A KNOWLEDGE-BASED MODEL FOR ORGANIZATIONAL PERFORMANCE EVALUATION

A. Claudio Garavelli1, Michele Gorgoglione2, Giovanni Schiuma3
1 Università di Lecce, Via Monteroni, 73100 Lecce (Italy), garavelli@ingle01.unile.it
2 Politecnico di Bari, V.le Japigia, 182 - 70126 Bari (Italy), gorgoglione@dppiprod.poliba.it
3 Università della Basilicata, Via Tecnica, 3 - 85100 Potenza (Italy), ecoge296@unibas.it

ABSTRACT

Knowledge has been widely recognized as a critical resource for competition. Then it seems important to analyze organizational performance based on a cognitive approach. In this paper, this approach consists in the identification of two main classes of organizational problem (repetitive and innovative) and two main cognitive processes (codification and interpretation) involved in problem solving. Given these classifications, a model to evaluate the organizational performance is proposed based on the assessment of the consistency between the type of problem with the knowledge management processes. Two examples of application are also provided.

Keywords: organizational performance, problem solving, knowledge management.

1. INTRODUCTION

Knowledge has been widely recognized as a fundamental factor in creating value and competitive advantage for companies. Academics and practitioners have paid great attention on both the analysis of competencies (Prahalad and Hamel, 1990) and the knowledge management (KM) processes (Davenport and Prusak, 1998). Thinking to organizations as a collection of competencies and knowledge resources have led to view in a different light many organizational activities and resources, such as strategy and technology, opening new opportunities to increase competitiveness.

The KM approach, in particular, seems to be useful to analyze organizational performance. The performance of an organizational process is traditionally associated with the quality of its output and with its productive effectiveness and efficiency, and depends on the way the process is designed and managed. Traditional performances are then mainly related to economic or other quantitative evaluations of the process results (Neely, 1998). A “process” is considered as a combination of activities, and activities are modeled as black boxes characterized by people, equipment, input materials, methods, and environment that contribute to produce an output. This model has enabled the development of an extensive set of metrics useful to improve organizational performance, for instance, by changes in process activities (e.g., worker training, procedures for incoming materials, etc.) and/or in process elements (e.g., the equipment).

Those performances, however, usually do not assess the inner characteristics of the organization, which primarily concern its knowledge assets and processes and can actually explain the organization capabilities. Analyzing and improving the way problems are solved seems to be a more effective way to improve organizational performance. For instance, better performance in the new product development may be achieved by fostering and sustaining knowledge generation and transfer between organization units. Similarly, in plant maintenance an effective management of historical data, i.e. information gathering, storing and retrieval, can allow to reach very high performance. According to this perspective, different companies can carry out organizational processes with identical traditional performances (e.g., cost, time, quality), but their knowledge resources (such as skills and technologies) and problem solving capabilities can be very different, thus
affecting each company’s opportunities.

By resorting to the KM approach, it emerges the possibility of performing a deeper analysis of organizational performance, involving the cognitive level of the organizational processes. In the KM perspective, the effectiveness of problem solving depends on the way the organization retrieves information from memories, arranges information, transfers knowledge, changes code and languages by which knowledge is expressed. Recent research has proposed methods to identify and measure knowledge assets, such as technology or people capabilities. However, the question is more to evaluate how knowledge resources are used, with respect to the company’s goals. To this aim, it is necessary both to understand which cognitive processes lie beneath the management processes, and to define some variable useful to evaluate the performance of these processes.

This paper is aimed to define a model to assess the capability of an organization to solve problems by effectively leveraging on its own knowledge. A basic assumption of the model is that an effective knowledge management yields high capabilities of problem solving, which allow to carry out effective organization processes. Consequently, the paper provides a model to evaluate whether an organization faces and solves problems using the right cognitive processes and resources. To this aim, two main classes of problem and two basic cognitive processes are identified. Some quantitative variables are also proposed to measure the consistency between problems and KM processes.

2. LEARNING AND KNOWLEDGE MANAGEMENT IN PROBLEM SOLVING

Problem solving has been approached by much research in the management literature. The investigation of the processes by which individuals solve problems and make decisions is a significant part of management science. Researchers have dealt with the development of psychological models, mathematical models, and organizational models of problem solving in companies. This research have produced many effects on management disciplines, such as theories of decision, principles for designing systems for supporting management, models of organizational design.

