environment object, the associated signal and the assumptions on the signal. It should be noted that the stakes provide the means of linking the organization parameters to the environment parameters the environment objects. The assumptions in stakes are also linked with the environment parameters. This close link between the organization and environment parameters is explained by the fact that the environment is the principal source of risks or opportunities for an organization, which constitutes the main study in economic intelligence

5. Problem decision example

A director of a research laboratory noticed during a national meeting (object of the environment), that some participants (signal) do not know his laboratory. This signal can be interpreted as lack of reputation (assumption). With this assumption, the director can translate it into a problem that is considered as stake.

What are the risks of this stake for the laboratory? The problem can be described according to the environment parameters as follows: The lack of notoriety at the academic level implies a less significant number of new researchers (customers). This can imply a reduced number of staff compared to the other laboratories (competitor) and can also imply the reduction or the stagnation of subventions (providers).

The decision-maker model for this example is as follows:

DMM

- **Objective:** Make the laboratory known in the scientist communities
- **Individual characteristics**
  - **Cognitive style** *(…)*
  - **Personality features** *(…)*
  - **Experience** *(history)*
  - **Identity** *(…)*
- **Organization parameters**
  - **Stakes**
    - *Environment object:* image of the laboratory
    - *Signal:* lack of notoriety
    - *Assumption:* reduction in the number of researchers, not increase in the budget
- **Environment parameters**
  - **Immediate environment**
    - *Customers:* researchers, Ph.D. students
    - *Providers:* financial bodies
    - *Competitors:* other laboratories
  - **Global environment** *(…)*
  - **Competence** *(…)*

Using this model, the watcher can identify the types of indicators needed by the decision-maker to solve his problem. The model will also help the watcher to identify the most relevant information sources. It should be noted that the same results might be presented differently for two decision-makers: one considered as pragmatic the other as analytical.

With the indicators delivered by the watcher, the decision-maker will be able to identify the most appropriate decision to take in order to achieve his goal.

IV. Conclusion

In the contexts of the IE, of the ICT developments, and of the considerable increase in the volume and in the number of information sources, the access to the relevant information is more and more difficult. The decision-maker model that we proposed in this paper allows to better understanding of the real need of a decision-maker and thus helps the watcher in the process of information retrieval. In addition, our model offers an information source on the decision maker characteristics.

In spite of the great number of characteristics identified in the literature on the mythical decision-maker, we have adopted only the measurable ones.

Several future works is considered. First, we continue our study of the model by its integration into a real IE process. This integration will allow us to measure its advantages and its limits. Then our idea is to generalize the model for any type of user in a context of information retrieval. We are also considering the work on the way of feeding the model.

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