ROLE OF THE COGNITIVE TASK IN DECISION MAKING PERFORMANCE

RUS MIHAELA, Phd.
"Ovidius" University of Constanța
Faculty of Law and Administrative Sciences

Abstract

In organizations are being carried out extensive work processes, activities which vary according to whether why they are made for, but also according to the direct results obtained. One can speak thus, on the one hand, about executive processes, in which human resource acts on and / or uses material, financial and information resources in order to achieve targets and, on the other hand, about managerial processes, in which, a part of human resources (managers: top managers, middle managers, etc..) act on the other party, represented by employees, in order to attract the organization in accomplishing its objectives.

În the latest years, that has become the main preoccupation of several researchers: Cohen (1981), Barwise and Perry (1983), Klein et al. (1993) etc.. This research is wanted to highlight types of schemas, which are activated by managerial decision: cognitive or emotional schemas. The study is realized on 160 managers from the railway domain, developing activities at state and private institutions. The working methodology is represented by decisional cognitive targets, which the participants must analyze and solve, adopting a solving strategy and a questionnaire to identify the type of the cognitive schema. We have also underline the fact that there are individual targets, not group targets. The results put into evidence the cognitive schemas accessing, together with an existing saturation of emotional decisional schemas.

Key words:organization, cognitive task, performance, decision, management

Introduction

The key process of the managerial process in any structure is the **management decision**. This is because it is present in all **management functions**: thus, **planning** ends with decision making on achieving objectives and courses of action, **organizing** culminates in the decision making on organization forms and methods of training organizing, **coordinating** ends with decisions concerning harmonization of staff and activities, **motivating** ends with decisions on incentives that motivate the staff, while **controlling** ends with correction decisions in order to achieve.

Features of the management process

• The management process is **unified**, meaning that management functions are highly correlated, making a whole. Thus, from the organization's objectives established by the forecasting function, all activities are being organized. Changing the objectives entails significant changes in the organization.

• The management process is **typical**, meaning that functions that define its contents shall be exercised in all structures and all management levels.

• The management process is **contextual**, that is, principles, rules and methods must adapt the general context in which they are applied. Also, contextual approach supposes that, from the set of alternatives for solving a certain management problem must be chosen the one that meets the specific context of the organization.

• The management process is a people management **oriented**-process. Through the management process people are directly commanded, and through them, also the necessary activities to achieve main objectives.

• The management process is **continuous**. Similar to the work conducted, management is continuous. Being continuous, it proceeds in phases. A stage may consist of a period of five years, one year, a quarter or a month.

• The management process takes place in stages. Within each stage there are three phases: planning, operative, post-operative.

Rational decision vs. irrational decision

What distinguishes psychological facts of logical facts is not just the process of making judgments that are contrary to formal logic, with inclination to form inconsistent preferences, irrational conclusions and unfounded assumptions. An illogical decision, may be that decision type which is exemplified in studies such as Wason's selection task, where, the subject is faced with a lack of elements that makes the phenomenon not easy to understand and thus, determines providing a deductive application. A rational decision is that decision-tasks are much more representative even if the answer is right or wrong, but predictable.

P. Goodwin and G. Wright (1988) showed that people have an inclination for adventure, even if they have invested time, money or energy or even if it is contrary to common sense. They conducted a study with students at a college in Ohio, a scenario called Oregon, where they bought the tickets for a hypothetical ski trip with $ 100 to Michigan and with $ 50 to Wisconsin for the same weekend. Students are also allowed to believe by those who make the trip to Wisconsin, that it is more attractive than that of Michigan.

Literature review

Role of the cognitive task in decision making

In recent years this problem has become the main concern for many researchers. Cohen (1981), Klein, Orasanu, Calderwood, & Zsambok (1993) are those who have highlighted the fundamental difference between the decision-making process, studied and explained by the traditional theory of the decision and that observed in natural/ concrete social situations. The empirical result on decision theory, has described in detail, almost ethnographic,the studies on decision theory in specific areas. The resulting database was dense, especially in the form of prose and analysis.

Parallel to the empirical decision theory, the cognitive science researchers and human-

computer interaction (HCI) have developed more powerful analytical methods, which have been called **cognitive task analysis techniques**. The purpose of these techniques was to analyze and model the cognitive processes that have as a finality, achieving performance in human tasks in different areas, as a basis for building and evaluating computer systems.