A fundamental contribution to explain the source of competitive advantage have also stem from this research, and in particular from the study of learning processes within organizations (Huber, 1991). The basic hypothesis is that excellent capabilities in problem solving, which are the basis for excellent organizational performance, are strictly related to learning capabilities. Then, in the “learning perspective” it is argued that learning must be a major goal for a virtuous organization, and the research focuses on both the investigation of the organizational learning mechanisms and the development of learning organization models.

Despite the great progress achieved in understanding complex mechanisms such as individual and group reasoning, measuring problem solving capabilities is still difficult, because learning remains hard to be approached by methods of measurement. Although companies use to assess the success of learning projects by, for instance, post-auditing employees or analyzing the evolving competitiveness of the company, the research on learning has probably not yielded effective methods to measure and control the organization problem solving capabilities.

The approach of KM, on the contrary, directly focuses on knowledge, viewed as a collection of “knowledge objects” that can be handled and transferred, rather than as a set of learning processes (Sveiby, 1997). This approach is strongly supported by the development of Information and Communication Technologies (ICTs) that, if properly used, allow to manage and transfer across the organization the knowledge captured in objects similarly to data and materials. In the KM perspective, the way people solve problems is no more a matter of having insight of solutions, making analogies, deducing explanations, but rather a process of retrieving information from memories, arranging information in objects, transferring knowledge objects, changing the knowledge code.
KM processes seem to be more suitable to measurement than learning processes. Quantifying the amount of information recorded in a file, or the number of knowledge objects transferred between two computers, or the time required to access information, seem to be definitely easier than measuring how much people learn. Still, there remain some difficulties. In fact, it is necessary to link the knowledge resources and processes to the organizational performance, and in particular to the problem solving. Thus, it is necessary to identify the cognitive processes at the basis of the problem solving and to measure the coherence between these processes and the kind of problems the company has to solve. To this aim, in the paper two main classes of problem and two basic cognitive processes are identified.

3. CLASSES OF PROBLEMS: REPETITIVE AND INNOVATIVE

Some of the problems companies usually face can be approached by standard procedures, appear simple and are perceived as routine, while others require much greater efforts and are perceived as innovative. Referring to the KM perspective, the paper proposes to identify two main classes of problem: repetitive and innovative problems.

This classification is clearly not new: it reproduces the classical Herbert Simon’s idea (1960) which distinguished structured and unstructured problems. The former are those associated with routine activities and can be solved by simple processing systems sometimes better than people do. The latter are those associated with non routine situations and require typically human capabilities, such as abstract thinking, inductive reasoning. Unstructured problems are usually affected by uncertainty, which can be due either to the lack of complete information about a problem, or to the incapacity of the decision maker to deal with the whole problem complexity, or by information ambiguity. Two main approaches are generally used to face these kinds of uncertainty: a stochastic approach, which provides expected results of a performance based on a statistical model, and the qualitative one, which refers to subjective or qualitative judgements, consistently with the ambiguous nature of the context.

According to the recent literature about KM, we argue that the two problem classes correspond to two distinct processes of KM: the knowledge transfer and generation.

Transferring knowledge is the process that an effective organization triggers in the case of routine problems. In these cases the organization already knows the solution of the problem: it must be extracted from an organizational memory (an expert, a repository, a database, etc.) and transferred to the problem solver. In fact, the notion of routine is associated with the skill (or ability) and the organizational memory (Nelson and Winter, 1982).

Generating new knowledge or a new ability is the process that effective organizations should trigger when problems are completely new. In these cases the organization ignores the solution of the problem and the solution is not in the organizational memory. In the KM perspective, new knowledge is generated by modifying and combining the existing knowledge. This must be extracted and selected from the memory, and the information has to be provided with new meanings, combined and organized in new ways.

The two classes of problems and, consequently, the two knowledge management processes have some common features. In both cases, in fact: a) there exists some organizational knowledge which is codified (i.e., selected and organized), b) this knowledge is conveyed within the organization by people or technology, and c) it is finally interpreted by the problem solver, that translates it into a new ability. The main problem for organizations is to understand how to perform effectively both the process of transfer and the one of generation. To this aim, it is necessary to identify the cognitive mechanism at the basis of the two processes.
4. BASIC COGNITIVE PROCESSES: CODIFICATION AND INTERPRETATION

Whatever a company does with its knowledge (memorizes or extracts it, transfers it, changes its code or use it to generate new one), knowledge must be codified (to be translated into information) and interpreted (to translate information into action). In both transfer and generation, part of the existing knowledge is selected and organized, is moved within the organization by people or technology, and finally is turned in a new ability by the problem solver. According to the KM perspective, codification and interpretation are the two basic cognitive processes involved in the problem solving.

