CREATIVITY AND PROBLEM SOLVING IN THE DEVELOPMENT OF ORGANIZATIONAL INNOVATION

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ABSTRACT

This research focuses on creativity and innovation management in organizations. We present a model of intervention that aims at establishing a culture of organizational innovation through the internal development of individual and team creativity focusing on problem solving. The model relies on management’s commitment and in the organization’s talented people (creative leaders and employees) as a result of their ability in defining a better organization. The design follows Min Basadur’s problem solving approach consisting of problem finding, fact finding, problem definition, solution finding and decision implementation. These steps are carried out using specific techniques and procedures that will link creative people and management in order to initiate the process until problems are defined. For each defined problem, project teams will develop possible solutions and implement these decisions. Thus, a system of transformation of the individual and team creativity into organizational innovation can be established.

Keywords: Organizational creativity, Organizational innovation, Creative problem solving, Kelly’s Grid.

RESUMO

A presente investigação debruça-se sobre a gestão da inovação e criatividade nas organizações. Apresenta-se um modelo de intervenção que procura estabelecer uma cultura de inovação organizacional através do desenvolvimento interno da criatividade individual e das equipas envolvidas na resolução criativa de problemas. O modelo baseia-se no compromisso da Administração e nos talentos da organização (líderes e colaboradores criativos) e na sua capacidade de definir uma organização melhor. O desenho da investigação assenta na abordagem de resolução criativa de problemas de Min Basadur, que consiste em encontrar o problema, encontrar os factos, definir o problema, encontrar as soluções e implementar a decisão. Estes passos são percorridos através da utilização de técnicas e procedimentos específicos que fomentam a interacção entre as pessoas criativas e os gestores de modo a iniciar um processo que permita a identificação dos problemas. Para cada problema definido, uma equipa de projecto irá desenvolver as soluções possíveis a implementar. Espera conseguir-se um sistema de transformação da criatividade individual e das equipas em inovação organizacional.

Palavras chave: Criatividade organizacional, Inovação organizacional, Resolução criativa de problemas, Grades de Kelly.

JEL Classification: M54
1. INNOVATION DEFINED

Innovation within the framework of a knowledge-based economy goes far beyond the linear or chain linkage models that have long been used in innovation theory to explain innovation processes in high-tech industries (Strambach, 2002). Innovation is to be understood as the result of cumulative dynamic interaction and learning processes involving many stakeholders. Here innovation is seen as a social, spatially embedded, interactive learning process that cannot be understood independently of its institutional and cultural context (Cooke Heidenreich, & Braczyk, 2004; Lundvall, 1992). Since Roberts’ (1999) definition [of innovation] maintains that an innovation can only be seen as innovation if it is has implementation and commercial value, it is important to measure the impact of innovation. Ravichandran (2000: 263) believes that measuring the impact of innovation activities will depend on (1) the typology, (2) the degree of departure from the preceding product, service or process, (3) the extent of usefulness of the innovation and, (4) the volume of profitability generated.

Strambach (2002) suggests that the interdisciplinary view of innovation systems is concerned with understanding the general context of the generation, diffusion, adaptation and evaluation of new knowledge which determines innovativeness. It follows that the focus is on non-technical forms of innovation as defined above. Common characteristics of the different approaches to innovation identified by Edquist (1997) include (1) innovation and learning at the centre, (2) a holistic and evolutionary perspective, and (3) an emphasis on the role of institutions. The increasing interdependence of technological and organisational change is a significant feature of systems of innovation, which means that technological innovation and organisational innovation have become increasingly important. These are combined with more diverse knowledge requirements which include not only technical know-how, but also economic, organisational, and sociological knowledge and competencies.

The second reason for the increased interest in non-technical innovations is associated with the connection between the organisational innovation and the corresponding learning capacity. The acceleration of change that is part of the globalization process means that organisational learning processes are more and more important for creating and maintaining competitiveness.