Cognitive modeling and analysis is a relatively new topic and may have different meanings. Many analysis techniques have been developed of cognitive and decision processes (Meyer and Kieras, 1996), but there is no "standard " method appropriate for all situations and areas. It should, rather, exist a selection of the method based on specific requirements of the domain.

Cognitive complexity is another concept that correlates with the concept of managerial decision (Curşeu, 2001). The idea that people differ in terms of quality of internal representations of their self and of other important figures from their lives is widely analyzed. These representations have been characterized in many ways, especially in terms of schematic theory.

Cognitive complexity seen as flexibility and diversity of representation on individuals themselves and on others is an important cognitive variable that must be taken into account in organizations. This variable can have either a stimulatory effect or an inhibitory effect on the decision, depending on the difficulty of the decision to be taken (Curşeu, 2001).

Affective processes and decision

Historically, researches on decision-making proceedings have tried to explain in the first phase the informational deliberative process reason-basis for choice (Shafir, Simonson and Tversky 1993). More recent research provide particular importance to emotional and affective processes in decision-making.

Information in the decision-making appears as a process used in two modes of thinking: affective / experiential and deliberative (Epstein 1994, Loewenstein et al. Of 2003, Reyna 2004, Stanovich and West 2002, Kahneman, 2003), both ways of thinking being very important in decision-making. A number of studies suggest that affective processes provide both understanding and motivation of the election process. (Damasio, 1994)

Kahneman (2003) suggests that in the operation of a system, it is important the quality of the processed information and its impact on the behavior. In the hereby study full emotion is defined as those positive and negative feelings to external stimulus. These feelings can be associated with the object that produces justice, or experiential processes that produce conditioning (Staats and Staats, 1958), familiarity (Zajonc, 1980), priming (Murphy and Zajonc, 1993) and incorrect award (Schwartz and Clore, 1983). Emotion may also be relevant to the decision-making, but may also affect the decision out of the process, this condition being called accidentally emotion.

Theories of cognitive schema

In decision-making domain, a large number of researchers have proposed theoretical contributions as: Theory of rational action (TRA, Fishbein, 1967), Theory of planning behavior (Ajzen, 1985) and Accepted technology model (TAM, Davis, 1989). Most theories present sequentially, the relationship causal-effect and also the relationship external variables-beliefs-attitude-behavioral intention.

Several recent studies consider that additional relationship (Adams et. All 1992, Bhattacherjee 2000, Taylor and Todd, 1995, Venkatesh 1996, 2000). For example, Davis and Venkatesh (2000) tested how the user accepts technology and the investigation.

Bartlett (1932) first proposed the concept of schema as a mental representation for understanding, remembering and applying information in any existent context. The scheme is created based on experience with the world, with different personalities and cultures, including interactions with people, objects and events.

The assumption that people possess a repertoire of cognitive strategies adapted to the domains in which they are involved, remains a valid assumption. These strategies include logical inferences (Gigerenzer, Todd, & the ABC Research Group, 1999), preferential choice (Einhorn, 1970, Fishburn, 1980, Payne 1976, Payne, Bettman, & Johnson, 1988, 1993, Rapoport & Wallsten, 1972, Svenson, 1979), probabilistic judgments (Ginossar & Tropea, 1987), estimates (Brown NR, 1995 NR Brown, Who, & Gordon, 2002), categorization (Patalano, Smith, Jonides, & Koepp, 2001), cognitive resources allocation (Ball, Langholtz, Auble, & Sopchak, 1998), memory (Coyle, Read, Gaultney, & Bjorklund, 1998), mathematical skills (Lemaire & Siegler, 1995 Siegler, 1999), word recognition (Eisenberg & Becker, 1982) and social interactions (Erev & Roth, 2001, Fiske, 1992).

Moreover, the scheme theory helps us understand how personal perception about specific objects can be organized as a valid experience. We propose that the scheme can be divided into two types: rational scheme and emotional scheme.

Rational scheme depends on a priori knowledge which can be gained through education and professional experience.

