"Mental models of governance actors with respect to the environmental information,"

AUTHORS

Garoui Nassreddine
Anis Jarboui

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Garoui Nassreddine (Tunisia), Anis Jarboui (Tunisia)

Mental models of governance actors with respect to the environmental information

Abstract

The aim of this paper is to examine the mental models of actors in Tunisian firms with respect to the environmental information. The authors use a cognitive map to observe these mental diagrams and to visualize ways to conceptualize the environmental information. The objective of this study is to understand the concept of "environmental information" through the presentation and analysis of the cognitive maps of the actors in Tunisian firms. The paper uses a corporate governance perspective to examine the mental models. Each actor's systematic exploration grid shows a balance of concepts that expresses their cognitive orientation. Thus, the authors visualize the concepts (variables) that structure the cognitive universe of the actors, which is projected in terms of influences and dependencies. Four major categories of variables can be distinguished through the distribution of the scatter plot variables in the grids, particularly in relation to different quadrants.

Introduction

Issues related to the environment have become increasingly important in recent years. Regulation is increasingly severe in company, stronger external pressures must provide more information about its practices, environmental policies. This information covers the following: the action of society to preserve the environment, the policy on consumer impact activities of the company on the national and global economy, action to save energy and action to improve products or services.

To expose the bridges of theoretical and scientific basis for everything we propose to do in the context of this work, we consider it useful to use two common accounting types of literature namely agency theory and signal theory.

The positive accounting theory (Leftwich, Watts and Zimmerman, 1981; and Watts and Zimmerman, 1978) uses agency arguments (Jensen and Meckling, 1976) to develop studies on the role of financial accounting in contractual relationships between managers and shareholders. This theory provides hypotheses for testing in empirical studies on accounting method choices and voluntary disclosures. Watts and Zimmerman (1990) state that contracting costs (a wide range of costs that include, besides agency costs, other contractual costs, such as transactions costs, information costs, renegotiation costs and bankruptcy costs) are crucial to models of accounting choice. According to this theory, accounting information can be seen as the basis for establishing contracts and for controlling these contracts. It is possible to find several empirical studies of voluntary disclosure that are based on agency arguments. See, for example, Watson, Shrives and Marston (2002), Haniffa and Cooke (2002), Eng and Mak (2003).

Increased disclosure of firms' information reduces the information asymmetry and the moral hazard problem. Increasing the degree of information disclosure facilitates investors' assessment on pertaining to the persistence of both accruals and cash flow about future earnings and prediction of stock returns using earnings components (Hsien-Li Lee and Hua Lee, 2015).

The signalling theory argues that the existence of information asymmetry can also be taken as a reason for good companies to use financial information to send signals to the market (Ross, 1977).

Other studies develop the relationship between the illiquidity factor, asymmetric information, and market decline (Paresh Kumar Narayan, Xinwei Zheng, 2012). Information disclosed by managers to the market reduces information asymmetry and is interpreted as a good signal by the market. A complementary perspective is derived by Morris (1987), who concludes that combining the agency theory and the signalling theory provides a good theoretical background for studies in accounting policy choices, with specific reference to voluntary disclosures. Empirically, several studies have studied signalling influence on disclosure: Inchausti (1997), Raffournier (1995), Watson, Shrives and Marston (2002) and Haniffa and Cooke (2002).

With their article in 1978, Watts and Zimmerman initiate a powerful stream of research referred to as the expression of positive political theory or con-

Garoui Nassreddine, Ph.D., Assistant Professor of Finance and Accounting, Higher Institute of Business Administration, Sfax, Tunisia. College of Business and Economics, Quassim University, KSA.
Jarboui Anis, Ph.D., Professor of Finance and Accounting, Higher Institute of Business Administration, Sfax, Tunisia.

tract theory. This theory was developed in a deductive and normative interaction, and considers that the choice of accounting methods by companies is a reflection of agency relationships within the enterprise, and political costs they may incur. The main results presented by Watts and Zimmerman showed that the accounting disclosures published by companies have information content for the financial markets. Thus, the results unanticipated by the market produce abnormal returns in the same direction and with variations connected. However, Watts and Zimmerman point out that financial and extra financial disclosure have no informational content to the extent that they provide information about the cash flows of companies. In order to make assumptions regarding the behavior of users of accounting, we rely on the agency theory and the theory of regulation.

According to the politico-contractual theory highly leveraged firms adopt accounting methods that increase their profits. In the same line of ideas, Belkaoui et al. argue that firms that undertake specific expenditures putting out their commitment in social responsibilities, have a primary objective of change in accounting period results and clauses in their contract debt. Indeed, the decision to dissemination of social information in the annual management reports is motivated by this vision by reducing the accounting profit related to costs of social commitments. Thus, Belkaoui and Karpik find a negative relationship between the CSD (corporate social disclosure) information and leverage the firm level. However, by referring to the notion of exclusive costs, company managers must give importance to the negative consequences resulting from the dissemination of social information. Exclusive costs are borne by the firm when the social disclosure is necessary for third parties whose interests diverge from those of shareholders. Thus; the ability of the firm to bear exclusive costs is related to the level of social disclosure in annual reports of management or separate reports. As a result, companies with high debt levels have less communicate social information, since these disclosures negatively affect the review of firm by financial institutions.