Interpretation involves the processes of high-level perception, which regards the construction of mental representations on the basis of external stimuli that determine the individual’s behavior. A very important part of this process is the selection and organization of information. In fact, only a little portion of a vast amount of the data perceived from the external environment is selected and organized in structures. Both selection and organization are influenced by cognitive characteristics such as goals, beliefs, context, and behavioral models.

The process of codification leads to build a knowledge object. Codification necessarily reflects the cognitive characteristics of the codifier (knowledge source or external observer). In fact, when somebody describes how to do something, he/she is influenced by his/her own cognitive system. Consequently, company’s documents, databases or flow charts reflect the cognitive characteristics of who has made them. It is important to observe that, similarly to interpretation, codification requires the same processes of selecting and organizing information.

Codification and interpretation are at the basis of problem solving regardless to the technological approach. Either in the case of people discussing about a problem, such as in a working team, or in the case of a problem supported by a technological tool, such as in computer aided design, information must be codified to be communicated and it must be interpreted to achieve a solution.

5. ORGANIZATIONAL PERFORMANCE EVALUATION

The relationship between codification and interpretation is definitely crucial for the performance of the whole problem solving: while transferring an ability requires to strictly couple the two cognitive processes, in order to minimize misunderstanding and misinterpretations, generating knowledge requires codification and interpretation to be independent of each other, in order to spur new ideas and applications.

Let us consider a team discussing a problem related to the development of a new product. Senior members codify their own knowledge in examples, rules and models when communicating with younger engineers. The latter have to interpret this information in order to correctly face the problem. But the particular class of problem has a great influence on the way people codify and interpret information.

If the problem is to explain “how to do something”, e.g. how to sketch mechanical components, seniors use the same language of younger people, express concepts they already know, be careful that goals are understood and that the background knowledge about the problem is shared. They must be sure that the messages they communicate are interpreted just in the expected way. In other terms, the way information is selected and organized at the source has to be consistent to the users’ expectations. Therefore, in the case of a repetitive problem, i.e. when the goal is to transfer an ability, codification and interpretation have to be constrained to each other, more than be performed independently.

On the contrary, if the problem is to promote innovation, e.g. to propose new shapes for restyling a product, sharing a common language and the same ideas could turn to be an obstacle. Seniors describe their experience by using a metaphorical language, introducing new concepts to stimulate making analogies. In this case young people must be spurred to
propose a different way to view things, i.e. to interpret in a different way the information communicated by seniors. A useful technique in such activities is brainstorming: everybody tells a message without restraint (codification) and subsequently modifies his/her message being inspired by what the other participants say (interpretation). In this way, codification and information are de-coupled as much as possible. Therefore, in the case of innovative problems, i.e. when the goal is to generate a new ability, codification and interpretation have to be performed independently of each other as much as possible.

By assessing how the cognitive processes of knowledge codification and interpretation take place within the organization, it is possible to evaluate the organization problem solving performance. In fact, according to the above consideration, this performance depends on the consistency between the KM processes with the problem class.

Two types of evaluation are then mainly requested, about the repetitiveness (or innovativeness) of the problem and the de-coupling of the codification and interpretation cognitive processes involved in the problem solving. These evaluations are reported in Table 1. Each dimension is directly influenced by variables related to, respectively, the problem nature and the way knowledge is actually managed by an organization. Assessing these variables it is then possible to measure the organizational performance investigated.

### Table 1. Organizational performance evaluation.

<table>
<thead>
<tr>
<th>Problem innovativeness</th>
<th>Bad Performance: innovative problems addressed by rigid interpretation</th>
<th>Good Performance: innovative problems addressed by flexible interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>high</td>
<td></td>
<td></td>
</tr>
<tr>
<td>low</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Good Performance:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>low</td>
<td></td>
<td></td>
</tr>
<tr>
<td>high</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5.1. Variables influencing the class of problem

Recognizing innovative problems sometimes may seem not very difficult in the practice, as well as distinguishing them from repetitive problems. However, to measure the problem repetitiveness or innovativeness may be not so easy.

The paper proposes to resort to the analysis of the variables which managers use to make decisions about a given problem. In fact, problems can usually be described by a certain number of variables assuming certain ranges of values and characterized by a certain degree of importance for each specific context of problem solving. The values that the variables can assume every time a given problem occurs, as well as the relative importance of one another (which can be taken into consideration, for instance, by appropriate weights in the problem model), can more or less vary, depending on the problem repetitiveness. By observing an organization for a given period of time and describing the problems faced by their modeling variables, it is then possible to achieve a measure of how much problems are more or less repetitive. In fact, the range of the variable values and the variability of their relative importance are a measure of how much problems are repetitive or innovative (Table 2).