The emotional scheme. The construct is formed according to the individual and cultural character. The three included variables: the decision to anxiety, propensity for truth, individualism, are external variables that describe the emotional scheme. The rational scheme refers to the accumulated professional experience and long term goals achieved through learning and education.

Research Objectives

The first general objective of this research aims to reveal cognitive schemes accessed in the managerial decision of the railway environment. To achieve this objective and to measure model variables it has been necessary to adapt the Questionnaire for identifying of rational vs. emotional schemes (QIRES), adapted after the model of Chang Kun Lee (2001).

The second general objective of this research aims to highlight significant differences in accessing cognitive schemes in decision-making process, according to independent variables: type of organization and management level. For this purpose, it was adapted the *Questionnaire of decision-making* (CDM), developed by French DJ, West RJ, Elander J, Wilding JM (1993), researchers from the Department of Psychology, Royal Holloway and Bedford New College, University of London , UK.

Research hypotheses

• HS1. cognitive factors involved in managerial decision influence the decision-making performance differently;

• HS2. cognitive schema type accessed, influences cognitive resonance.

Participants to the study

Subjects on which research was carried out are 160 managers from private and government

organizations, shipments industry, formal leaders through leadership positions in state organizations to which they belong, as well as private companies.

Table no. 1 Distribution of participants to the study after "the hierarchical level"

Organization	Hierarchical level	N valid
Public organization	Top management	7
	Middle management	18
	Unity managers	55
	Total	80
Private organization	Top management	8
	Middle management	21
	Unity managers	51
	Total	80

Questionnaire

The identification questionnaire of the rational versus emotional schemes. (see annexes for the final shape of the sample) adapted from Chang Kun Lee (2001). The constructs used by the author have been kept largely in the validation of the instrument on the population targeted by the study; we therefore wish to present them, before proceeding to analyze the validity and fidelity of the instrument.

The Rational Schema depends on a priori knowledge which can be gained through educational and professional experience.

The Emotional Schema describes the psychological process leading to a specific behavior or satisfaction. It can be noted that both types of schemas have intrinsic definitions; the rational schema systematically influences learning constructs, while the emotional schema is influenced by individual characteristics and cultural factors.

Decision-making questionnaire was developed by French DJ, West RJ, Elander J, Wilding JM (1993), researchers from the Department of Psychology, Royal Holloway and Bedford New College, University of London, UK (see Annex for the final form of the sample).

The adaptation of the questionnaire was conducted on a total number of 160 middle and senior level managers of the railway companies in public and private.

Analysis and interpretation of results

Regarding the hypothesis that the **type cognitive schema accessed influences the cognitive resonance and implicitly the performance**, we used linear regression in which we used as dependent variables (criteria) each dimension of the two schemes and as predictors (independent variables) the four dimensions of cognitive resonance.

Will therefore result a total of four regression models for each dependent variable, through which we test the two schema influence on factors.

Analyzing the first regression equation where we used as predictors variables of the two cognitive schemas and as a criterion the speed of decision, we realize that the models acquire significance from the third model ($F = 82.50$, $p < 0.01$). We note that the regression model acquires significance at the involvement of predictors of emotional type, which leads us to appreciate that the speed of decision, is determined by the appearance of emotional components.

Table. No. 2 Summary of the regression analysis: *independent variables*- variables of the cognitive schemes

DA (Anxiety decision), TP (Trust), IN (individualism), CS (own effectiveness in the decision), FC (conditions of facilities), SE (experience of the system) and dependent variable- decision-making speed

	R	R ²	R ² adjusted	F	p
1=FC	,07	.00	-,00	0,892	,346
2=1+SE	,11	.01	,00	1,049	,307
3=2+DA	,78	.61	,60	242,57	,000
4=3+TP	,78	.62	,62	2,528	,111
5=4+IN	,78	.62	,60	0,749	,388
6=5+CS	,79	.62	,60	0,919	,339

Analyzing the summary of the predictive model we can see that the highest predictive value is held by the fourth model that explains 61% of the variance of speed in decision-making through facilitating conditions, own experience, decision anxiety and trust.

Significant change in the prediction appears at the inclusion of the third variable (anxiety of decision) - F (1156) = 242.57, p <0.01 - the variance explained by this being of 60.1%. (R^2 changed = 0.601). The other variables from the emotional schema introduced afterwards in the model reduces the power of prediction R^2 adjusted = 0.609 for five and six models.