Ultimately, whether innovation is successfully diffused, requires some absorptive capacity on the part of the target audience. Cohen & Levinthal (1990: 128) define absorptive capacity as ‘... the ability of a firm to recognise the value of new, external information, assimilate it and apply it to commercial ends.’ The diffusion of the innovation is normally dependent upon the specific innovation typology, the innovation champions, the time element to successful diffusion and the absorptive capacity of the adopters. Schnepp, Bhambri, & Von Glinow (1999) define technology transfer as a process whereby the knowledge is passed from one entity to another. This process involves the dissemination of documentation describing the technology, the training (called software) to transmit the knowledge and the transfer of the equipment, components or raw materials (called hardware). Gee (2006) maintains that technology transfer is the application of technology to a new use or a new user. Thus, technology transfer links the existing technology base and the innovation process in order to increase productivity.

In organizational innovation, the unit for innovation is the organization itself (Wolfe, 1994). Although the outcome of the innovation may be process, product or service, the innovation needs to be undertaken through the creative inputs of the individuals and/or the management. We will suggest a project approach.
2. CREATIVITY AND ORGANIZATIONAL INNOVATION

As Huhtala & Parzefall (2007) mention, “to remain competitive in the global market, organizations must continuously develop innovative and high quality products and services, and renew their way of operating” (p. 299), and they also maintain that companies increasingly rely on employees continuous ability to innovate. Also, even though innovation may take place by adopting or developing an existing product or service, through investments on R&D or in technology acquisition, only by developing and sustaining a creative workforce, the organization will succeed in maintaining the necessary potential to overcome difficult problems and situations that cannot be solved only through investments (Cebon, Newton & Noble, 1999).

This potential is both the ability to retain creative managers and employees (McAdam, 2006) and to provide an environment where each one will feel free and willing to contribute to organizational success. Aspects like raising job complexity, employee empowerment and time demands, together with low organizational controls (decision making, information flow and reward systems), are said to raise employee creativity (Adams, 2006), but more elements are necessary in order to make people willing and able to contribute to organizational success, like supportive leadership, knowledge acquisition, and team work procedures favouring creativity (Unsworth, 2005). Creative people, either managers or employees, are committed to their work and organization, and so they may bring in important issues, provided that top management values their work and ideas. In fact, according to a Gallup Management Journal (GMJ) survey (Hartel, Schmidt & Keyes, 2003), engaged employees are more likely to “think outside of the box” and produce creative ideas than disengaged people; they also are more receptive to new ideas. The research concludes that engaged people tend to find and suggest new ways to improve their work and business processes, which may lead to the assumption that the more creative people have a deeper understanding of the organizational processes, being in a privileged position to identify, define and find the relevant organizational problems.

All this can be achieved, up to a certain extent, by raising the importance of creativity in the organization and by providing a system through which individual potentialities may be channelized into profitable innovation. Freedom to create, content and process skills to be able to create, and a supportive human environment (peers and team leader), seem then to constitute the secret to success. Nevertheless, the issues surrounding the potential of an organization to innovate, although subjected to interesting empirical research, as the ones reported by McLean (2005) and Puccio et al. (2006), are still in its beginning, thus providing one of the major challenges, which is to define criteria to evaluate the impact of organizational innovation on process and product innovation and, of course, in the final success of the organization (Wolfe, 1994).

3. CREATIVITY AND INNOVATION DEFINED

Even though authors like Stein (1994) describe creativity as a process that results in novelty which is accepted as useful, tenable, or satisfying by a significant group of others at some point in time, and innovation as the intentional introduction and application within a role, group or organization of ideas, processes, products or procedures, new to the relevant unit of adoption, designed to significantly benefit the individual, the group, organization or wider society, it remains difficult to separate the idea from its implementation, especially when we move from the individual level to team and organizational levels. In fact, while innovation concerns the processes of implementation, relying mainly on organizational communication and power, in the domains of production,
adoption, implementation, diffusion, or commercialisation of creations (Spence, 1994),
creativity remains exclusive to the relation established between the creator and his product,
where nor even originality and usefulness are important, but only the “trying to do better”,
connected to cognitive and emotional processes taking place at the individual level.