In addition, problem solving can require not only deterministic variables, evaluated in the specific context, but also stochastic and qualititative variables, more suited to describe unstructured problems affected by uncertainty. In this case, the more a problem is characterized by stochastic and qualitative variables, the more it can be considered
innovative for a certain organization.

Finally, an important aspect to be considered is the degree by which technology can automate a particular problem solving. This variable is then affected by the technological availability of support tools, which can be evaluated, for instance, observing how a certain problem is faced by other organizations. In this sense, the more problems require the human intervention, the more they can be considered innovative.

As an example, let us consider a manufacturing company operating by a make-to-order production strategy. Production planning is a typical problem in this case: its nature can vary from repetitive to innovative depending on external conditions. Suppose that the shop floor managers use to make planning decisions based on two variables: lot dimension and delivery schedule. Three cases can be highlighted. In the first case, both the lot dimension and the delivery date required by the customers are usually within certain ranges: the planning problem is repetitive for the organization. In this case, the optimal planning rules (heuristics or organizational procedures) are those typically used, i.e. the solution is known by the organization and is stored in one of its knowledge resources (e.g. in the experience of a manager). In the second case, customer orders can consist of lots particularly different from the usual ones, requesting urgent delivery dates. The values of the two variables can happen to be far from their averages: the problem is less repetitive for the organization, and the typical planning rules are likely to be wrong, so that new solutions should often be generated. In the third case, the orders can exceed the shop’s capacity. In this case, lot dimension and delivery schedule are no more sufficient to solve the problem, so that also other variables have to be considered, such as financial information or the availability of external suppliers and their reliability, that become important in these cases. The critical variables for modeling the problem then change, and the problem innovativeness increases.

<table>
<thead>
<tr>
<th>Variables for the problem innovativeness</th>
<th>Variables for the codification and interpretation de-coupling</th>
</tr>
</thead>
<tbody>
<tr>
<td>variability of the variable values</td>
<td>no. of individuals</td>
</tr>
<tr>
<td>variability of the importance of the problem variables</td>
<td>no. of interactions</td>
</tr>
<tr>
<td>no. of stochastic variables / total no. of variables</td>
<td>no. of departments involved</td>
</tr>
<tr>
<td>no. of qualitative variables / total no. of variables</td>
<td>no. of alternative source of information</td>
</tr>
<tr>
<td>degree of human intervention required</td>
<td>users enabled to modifications / total no. of users</td>
</tr>
</tbody>
</table>

Table 2. Variables for the model dimension evaluation.

5.2. Variables influencing the codification-interpretation de-coupling

The relationship between codification and interpretation can be influenced and controlled by both organization and technology. The organizational actions, procedures, structures can strongly affect the information flow and characterize a KM process. In particular, the way people interact, communicate and exchange information is essential to understand the relationship between codification and interpretation. The basic idea is that the higher the number of people interacting and the more different their experience and culture, the higher the probability that information is interpreted in unexpected ways.

Table 2 shows some variables proposed for the measurement of codification and interpretation de-coupling. The number of individuals involved in a process and the number of their interactions are related to the probability of misinterpretations due to human communication. The number of different departments involved is related to the cultural divergence which can introduce further distortions and misunderstandings in the communication flow. Similarly, the number of alternative sources of information available is a measure of how many different languages or codes are used in the communication flow. Also the number of users enabled to modify information in memories (databases, files, etc.), over the total number of users, is proportional to the possibility of introducing
distortions in the codification-interpretation process. The higher the values of all these variables, the more the two cognitive processes are de-coupled.

For instance, a good strategy to introduce more creativity in a brainstorming process is to increase the number of people involved, or to collect people with a different experience and culture. Conversely, customer service centers are organized to avoid misunderstandings when clients ask for information about products or services. To this aim, clients at the phone interact with only one manager, and often clients are suggested to recall the same manager, in order to develop a common language and experience.