Analyzing the second regression equation, where I used as predictors variables of the two cognitive schemas and, confidentiality as a criterion, we see similarly to the previous equation, from the above table that, the models derive significance starting from the third model (F = 17.98 , p <0.01). We therefore note that the regression model becomes significant at the involvement of predictors of emotional type, which leads us to appreciate that confidentiality is determined by the appearance of emotional components.

Table no. 3 Summary of regression analysis: independent variables - variables of the cognitive schemas

DA (Anxiety decision), TP (Trust), IN (individualism), CS (own effectiveness in the decision), FC (conditions of facilities), SE (experience of the system) and dependent variable-confidentiality

	R	R ²	R ² adjusted	F	p
1=FC	,053	.00	-,00	0,452	,502
2=1+SE	,065	.00	-,00	0,214	,644
3=2+DA	,507	.25	,24	53,067	,000
4=3+TP	,520	.27	,25	2,823	,095
5=4+IN	,527	.27	,25	1,568	,212
6=5+CS	,527	.27	,24	0,011	,917

Analyzing the predictive model summary, we note that the highest predictive value is that of the fifth model, which explains 25.4% of confidentiality variance through facilitating conditions, own experience, decision-making anxiety, confidence and individualism. Significant change in the prediction appears always at the inclusion of the third variable (anxiety of decision) - $F_{(1,156)=}$53.06, p <0.01 - the variance explained by this being of 25.3%. (R^2 changed = 0.253).

The other variable from the emotional schema, subsequently introduced in the model lower its power of prediction to R^2 adjusted = 0.249 for model six.

Analyzing the third regression equation, where we used as predictors variables of the two cognitive schemas and as a criterion the reality of the decision, we note that the models achieve significance from the third model (F = 13.64, p <0.01).

Tabel no. 4 Summary of the regression analysis: *independent variables* – variables of the cognitive schemas

DA (Anxiety decision), TP (Trust), IN (individualism), CS (own effectiveness in the decision), FC (conditions of facilities), SE (experience of the system) and dependent variable- decision realism

	R	R^2	R^2 adjusted	F	p
1=FC	,068	.005	-,002	0,725	,396
2=1+SE	,081	.007	-,006	0,321	,572
3=2+DA	,456	.208	,193	39,629	,000
4=3+TP	,465	.216	,196	1,581	,210
5=4+IN	,469	.220	,194	0,752	,387
6=5+CS	,471	.222	,191	0,427	,515

Analyzing the predictive model summary, we noted that the highest predictive value is hold by the fourth model, explaining 19.6% of the variance of reality decision through the conditions of facility, its own experience, decision-making anxiety and trust. Significant change in the prediction appears always at the inclusion of the third variable (anxiety of decision) - $F_{(1,156)}$=39.62, p <0.01 - the variance explained by this being of 20.1%. (R^2 changed = 0.201). Trust variable adds 0.8% information, that improves predictive power of the model but this information is not important.

Analyzing the fourth regression equation, where we used as predictors variables of the two cognitive schemas and as a criterion the decision consistency, we note that the models achieve significance from the third model (F = 17.29, p <0.01). Starting with the third model, in the regression equation are being included variables of the emotional schema.

Tabelul no. 5 Summary of the regression analysis: *independent variables* –variables of the cognitive schemas

Source	F	P
Corrected model	7,04	,000
Interception	3694,60	,000
Organization	14,12	,000
Hierarchical level	3,20	,043
Organization * Hierarchical level	,076	,927

DA (Anxiety decision), TP (Trust), IN (individualism), CS (own effectiveness in the decision), FC (conditions of facilities), SE (experience of the system) and dependent variable- decision consistency

	R	R^2	R^2 ajustat	F	p
1=FC	,025	.001	-,006	0,096	,758
2=1+SE	,143	.021	-,008	3,199	,076
3=2+DA	,501	.251	,236	47,910	,000
4=3+TP	,506	.256	,237	1,164	,282
5=4+IN	,516	.264	,240	1,682	,197
6=5+CS	,515	.265	,237	0,231	,631

Analyzing the predictive model summary, we noted that the highest predictive value is hold by the fifth model, explaining 24% of the variance of decision consistence through the conditions of facility, own experience, decision-making anxiety and individualism. The first two predictive models - those based solely on rational schema can not predict consistency of decision. Significant change in the prediction appears always at the inclusion of the third variable (anxiety of decision) - $F_{(1,156)=}$ 47,91; p<0,01 - the variance explained by this being of 23%. (R^2 changed = 0.23).