Jensen and Meckling (1976) consider the firm as a set of formal and informal contracts between the various economic agents involved in its operation. Inspired by this theory, the supply voluntary information appears as a breeding ground for managing conflicts of interest may arise within the company. In addition to its contribution to reduce costs agency related to differences of interest between shareholders, creditors and managers, voluntary disclosure plays a key role in managing the political visibility (Tremblay et al., 1993). Indeed, the link between the political visibility

of the firm and the information not based on an explicit contract but rather a result of the use made of the government and interest information published by the company of other groups. The reactions of these groups can cause negative wealth transfers to the company such as new taxes to pay the state, fines and penalties for contrary to the standards of environmental protection. Therefore, the objective the company is to eliminate these costs by reducing its political visibility.

The second theoretical framework is the theory of signal. According to this theory, holder of privileged information is obliged to follow a policy of publication voluntary information to avoid the risk of misinterpretation by the external users (Verrechia, 1990). Note that it allows voluntary disclosure of more legitimate business activities with political powers and groups interest (Neu et al., 1998).

The motivations of companies providing environmental information are extremely varied. Some companies believe that through environmental communication they contribute to an open dialogue with the world, they represent a benefit to any country or community in which they are present, they show the impact of the company in the natural environment and its evolution, they mark the culmination of a well-defined and well-controlled environmental policy, they are about actions for the protection of the environment and they are state progress. In addition to these ethical reasons, there are other reasons why CEOs of fundamental interest to the publication of ecological information. These reasons are more pronounced among multinational firms. Analysis information published by British firms and other Japanese identified three reasons pushing companies to disclose environmental information namely: competitiveness, legal rules and ecological responsibility (Bensal and Roth, 2000).

The development of the international economy puts a body of evidence standards diversified. It therefore seems appropriate to compare the American and European environmental standards and demonstrate the differences in particular as regards the practical consequences of the implementation of various environmental regimes.

In 1980, "United States Congress" issued a contractor's environmental program of environmental risks from releases of different materials and chemical gases. This is known as Comprehensive Environmental Response Compensation and Liability Act, which is a complement to the Resource Conservation and Recovery Act, which was established to encourage the treatment of waste. The role of CERCLA has been strengthened with the creation of the

Environmental Protection Agency. Indeed, this body is primarily responsible for policy US Environmental: it implements actions to restore land damaged (CICA, 1992). In addition, EPA provides a list of companies that have been subjected to the penalties to the SEC (Securities Exchange Commission) to ensure that ecological communication is adequate. Note that this committee advises firms publish in their annual reports environmental information such as: materials used to preserve the natural environment, ecological threats ... Several other US agencies have recommended rules on disclosure of ecological information such as TRIA (Toxic Release Inventory Act) which requires polluting firms provide information on emissions from products toxic, FASB has implemented recommendations known as "FAS 5" SARA (Superfund Amendments and Reauthorization Act), which requires imprison officials who failed to communicate environmental risk. In this regard, Epstein et al. (1994) reported that the rigidity of environmental standards has motivated different parts stakeholders to integrate environmental responsibility in their business process of decision making. In addition, they interpret any failure of environmental information disclosure by a high loss.

For its part, the European Community has identified a number of rules from which it seeks to achieve integration of environmental responsibility. The Community of environmental policy is based on three key principles namely: the principles of preventive action (implementation of precautionary measures before reaching the environment will actually occur), the principle of priority be rectified at source damage to the environment (environmental challenges must be managed in source rather than at their efforts downstream) and the principle of "polluter pays" (the polluter is solely responsible for the cost of environmental pollution) (Treaty of the European Community, 1999). In addition, on several occasions, the Committee expressed support for increased use of fiscal instruments (eco fees, environmental taxes) that among the incentives for producers and consumers to encourage and guide the selection towards more sustainable activities on the environment (Report of the European Environment Agency, 1997). At the European level, guidelines specify only the essential criteria to be met by firms and it is, then, the standardization bodies to prepare detailed technical specifications.

Therefore, enormous efforts are needed to achieve a just application and entire legislation. In addition, some European standards are developed on behalf of community in the field of testing and sampling related emissions, waste or environmental management systems.

Some countries have chosen to present their rules of environmental disclosure: France, Germany, Britain and Spain.