If we relate creativity to problem definition, and innovation to decision implementation,
this last step requires a series of problem definitions, in order to carry out a decision or
an idea, thereby making it difficult to separate these concepts at an organizational level.
In fact, when we move from the individual level to the team and organizational levels,
creativity and innovation become more and more difficult to separate, so that we must agree
with Basadur (1997), when he says there is no difference between organizational creativity
and innovation. Therefore, the moment we move to other levels besides the individual,
we will use these terms (creativity and innovation) as synonyms, in order to simplify the
discussion, and we refer to organizational creativity, in the intervention model depicted
in Figure 1, as a system devoted to enhance creativity in organizations, thus using the definition
proposed by Basadur.

As to the several approaches to identify types of innovation, either by separating the
adoption of products and processes from its development (Cebon, Newton & Noble,
1999) or, in a more classical way, product and process innovation (Adams, 2006), authors
agree that innovativeness, or organizational innovation, represents a third important type
of innovation, which represents the potential of the workforce to promote changes in the
benefit of the organization.

4. MODELS OF INTERVENTION

Intervention strategies following initial definition of the desired outcomes usually begin
with the assessment of the current situation, using surveys and interviews to evaluate the
organizational climate (McLean, 2005; D’Amato & Burke, 2008). Even though authors
recognize that a formal approach with the administration is necessary in order to investigate
the problems the organization faces, others stress the importance of the understanding of
how it works from the point of view of its employees (the informal approach). As it is not
feasible to ask each individual, this can be made by identifying the implicit theories (ideas
and concepts) people use to describe the organization (fact finding). In fact, most research
in an organizational context has to deal with people who often speak in one way, but act
differently. As Argyris (1999) declared, espoused theories (i.e., values and objectives that people
declare as guiding their behaviour) differ from theories in use (the latter which really guide
behaviour). Using Kelly’s repertory grid method to design a questionnaire it becomes easier
to use theories in use and overcome the espoused ones.

In his theory of personal constructs, Kelly stated that people anticipate events and
that their behaviour is thus guided by this interpretation. Kelly’s method allows people to
vocalize their perceptions (sometimes in a way they have never verbalized before). Through
a structured interview, this method allows us to design a creative leadership questionnaire,
from the participant’s viewpoint, thus reducing the observer’s bias. Using an organizationally
adapted questionnaire, it becomes possible to spot weak and strong points in the organization,
assessing the organizational climate through the assessment of the creative management
level, and creative climate, existent in each organizational unit.

Creative leaders, preferably designated by their teams, from whom much of the
innovation is dependent, can also be interviewed and their perceptual maps identified in
order to have a deeper approach to the problems identified by the administration. Perceptual
maps can be obtained through content analysis of the responses, which are then subjected
to correspondence factor analysis, as explained by Sousa & Monteiro (2005). Here, the innovative leaders are not the ones who have good or creative ideas, but those who develop the co-workers creativity and ability to innovate, in a definition quite consistent with Basadur’s creative leadership conception.

Several training systems in creative team work are available since Alex Osborn introduced the brainstorming method to produce ideas. Sidney Parnes and Ruth Noller, for example, worked on CPS—Creative Problem Solving—a method that has been subjected to investigation by researchers like Isaksen, Dorval, & Treffinger (2000) and, especially, Min Basadur, in its applications in companies, consultancy and education, as reported by Puccio, et al. (2006). Of the other methods, the more well known are Synectics, TRIZ, and DE Bono’s Six Thinking Hats. As these methods do not possess the scientific background that CPS does, and their complexity requires external consultancy, they were not considered in this project, as it is intended to be entirely carried out by the organization’s personnel, without the need for external consultancy.

From the Creative Problem Solving (CPS) approach, Min Basadur proposed a more elaborated model, he called Simplex. Basadur’ Simplex model is a cyclic process, in three distinct phases and eight steps, which was chosen as the working tool for the second level of this model. According to Puccio et al. (2006) research, the impact of CPS in the workplace can take place in three areas: on the individual’s attitudes; on the individual’s behaviour and; on its effects on groups. For example, in the study run by Basadur and Hausdorf, they concluded that CPS procedures only produced changes in behaviour when attitudes towards divergent thinking had been changed into a positive way; also, CPS training improved the fluency in producing solutions to problems. As to groups, CPS training improved work group climate, communication, interpersonal relations and problem solving outcomes. Finally, Puccio et al. (2006) report several studies concerned with CPS impact on organizational effectiveness revealed aspects like cost reduction, high revenue solutions, or a culture that inspired innovative design concepts.