Other variables can be considered to evaluate the codification-interpretation de-coupling in an organization. For instance, the influence of technology can be measured, at least to some extent. Many ICTs are very effective to support the process of codification, such as multimedia technologies. Many of them provide the possibility of sharing and transferring knowledge, such as LANs or the Internet. Less clear are the effects of some technologies on the process of interpretation. For instance, hypertexts and portals on the Web provide the user with information already structured in such a way to guide the process of interpretation. These technologies then favor codification and interpretation coupling. Conversely, the autonomous agents used to perform free searches on the Web allow the user to autonomously specify the parameters (e.g., the keywords) by which information has to be searched and then selected and organized. This technology enable the de-coupling between the two basic cognitive processes. It is possible, in general, to observe the technologies an organization uses and distinguish the two kinds of technologies. In this way, a measure of the codification-interpretation relationship is carried out. In particular, it could be proposed to count the number of free searches (autonomous agents) over the number of guided searches (portals). The higher the ratio, the more the organization makes use of technologies able to de-couple the two processes.

6. TWO EXAMPLES OF APPLICATION

In this section two case examples are discussed to show the implementation of the knowledge-based model for the evaluation of organizational performance.

6.1. Production planning in a world leader producer of leather sofas

Production planning is an example of organizational problem which can be analyzed under a knowledge-based perspective. Referring to the traditional models of production organization, it is possible to analyze production planning in different contexts such as a production line, a job shop and a construction site.

Typical variables of the production planning problem are the production capacity, the product volume and mix, the lot size, the due dates, the planning time interval. It is then possible to point out that, independently on the production organization, the variables involved are in this case mainly quantitative.

In a manufacturing line, production planning variables are also mainly deterministic in nature, due to the relative certainty of the production process working conditions. Moreover, the importance of the different variables in the specific contexts of application is not very variable, as well as the range of the variable values (capacity, time, mix, etc.) which affect the process planning. The problem repetitiveness in this context can then be considered quite high (Table 3).

In a job shop, on the contrary, the process is less deterministic, due to the higher variability of the products to be manufactured and of the resource capabilities involved in the production process. The performance optimization of a job shop is then typically investigated by computer simulations which make use of stochastic variables and heuristics. In addition, the variability of the values of the problem variables (e.g., volume and mix of product orders, due dates, etc.) is usually quite high, while the importance of the model
variables in the decision problem (e.g., due dates, capacity, etc.) may depend on the specific context or situation of working. Due to the complexity of the problem, the production planning, and in particular the scheduling, is then a real time job carried out directly in the shop floor. Due to its variability and uncertainty, the problem repetitiveness in this context can then be considered quite lower than in the previous case (Table 3).

<table>
<thead>
<tr>
<th>Variables for the problem innovativeness</th>
<th>Line</th>
<th>Job shop</th>
<th>Projects</th>
</tr>
</thead>
<tbody>
<tr>
<td>variability of the variable values</td>
<td>Low</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>variability of the importance of the problem variables</td>
<td>Low</td>
<td>Medium</td>
<td>High</td>
</tr>
<tr>
<td>no. of stochastic variables / total no. of variables</td>
<td>Low</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>no. of qualitative variables / total no. of variables</td>
<td>Low</td>
<td>Low</td>
<td>Medium</td>
</tr>
<tr>
<td>degree of human intervention required</td>
<td>Low</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Production Planning innovativeness</td>
<td>LOW</td>
<td>HIGH</td>
<td>VERY HIGH</td>
</tr>
</tbody>
</table>

Table 3. Production planning innovativeness in different contexts.

If we finally consider a production context like a construction site, we then face production planning problems characterized not only by stochastic data and high range variability of the problem variables, but also by a considerable variability of the model variable importance in different contexts (e.g., due dates can be more critical than resource capacity, and vice-versa), and even by the presence of some qualitative variable, such as those concerning the evaluation of the supplier reliability on the site, the weather conditions, etc. In this context, then, production planning can be considered a problem much less repetitive for the organization (Table 3).

These considerations are useful as a reference to evaluate the production planning performance of an organization, once the characteristics of the problem nature (repetitive-innovative) and of the cognitive processes (degree of codification-interpretation decoupling) are investigated on-the-field.

A case example is provided by a world leader firm in the production of leather sofas. The production process of this company can be described as a flow shop, i.e. a set of shops crossed by the products always in the same sequence (as in a line). However, differently from a line, the production scheduling of each phase (which is actually a job shop) is quite complex, due to the variable resource capabilities and product mix. The process is then characterized by the typical complex flow of materials and information of the job shop, so that the problem class is quite close to the production planning in the job shop (Table 4).