France is one of the first countries convinced of the importance of implementing an ecological measure within the organization (Capron et al., 2000). It provides a framework of considerably binding environmental standards (Cormier et al., 2001). Indeed, in 1995, two miles of penalties were charged to the polluting companies which have caused 5% of economic hardship (College of Accountants, 1996). However, environmental disclosure of French companies still suffers from shortcomings. One study on the environmental performance of 25 French firms during the period from 1992 to 1999 shows that 10 companies disseminate environmental information with sole desire to follow a fashion trend, 12 give no because they do feel concerned and only 3 give full information (Mikol, 2001). Similarly, Pelle Culpin (1998) affirms the complexity of the process of dissemination of environmental information and suggests there are no legal obligations for the dissemination of this type of information.

Disclosure of environmental information

To analyze the environmental disclosure in annual reports of multinational companies, we use index developed by Wiseman (1982).

The index is structured into six categories, namely: economic factors, laws and regulations, reduced pollution, sustainable development, land restoration, environmental management (Table 2).

List of categories in the index of Wiseman (1982):

♦ economic factors;
♦ laws and rules;
♦ reduction of pollution;
♦ sustainable development;
♦ land restoration;
♦ environmental management.

1. Research methodology

1.1. Methodological tools. We chose to examine the performances of the actors in the company by using a common technique in cognitive approaches, that of cognitive mapping. Cognitive mapping is a graphical modeling technique that has been used in numerous studies in management sciences. The cognitive map is not the only tool for analyzing managerial cognition, but it is the most popular for the presentation of cognitive structures (Nassreddine, G., Anis, J. (2012).

Cognitive mapping is a now well-established technique that captures the minds of the players in a

problem or situation. A cognitive map allows the researcher to observe certain ideas and beliefs of an individual within a complex area such as corporate governance. A cognitive map is usually defined as the graphical representation of a person's beliefs about a particular field. A map is not a scientific model based on an objective reality, but a representation of a part of the world as seen by an individual.

1.2. Description of the empirical investigation. To meet the research objectives noted above, a survey was conducted among players in companies in Tunisia. I chose an exploratory approach using multiple case studies. Through the use of multiple case studies, I aimed to create a better understanding of the phenomenon by studying the phenomenon in its natural setting. The use of case studies is particularly interesting in the case of little-known phenomena. The case studies thus allowed multiple accounts of the specificities and characteristics of corporate governance.

The data were derived from 10 firms. The decision to base my study on a sample of firms from various sectors was based on the assumption that a variety of issues could be addressed. The output is a cognitive map for the actors that reflect their perceptions of the behavioral approach to corporate governance.

The method used to create the cognitive maps was the questionnaire.

1.3. Presentation of the questionnaire. The questionnaire is divided into two parts: the first identifies the company and the second addresses "environmental information". For the second part, we interviewed actors from each firm by providing a list of concepts with systematic exploration grids and matrices. Systematic exploration of the grid is a technique for collecting materials (Figue 1).

Each player was encouraged to explore his own ideas or cognitive representations in relation to his strategic vision. The subject was asked to identify mental models of actors in Tunisian firms with respect to the environmental information.

The cross-matrix is also a technique of data collection and was the basis for the construction of the cognitive map. The matrix was presented in the form of a table with n rows and n columns. The box for index (i, j) indicates the relationship between concept i and concept j.

The actors manipulated the key concepts and assigned pairs of concepts depending on the nature and degree of proximity sensed between the concepts.
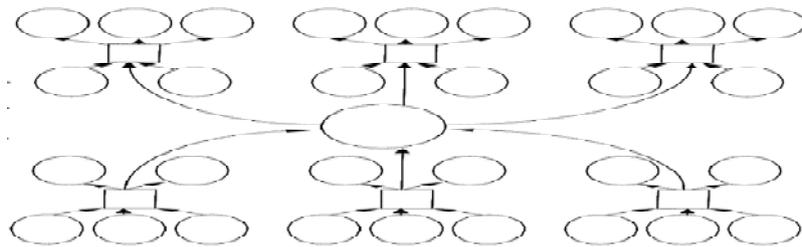
Fig. 1. Systematic exploration grid

Table 1. Adjacency matrix

	Concept 1	Concept 2	Concept n
Concept 1			
Concept 2	L21		L2n
Concept n	Ln1	Ln2	lnn

1.4. Proposal for modeling cognitive maps. When it is difficult to identify the goals, an integrated approach to performance provides a holistic view whereby the performance is analyzed by the processes that lead to the performance. These representation processes represent two problems of implementation: the sharing of the representations of the actors and the identification of the dominant representations in an organization that allows the organization to act upon them. The construction of this representation necessarily requires a model that allows understanding that to act is "an action of intentional design and construction, for composition of symbols, patterns that would make a complex phenomenon intelligible perceived.

In this context, the use of cognitive maps seems relevant because cognitive maps can take into account the complexity and comprehensiveness of the system in which [the behavior] is embedded while maintaining access to the analysis" (Komocar, 1994). The value of the tool is instrumental (Audet, 1994) because it allows the actors to both improve their actions and to make sense of them.