### 5. CREATIVE PROBLEM SOLVING USING BASADUR’S SIMPLEX MODEL

From the Creative Problem Solving (CPS) approach, Basadur (1997, 1999, 2000) proposed a new model, the Simplex model. Basadur’s Simplex is a cyclic process in three distinct phases and eight steps. In each step there is a moment for active divergence, when individuals or groups produce as many ideas or options they can find, in a supporting climate in which judgment is deferred to allow the perception of new relationships between facts. During the divergence moments everyone must make extended efforts to avoid stopping too early, before all possible options have been produced. During active convergence, the participants will select one or more options to carry on to the next step. One last skill will allow the process to go on systematically through its eight steps and three phases: it’s called vertical deferral of judgment. This skill helps the participants to distinguish between unclear situations and well defined problems, and between defining a problem and solving a problem.

#### First phase – Problem definition

The following steps are involved:

1. **Problem finding**

   This step consists in identifying problems and opportunities for change or improvement within or outside the organization. In the first moment of active divergence, judgment
deferral is required and sustained until the participants feel they cannot collect more relevant problems or changes opportunities. It is then time for active converge, selecting the problems that will deserve further exploration.

2. Fact finding

Begins with a divergence moment, when the group defers judgment in order to gather as many information as possible on the selected problem, always accepting all the data that is produced. When there is a perception that all useful or possible facts have been collected, the group can converge and select a few facts that are considered to deserve further expansion.

3. Problem definition

In this step the group will reformulate the facts selected into creative opportunities or challenges. Then the more promising problem will be selected to carry on to the next step. For Basadur et al. (1994) this is a crucial step and skilled participants will really help the process by asking the right questions that will be answered further on. In this step they elaborate maps reframing the problems using the question “How might we…”, considered the most important question in the Simplex process. Another question will help to deepen the problem: “What is blocking…”, “What is stopping..” or “why”. The challenge mapping process helps to see the hierarchy or problems and the relations between them, clarifying the big picture.

Second phase – Problem solving

The following steps are involved:

4. Generating potential solutions

This step requires the participants to actively create as many potential solutions as possible to solve the selected problems or challenges. Divergence moment allows creating the most radical and apparently impossible solutions. In the convergence moment, some of them will be selected for evaluation.

5. Evaluating potential solutions

Here it is required to generate as many criteria as possible to help evaluating the potential of each solution that has been developed in the previous step. Having established the criteria, participants will evaluate the potential solutions against each criterion and decide which should be implemented.

Third phase – Solution implementation

The following steps are involved:

6. Action planning

Divergence skills are required to generate a number of specific actions that may help the implementation of solutions generated previously. Then convergence skills will allow selecting the most adequate actions.

7. Gaining acceptance

This step aims at overcoming resistance to change and involve people needed in the process to assure its feasibility. This is directed essentially to people who did not participate in the earlier steps, but whose commitment is indispensable to bring the project to success.
8. Taking action

Taking action is not the final step of the model, assumed as a circular process. As Basadur (2000) mentions, the organizational level is a continuous flow of products, services and processes that foster a better interaction with the environment. In this step, participants may find reasons not to fully implement the project, as a result of fear of failure and of resistance to change. To undermine these problems the author adopts Lakein (1973) techniques that advise to start with simple, specific and realistic actions, to address the fear of unknown by analyzing what could happen and then generating ideas to cope with fear of failure, trying to turn it into advantages.

6. PROPOSED MODEL OF ORGANIZATIONAL INNOVATION USING CREATIVE PROBLEM SOLVING

The proposed model (Figure 1) follows common research in intervention strategies (initial definition of the desired improvement, assessment of the current situation, training in the work methodology, execution of the necessary procedures and decisions, and measuring its results for organizational efficiency and effectiveness), as reported by McLean (2005), and relies on: management’s commitment to innovation; the organization’s talented people and their ability in defining a better organization together with the administration (Hartel et al., 1999); balancing the formal and the informal organization, so that change becomes accepted throughout the whole environment, as in the explanation of Stacey (1989); and the use of a team work technique (CPS – Creative Problem Solving) that provides the transformation of individual creativity into profitable innovation (Basadur, 1997).