To examine the manner in which the management levels and organization type influence variables of the cognitive emotional and rational schemas we used the analysis of variance ANOVA.

Regarding the dependent variable "trust" as an indicator of the emotional schema, we observe the existence of main effects of the two independent variables: "type of organization" ($F_{(1,159)}$= 14.12, p <0.01) and "hierarchical level" ($F_{(2,159)}$=3.20, p <0.05).

Table no. 6. The effects of factors on the dependent variable "trust"

Note:R^2=,186(R^2adjusted)=,160

Dependent variable: trust

Regarding the management level, we note the existence of a significant difference between unit managers and middle management in terms of confidence level (Bonferroni = 1.74, p <0.01) in the sense that, unit managers have a significantly higher level of confidence compared with those in middle management.

Table No. 7. *The main effect of the independent variable "hierarchical level "*

(I) hierarchical level	(J) hierarchical level	t	p
top management	middle management	,38	1,00
	unity managers	-1,35	,497
middle management	top management	-,38	1,000
	unity managers	**-1,74**	**,027**
unity managers	top management	-1,35	,497
	middle management	**1,74**	,027

Note: Dependent variable: trust

Method Bonferroni

In terms of facilitating conditions we note the existence of a single main effect of organization type on the dependent variable ($F_{(2,159)}$=8.20, p <0.01).

Conclusions

The conclusions drawn from the analysis of the results obtained in solving cognitive tasks indicate that in the decision-making process, managers access cognitive schemas to choose the most desirable variant to make a correct decision.

Analyzing the impact of emotional and rational schemes on the performance of the managerial decision we can conclude the following:

• Anxiety of the decision is the most important predictor. This is a significant emotional predictor, always in direct and strong touch with the reality of the decision-making;

• Other predictors, namely, trust, individualism, facilitating conditions, own effectiveness, own experience.

Bibliografie

Ajzen, I. (1985). From Intention to Actions: A Theory of Planned Behavior, *in Action Control: From Cognition to Behavior, J.Kuhl and J.Beckmann (eds.),* New York: Springer-Verlag, 11-39.

Ball, C. T., Langholtz, H. J., Auble, J., & Sopchak, B. (1998). Resource-allocation strategies: A verbal protocol analysis. *Organizational Behavior & Human Decision Processes*, *76*, 70-88

Blair, E., &Burton, S. (1987). Cognitive processes used by survey respondents to answer behavioral frequency questions. . *Journal of Consumer Research, 14,* 280-288.

Boldur, Gh.(1973). Complex economic decision-making foundation, Scientific Publishing, Bucharest.

Damasio,H., Bechara, A.&Damasio , A.R.(2002). Do somatic markers mediate decisions on the gambling task? Nat Neurosci, 5(11), 1104

Donelson, Forsyth R.(2001). Leadership. Groups' dynamics. Base texts, Polirom Publishing House, Iaşi.

Hastie,R.(2001). Problems for judgement and decision making, in *Annual Review of Psychology*

R. M. Heilman (2006). The impact of emotions and individual differences upon economic decision-making: A review of experimental literature. *Cognition, Brain, Behavior*, 10 (3), 439-459.

R. M. Heilman, L. Crişan, D. Houser, M. Miclea, & A. C. Miu (2009). Emotion regulation and decision making under risk and uncertainty.

Loewenstein, G., & Lerner, J. S. (2003). The role of affect in decision making. In R. Davidson, H. Goldsmith, & K. Scherer (Eds.), *Handbook of affective science,* Oxford, UK:Oxford University Press, 619-642.

Rettinger, David & Hastie, Reid(2001). Content Effect on decision Making in *Organizational Behavior and Human Decision Processes*, vol.85, nr.2

Richard J. Norton and George E. Teague(2002). Cognitive Factors in National Security Decision Making, Newport RI: Naval War College faculty paper, March.