Cognitive mapping is used as a tool for the representation of an idiosyncratic schema (Cossette, 1994), and a pattern is "a cognitive structure that guides the cutting of reality, the interpretation of events, and the actions of individuals." Each pattern is unique to each individual, showing each to have his own behavior.

1.5. The construction of the cognitive maps. First, we will present the construction of the concepts and the methodological approach. Then, we will examine how the cards were developed.

Concepts

We addressed this issue by the representations constructed by the players using the method of cognitive maps, which is a method that can be applied to poorly structured situations. An analysis based on cognitive maps can allow an understanding of the process of structuring because the model is built or rebuilt simultaneously with the mental modeling. That is, this construction takes the form of an adapting structure.

The method helps to identify ways to achieve a given goal, the same way it helps to identify the goals justifying the use of such means. Thus, the method facilitates communication and negotiation.

There are two major trends in the construction of the cards: the determination of the concepts can be ex ante or can be determined in subsequent interviews with the respondents for whom the cards are built. Komocar (1994) links the question of determining nodes – or concepts – and links to two paradigms. In the phenomenological paradigm, the universe is largely unknown. The emphasis is on describing the world from the point of view of the people who experience it.

Nodes and links are determined directly by the participants, as advocated by Cossette and Audet (1994), not to avoid the subject of representations: the questions should be invitations for the respondent to verbalize his thoughts on what he considers an important subject of research (Cossette, 1994). In addition, the researcher cannot force the subject to consider every possible link because the links must be made spontaneously or in response to open questions, so that the subject constructs its own reality (Cossette & Audet, 1994). In the normative paradigm, the universe is more or less determined. The focus is on operational definitions, and the research plans must be reproducible. Observers and different participants should be able to determine the relationship between the variables and nodes. We were guided in this task by a literature review and an exploratory study based on a questionnaire made up of systematic exploration grids and cross-matrices. The concepts are presented in the table below.

Table 2. Key concepts for environmental information

Economic factors
Laws and rules
Reduction of pollution
Sustainable development
Land restoration
Environmental management

2. Materials and methods of structural analysis

Analysis of the results was led initially by a preliminary investigation of the perceptions of the players in the Tunisian company's vis-à-vis the notion of environmental information.

This investigation was limited to the analysis of a collective cognitive map for all of the companies, which was prepared based on the systematic exploration grids completed by the actors in each company. From the cognitive maps, we identified and qualified the designs of the actors in the field of environmental information.

The development and analysis of the cognitive maps were performed using the MICMAC software. Our initial investigation was focused on two elements: the relative importance of the concepts and an analysis of the dynamics of the influence/dependence concepts (or variables) in the cognitive universe of the players in the companies. The relative importance of the concepts was evaluated from the MIC. The MICMAC program allowed us to rank the concepts as "balance" and "dependency."

2.1. Overview of structural analysis method. The main objective of structural analysis is to identify the most important variables in determining the evolution of the system. Inspired by graph theory, structural analysis is based on the description of a system using a matrix linking all of its components. By weighting these relationships, the method highlights the key variables for changes in the system. As a tool, we opted for the software "MICMAC" (cross-impact matrices, Multiplication Applied to Classification) (Nassreddine, G., Anis, J., 2014).

The first step of the MICMAC method is to identify all of the variables characterizing the system under study (both external and internal). The second step involves the linking of the variables in the construction of the matrix based on direct influence and potential. Indeed, this approach is supported by the fact that in a systemic approach, a variable exists only through its network of relationships with other variables.

From this matrix, we identify the key variables. Indeed, we obtain the classifications by the direct sums of the rows and columns. If the total connections line indicates the importance of the influence of one variable on the overall system (direct motor level), the total column shows the degree of dependence of each variable (level of direct dependence). The indirect ranking detects hidden variables through a matrix multiplication program applied to the indirect classifications. "This program allows us to study the distribution of impacts by the paths and feedback loops and therefore to prioritize the variables in order of influence" (Nassreddine, G., Anis, J., 2014).

2.2. Matrix and processing of the MICMAC method. All of the structural analysis matrices above were established only from direct relationships between the variables. However, it is clear that a variable can also exert an influence on other variables indirectly or through another variable ("path" of order 2) or through several others exercising their influence through longer and longer "paths", and the "paths" can also loop over themselves. The classification of motor skills may be significantly altered, and understanding the mechanisms of the system similarly.

Establishing direct relations matrices for indirect paths of length two, then three ... then *N* would quickly become intractable.

A relatively simple mathematical processing approach (multiplication of a matrix by itself and elevation of the power matrices *N*) solves this problem. Benefiting from the spread of personal computers, the MICMAC method (cross-impact matrix-multiplication applied to classification) is a commercial version. As expected, the rankings of the variables by motor/decreasing influence (or dependence) generally change the matrices. However, experience has shown that these rankings become almost stable after three or four students to the power, and the importance of new variables becomes clear in terms of their indirect influences.