The production planning is carried out by a central office, that knows the product orders (lot, mix and volume), the due dates, the shop floor capacity, and the production phase times. According to this information, the office defines the production schedules quite automatically and is the only responsible for modifications, which occur quite rarely. According to the variables of the model, the degree of codification and interpretation decoupling of the production planning can be then considered substantially low, like for a routine problem, and the organization is considering to completely make this task automatic (Table 4).

The production planning in the company is the source of many problems: the due dates are never respected, the work in process and the lead time are very high, as well as the delivery delays. According to our knowledge-based approach, the reason is that there is inconsistency between the problem class and the knowledge management approach (Table 4). In fact, the problem repetitiveness is much lower than what the organization thinks (or acts to manage it), relying on automation and on the capability of an isolated office for its solution. Other management actions are then required to improve performance, such as increasing the number of information sources (for instance, from the shop floor), enabling other subjects to modify planning, etc.
6.2. Consulting services in four world leader companies

Consulting services are among the most knowledge-intensive products. Thus, managing knowledge effectively seems to be particularly critical for consulting companies, and strongly affects their organizational performance. According to the proposed model, a key issue is to trigger the right KM process with respect to the problems the organization deals with.

To assess the problem class, it is helpful to identify the business focus of a consulting firm, which can provide different services and compete on different performance. To measure the problem innovativeness, it is possible to assess variables such as the problem context (if it is highly variable, it determines unique problems), the degree of creativity, integration capability and experience required (i.e., the human intervention), the relevance of non-quantitatively measurable aspects of the problem.

Consulting companies can adopt very different KM processes. Some of them require people to work in large teams, while others prefer small groups. Some motivate people to exchange opinions and experiences, others tend to strengthen work specialization and reduce employees departmental transfers. The same variety of behaviors can be observed with respect to the technologies adopted for KM support. Some of them are oriented to codify knowledge objects, share them and enable searches. Others aims to assist consultants in searching and meeting people throughout the organization. In general, it is possible to apply the variables in Table 2 in order to measure how much codification and interpretation are constrained or de-coupled.

According to the model proposed, the case of some major consulting companies, recently reported by Hansen et al. (1999), can be analyzed. These companies, namely Andersen Consulting (AC), Ernst & Young (EY), McKinsey (MK) and Bain (BA), exhibit excellent organizational performance, which are at the basis of their business success. The application of the model proposed in this paper show how the high performance are due, according to our approach, to a high coherence between problems and KM processes. The comparison is reported in Table 5.

On the one hand, the variability of the problem context (problem uniqueness) is higher for MK and BA, that also usually address problems difficult to be supported by quantitative models and highly requiring human capabilities. They focus their business on unique and highly customized consulting services, select personnel among excellent graduates and train employees aiming to improve their creativity. The innovativeness of the problems typically faced by these companies is then quite high, as for instance witnessed by the remarkable contribution of McKinsey to the scientific literature.

AC and EY, on the contrary, focus their business on standard consulting services.
They excel in solving rather repetitive problems, foster specialization among employees and compete by exploiting scale and scope economies.

On the other hand, MK and BA tend to maximize the people interaction in a problem solving process, favoring the exchange of different experience and enhancing creativity, while AC and EY leverage on specialization. Even the use of technology reveals these differences. AC and EY tend to use technology (the Lotus Notes software suite) to share knowledge, mostly in form of documents, enabling information search and retrieving: consultants tend to inquire a software database rather than other people when solving problems. MK and BA tend to use technology just to facilitate the search for other people and favor face-to-face meetings.

<table>
<thead>
<tr>
<th>Problem innovativeness</th>
<th>McKinsey</th>
<th>Bain</th>
</tr>
</thead>
<tbody>
<tr>
<td>high</td>
<td>Andersen C.</td>
<td>Ernst &amp; Young</td>
</tr>
<tr>
<td>low</td>
<td>low</td>
<td>high</td>
</tr>
<tr>
<td>Codification-interpretation de-coupling</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 5. Model application in the consulting cases considered.

7. CONCLUSIONS

In the paper, the evaluation of the problem solving performance of an organization has been investigated. This performance is inherently founded on the cognitive processes at the basis of every organizational action. In particular, this performance is evaluated by assessing the consistency between the nature of problems addresses by the organization and the knowledge management processes activated. To this aim, two main types of problems, repetitive and innovative, and two main cognitive processes, codification and interpretation, have been identified. The model outline a good performance when the organization uses codification-interpretation de-coupling to solve innovative problems, and codification-interpretation coupling for repetitive problems. Two case examples have been presented to explain the model application.

REFERENCES