Analyzed at the collective level, the map is the collective model of the mental representations of several people on an identified research topic. In some cases, the cards were developed by the collective aggregation of individual cards, and in other cases, the cards were developed directly by building a group card. In the first case, the card is called a collective, and the composite map is constructed by superimposing individual maps (Bougon & Komocar, 1994; Ford & Hegarty, 1984). In the second case, the cards are called strategic, and more individual cards must come together to create a community card. The card then seeks to map the shared perceptions of a group of individuals on a particular area.

Table 3. Matrix of direct influences

	Economic factors	Laws and rules	Reduction of pollution	Sustainable development	Land restoration	Environmental management
Economic factors	0	0	0	0	0	0
Laws and rules	0	0	0	1	0	0
Reduction of pollution	0	0	0	0	0	0
Sustainable development	0	1	2	0	1	0
Land restoration	0	0	1	0	0	P
Environmental management	0	1	0	0	1	0

Note: The influences are rated from 0 to 3 and the ability to report potential influences: 0: no influence; 1: low; 2: average; 3: strong; P: potential.

Presentation of variables

List of variables

Economic factors
Laws and rules
Reduction of pollution
Sustainable development
Land restoration
Environmental management

The input. This step was designed to compile a matrix of direct influence between the variables in a scoring session. The matrix of direct influence (MID) describes the relationship of direct influence between the variables defining the system, and the Matrix Influences (MIDP) represent the potential direct influences and dependencies between the existing and potential variables. The scoring has developed as the input matrix a "matrix of direct influences" (MID). The influences are rated from 0 to 3, with the ability to report potential influences.

Matrix of direct influences (MID). The matrix of direct influence (MID) describes the relationship of the direct influences between the variables defining the system.

Matrix of direct potential influences (MIDP). The Matrix of Direct Potential Influences (MIDP) represents the potential direct influences and dependencies between the existing and potential variables. It complements the MID matrix and also takes into account possible relationships in the future.

Table 4. Matrix of potential direct influences

	Economic factors	Laws and rules	Reduction of pollution	Sustainable development	Land restoration	Environmental management
Economic factors	0	0	0	0	0	1
Laws and rules	0	0	1	0	3	2

Table 4 (cont.). Matrix of potential direct influences

	Economic factors	Laws and rules	Reduction of pollution	Sustainable development	Land restoration	Environmental management
Reduction of pollution	0	0	0	0	1	1
Sustainable development	0	1	2	0	1	0

3. Results of the study

Direct influences

Characteristic of MID. This table shows the values for 0, 1, 2, 3, 4 for the matrix and displays the filling ratio, which is calculated as the ratio between the number of MID values different from 0 and the total number of elements in the matrix.

Table 5. Characteristic of MID

Indicator	Size of matrix	Number of iteration	Number of zero	Number of one	Number of two	Number of three	Number of P	Total	Fill rate
Value	6	2	28	6	1	0	1	8	59.25926%

Stability of MID. If it is shown that any matrix must converge to stability after a certain number of iterations (usually 4 or 5 for a matrix of size 30), it would be interesting to monitor the stability during successive multiplications. In the absence of mathematically established criteria, we chose to rely on the number of permutations (bubble sort) necessary to classify each iteration, influence and dependence for all of the variables in the MID matrix.

Table 6. Stability of MID

Iteration	Influence	Dependence
1	82%	66%
2	100%	106%

Sum of rows and columns of MID. This table enters the sums of the rows and columns of the MID matrix.

Table 7. Sum of rows and columns of MID

N°	Variable	Total of lines	Total of columns
1	Economic factors	7	11
2	Laws and rules	14	3
3	Reduction of pollution	8	18
4	Sustainable development	11	11
5	Land restoration	11	8
6	Environmental management	7	9

Potential direct influences

Characteristic of MIDP. This table shows the values for 0, 1, 2, 3, 4 for the MIDP matrix and displays the filling ratio, which is calculated as the ratio between the number of MID values different from 0 and the total number of elements in the matrix.

Table 8. Characteristic of MIDP

Indicator	Size of matrix	Number of iteration	Number of zero	Number of one	Number of two	Number of three	Number of P	Total	Fill rate
Value	6	2	23	8	4	1	0	13	31.64%

Stability of MIDP. If it is shown that any matrix must converge to stability after a certain number of iterations (usually 4 or 5 for a matrix of size 30), it would be interesting to monitor the stability during the successive multiplications.

In the absence of mathematically established criteria, we chose to rely on the number of permutations (bubble sort) necessary to classify each iteration, influence and dependence for the set of variables.

Table 9. Stability of MIDP

Iteration	Influence	Dependence
1	82%	66%
2	100%	106%

Sum of rows and columns of MIDP. This Table is used to enter the sums of the rows and columns of the MIDP matrix.

Table 10. Sum of rows and columns

N°	Variable	Total of lines	Total of columns
1	Economic factors	7	11
2	Laws and rules	14	3
3	Reduction of pollution	8	18
4	Sustainable development	11	11
5	Land restoration	11	8
6	Environmental management	7	9

Indirect influences

Matrix of indirect influences (MII). The matrix of indirect influences (MII) is the matrix of direct influences (MID) high power by successive iterations. From this matrix, a new classification of variables highlights the most important variables in the system. Indeed, it reveals the hidden variables through a matrix multiplication program applied to the indirect classification. This program allows us to study the

distribution of the impacts by the paths and feedback loops and therefore to prioritize the variables in order of influence, taking into account the number of paths and loops of length 1, 2, ... n from each variable in order of length, taking into account the number of paths and loops of length 1, 2, ...n arriving on each variable. The ranking is stable in general from an increase in the order 3, 4 or 5 (Table 11).

Table 11. Matrix of indirect influences (MII)

	Economic factors	Laws and rules	Reduction of pollution	Sustainable development	Land restoration	Environmental management
Economic factors	35	14	51	44	25	28
Laws and rules	80	25	96	79	34	54
Reduction of pollution	64	24	71	61	24	15
Sustainable development	49	11	59	64	25	71
Land restoration	61	17	59	123	24	101
Environmental management	33	14	60	34	32	39

Stability of MIDP. If it is shown that any matrix must converge to stability after a certain number of iterations (usually 4 or 5 for a matrix of size 30), it would be interesting to monitor the stability during the successive multiplications. In the absence of mathematically established criteria, we chose to rely on the number of permutations (bubble sort) necessary to classify each iteration, influence and dependence for the set of variables (Table 12).

Table 12. Stability of MIDP

Iteration	Influence	Dependence
1	82%	66%
2	100%	106%

Sum of rows and columns of MII. This table is used to enter the sums of the rows and columns of the MII matrix (Table 13).

Table 13. Sum of rows and columns of MII

N°	Variable	Total of lines	Total of columns
1	Economic factors	488	772
2	Laws and rules	926	265
3	Reduction of pollution	592	997
4	Sustainable development	709	1010
5	Land restoration	927	421
6	Environmental management	505	744

Conclusion

This plan (Figure 2) visualizes the concepts (variables) structuring the cognitive universe of the actors that can be projected in terms of influences/dependencies. By the distribution of the scatter plot variables in this plan, particularly in relation to different quadrants, we can distinguish four major categories of variables (Figure 2).

The first quadrant includes the most prominent concepts in the dynamics of thought of the actors. For the actors in each organization, the notion of "Reduction of pollution" and "Laws and rules" are the most dominant in their cognitions, reflecting an intention based on laws logic.

Faced with voluntary disclosures gaps, several studies (Gray et al., 1995; Deegan and Rankin, 1997) put forward the idea of regulatory responsibility of environmental companies to obtain better disclosures.

Adams (2004) shows that several countries (Australia, France, Denmark, Spain, Norway, Sweden) are legislating increasingly on disclosure environmental and social issues in annual or self-reports. So of mandatory disclosures obtained when companies comply with legal requirements established. Mandatory disclosure may be part of financial documents, the annual management reports, disclosure and analysis; or non-financial information such as reports on the health and security or reporting on pollutant releases/emissions. Thus, in the American context, the study of Bewley and Magness (2008) described the effect the adoption by the SEC (Securities and Exchange Commission) Staff Accounting Bulletin (SAB 92) on environmental information disclosure by companies. This regulation concerns the treatment of contingent liabilities. The results show an increase in environmental disclosures after the adoption of these provisions. These same results were obtained in the context of Australia, with the introduction of the reporting guidelines through the Corporations Law, which requires companies to account for their environmental performance in relation to any specific and significant regulations (Frost, 2007).
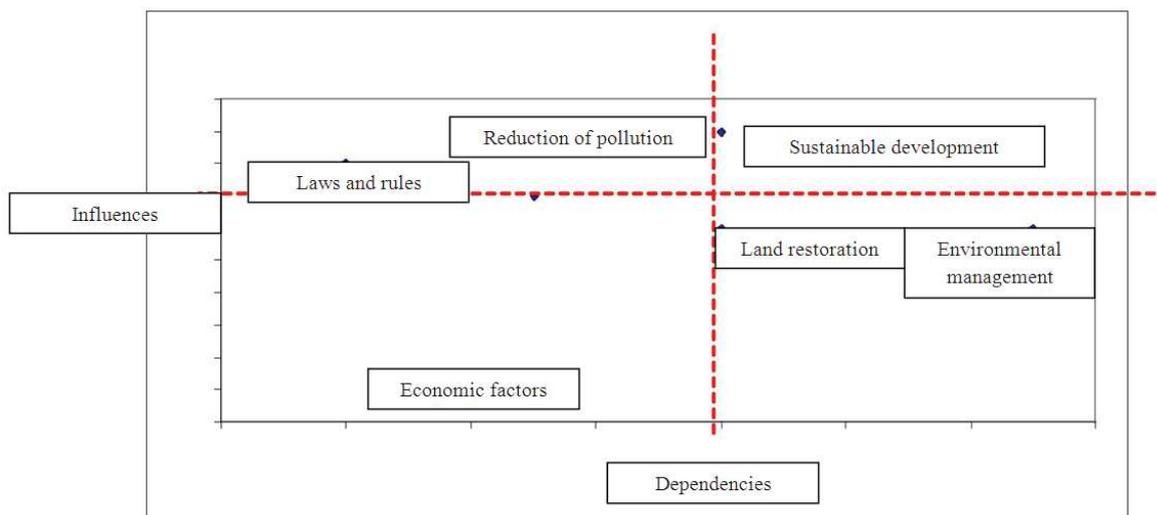
Fig. 2. Cognitive mapping through the influences dependencies plan

References

1. Abelson, R., & Rosenberg, M. (1958). Symbolic psychologic: a model of attitudinal cognition, *Behavioral Science*, 3 (1), pp. 1-13.
2. Anderson, J.J. (1973). Silicate water mass analysis off the northwest coast of Africa, *Investigations Pesqeras*, sup. 2, pp. 53-64.
3. Audet, M. (1994). Plasticité, instrumentalité et réflexivité [Plasticity, instrumentalisty and reflexivity]. In P. Cossette (Eds.), *Cartes cognitives et organizations*, Collection. Québec/Paris: Les Presses de l'Université Laval/Éditions ESKA, pp. 187-198.
4. Barberis, N., Shleifer, A. & Vishny, R.W. (1998). A mod-el of investor sentiment, *Journal of Financial Economics*, 49 (3), pp. 307-343.
5. Bougon, M. G., & Komocar, J. M. (1994). Les cartes cognitives composites. une théorie holistique et dynamique des organizations. in p. cossette (eds.), *Cartes cognitives et organizations*, Collection. Québec/Paris: Les Presses de l'Université Laval/Éditions ESKA. pp. 37-56.
6. Brehm, M.L., Back, K.W. & Bogdonoff, M.D. (1964). A physiological effect of cognitive disso-nance under stress and deprivation, *The Journal of Abnormal and Social Psychology*, 69 (3), pp. 303-310.
7. Cossette, P. (1994). Les cartes cognitives au service de l'étude des organizations. In P. Cossette (Eds.), *Cartes cognitives et organizations*, Collection. Québec/Paris: LesPresses de l'Université Laval/Éditions ESKA, pp. 3-12.
8. Daniel, K., Hirshleifer, D. & Subrahmanyam, A. (1998). Investor psychology and security market under- and over-reactions, *Journal of Finance*, 53 (6), pp. 1839-1885.
9. De Bondt, W.F.M. & Thaler, R. (1985). Does the stock market overreact? *The Journal of Finance*, 40 (3), pp. 793-805.
10. Dittrich, P., & Speroni di Fenizio, P. (2007). Chemical Organization Theory, *Bulletin of Mathematical Biology*, 69 (4), pp. 1199-1231.
11. Fairchild, R.J. (2005). The effect of managerial over-confidence, asymmetric information, and moral hazard on capital structure decisions.
12. Festinger, L. (1957). *A theory of cognitive dissonance*. Standford, CA: stanford university press.
13. Ford, J.D., & Hegarty, W.H. (1984). Decision makers' beliefs about the causes and effects of structure: an exploratory study, *Academy of Management Journal*, 27 (2), pp. 271-291.
14. Gomez, P.Y. (1996). Le gouvernement de l'entreprise [corporate governance: economic models and business Practices]. Paris: éditions masson.
15. Griffin, D. & Tversky, A. (1992). The weighing of evi-dence and the determinants of confidence, *Cognitive psychology*, 24 (3), pp. 411-435.
16. Haniffa, R. & Cooke, T. (2002). Culture, corporate governance and disclosure in malaysian corporations, *Abacus*, 38 (3), pp. 317-349.
17. Harmon, J.E. (2000). A cognitive dissonance theory perspective on the role of emotion in the maintenance and change of beliefs and attitudes. In N.H. Frijda, A.R.S. Manstead & S. Bem (Eds.), *Emotions and beliefs*. Cambridge, UK: Cambridge University Press, pp. 185-211.
18. Harmon-Jones, E. & Harmon-Jones, C. (2007). Cognitive dissonance theory: an update with a focus on the action-based model. in J. Shah & W. Gardner (eds.), *Handbook of motivation science*, pp. 71-83. New York, NY: guilford publications.
19. Heath, C. & Tversky, A. (1991). Preference and belief – ambiguity and competence in choice under uncertainty, *Journal of Risk and Uncertainty*, 4 (1), pp. 5-28.

20. Hsien, L.L. & Hua, L. (2015). Effect of information disclosure and transparency ranking system on mispricing of accruals of Taiwanese firms, *Review of Quantitative Finance and Accounting*, 44, pp. 445-471.
21. Inchausti, B.G. (1997). The influence of company characteristics and accounting regulation on information disclosed by spanish firms, *European Accounting Review*, 6 (1), pp. 45-68.
22. Jolls, C. (2009). Behavioral law and economics (working paper no. 130). Yale Law School.
23. Kahneman, D., Tversky, A. (1979). Prospect theory: an analysis of decision under risk, *Econometrica*, 47 (2), pp. 263-291.
24. Kempler, D. (2005). *Neurocognitive disorders in aging*. Thousand oaks, CA: Sage Publications.
25. Komocar, J.M. (1994). Cartes causales d'un milieu de travail. In P. Cossette (Ed.), *Cartes cognitives et organizations*. Quebec: Les Presses de l'Université Laval, pp. 155-184.
26. Leftwich, R.W., Watts, R.L. & Zimmerman, J.L. (1981). Voluntary corporate disclosure: the case of interim reporting, *Journal of Accounting Research*, 19 (3) supplement, pp. 50-77.
27. Leltzoff, A.N. (2005). Imitation and other minds: the 'like me' hypothesis. in S. Hurley & N. Chater (eds.), perspectives on imitation: from cognitive neuroscience to social science (vol. 2). Cambridge, UK: MIT press, pp. 55-77.
28. Miller, M.H. (1977). Debt and taxes, *Journal of Finance*, 32 (2), pp. 261-275.
29. Nassreddine, G. & Anis, J. (2012). Cognitive mapping: testing application of causal algebra, *Applied Mathematics*, 3 (4), pp. 364-373.
30. Nassreddine, G. & Anis, J. (2014). Cognitive governance, cognitive mapping and cognitive conflicts: structural analysis with the Micmac method, Cogent Economics and Finance (Taylor and Francis), volume 2.
31. Nassreddine, G., Anis, J. (2014). Corporate governance, behavioral approach and cognitive mapping technique, *Contemporary Economics*, 8 (2), pp. 229-242.
32. Oliver, R.L. (1980). A cognitive model of the ante-cedents and consequences of satisfaction decisions, *Journal of Marketing Research*, 17 (4), pp. 460-469.
33. Paresh, K., Narayan & Xinwei, Z. (2012). Asymmetric Information and Market Decline: Evidence from the Chinese Market, *Review of Pacific Basin Financial Markets and Policies*, 15 (3).
34. Raffournier, B. (1995). The determinants of voluntary financial disclosure by swiss listed companies, *European Accounting Review*, 4 (2), pp. 261-280.
35. Ritter, J.R. (2003). Difference between European and American IPO markets, *European Financial Management*, 9 (4), pp. 421-434.
36. Scheinkman, J.A. & Xiong, W. (2003). Overconfidence and speculative bubbles, *Journal of Political Economy*, 111 (6), pp. 1183-1219.
37. Sherif, M. & Hovland, C.I. (1961). *Social judgment: assimilation and contrast effects in communication and attitude change*. Westport, CT: Greenwood Press.
38. Svenson, O. (1981). Are we all less risky and more skill-ful than our fellow drivers? *Acta Psychologica*, 47 (2), pp. 143-148.
39. Thaler, R.H. (1996). Doing economics without homo economicus. In S.G. Medema & W.J. Samuels (eds.), *Foundations of research in economics: how do economists do economics*, Cheltenham, UK: Edward Elgar, pp. 227-237.
40. Watson, A., P. Shrives & Marston, C. (2002). Voluntary disclosure of accounting ratios in the UK, *The British Accounting Review*, 34 (4), pp. 289-313.
41. Watts, R. & Zimmerman, J. (1978). Towards a positive theory of the determination of accounting standards, *The Accounting Review*, Janeiro, 53 (1), pp. 112-134.
42. Weinstein, N.D. (1980). Unrealistic optimism about future life events, *Journal of Personality and Social Psychology*, 39 (5), 806-820.
43. Yohn, T. (1998). Information asymmetry around earnings announcement, *Review of Quantitative Finance and Accounting*, 11 (2), pp. 165-182.
44. Yates, J.F. (1990). *Judgment and decision making*. Englewood Cliffs, NJ: Prentice Hall.
45. Zacharakis, A.L. & Shepherd, D.A. (2001). The nature of information and overconfidence on venture capitalists' decision making, *Journal of Business Venturing*, 16 (4), pp. 311-332.