As can be seen in the figure, the 4th step consists of managers and creative people teaming up, where talented employees are identified and integrated into development teams together with other technicians in order to contribute to the project development. These teams receive creative problem solving training and list organizational problems from which management will select those that deserve to be subjected to the ‘idea finding’ step, until a decision is made and implemented in the last step (called project implementation). Creative people, either managers or employees, are committed to their work and organization, and so they may bring in important issues, provided that top management values their work and ideas. In fact, according to a Gallup Management Journal (GMJ) survey (Hartel et al., 2003), engaged employees are more likely to “think outside of the box” and produce creative ideas than disengaged people; they also are more receptive to new ideas. The research concludes that engaged people tend to find and suggest new ways to improve their work and business processes, which may lead to the assumption that the more creative people have a deeper understanding of the organizational processes, being in a privileged position to identify, define and find the relevant organizational problems.

Other central aspects of organizational innovation (management control measures, knowledge management, organizational communication and culture, and employee commitment) will be addressed in this cycle, for instance the outcomes of the change process that will establish (if successful), a different culture in the organization, allowing for a shared thinking process that will facilitate knowledge management and the fit between the organization and its changing environment (Basadur & Gelade, 2006).

If successful, the model will allow for the creation of a culture of innovation within the organization, committing more and more of its constituents, as more development projects become profitable innovations (Basadur & Paton, 1993; Isaksen et al., 2000).

The research project focuses on creativity and innovation management in organizations and aim at testing a model of participatory action research. The model pictures an
intervention to develop the potential of the organization to innovate, through the internal support of individual and team creativity. The model is designed so that the research can be tailored to the specific organization and the intervention used to its full power by the members of the organization, without the need for external consultancy. It was designed to work with small and medium sized organizations, public or private, but it may be adapted to micro organizations, provided that they gather into a network around the same project, thus building a team wide enough to run extensive work upon a problem.

After an initial organizational investigation of all information and the problems the organization faces (problem finding) using interviews with management (the formal approach), an understanding of how it works from the point of view of its employees (the informal approach) is required. As it is not feasible to ask each individual, this can be made by identifying the implicit theories (ideas and concepts) people use to describe the organization (fact finding). In fact, most research in an organizational context has to deal with people who often speak in one way, but act differently. As Argyris (1999) reports, espoused theories (i.e., values and objectives that people declare as guiding their behaviour) differ from theories in use (the latter which really guide behaviour). Using Kelly’s repertory grid method (Kelly, 1963) to design a questionnaire it becomes easier to use theories and overcome the espoused ones.

In his theory of personal constructs, Kelly (1963) stated that people anticipate events and that their behaviour is thus guided by this interpretation. Kelly’s method allows people to vocalize their perceptions (sometimes in a way they have never verbalized before). Through a structured interview, this method allows us to design a questionnaire from the participant’s viewpoint, thus reducing the observer’s bias.

Using an organizationally adapted questionnaire, it becomes possible to spot weak and strong points in the organization. Although the questionnaire can address any organizational climate issue, it is preferable to ask people to describe their line managers in order to identify creative leaders and their teams. Nevertheless, other types of climate questionnaires (D’Amato & Burke, 2008) can be used and variables analysed, if some type of organizational evaluation has already been made.

Creative leaders, preferably designated by their teams, are interviewed and their perceptual maps identified in order to have a first approach to problem identification. Perceptual maps can be obtained through content analysis of the responses and then using factor analysis to categorise these (Sousa & Monteiro, 2005). Here, the innovative leaders are not the ones who have good or creative ideas, but those who develop the co-workers creativity and ability to innovate, in a definition quite consistent with Basadur’s (2004) creative leadership conception. An innovative manager permanently seeks the continuous quality improvement and gets the co-workers to invest in the constant enhancement of the performance, which is the essence of innovation.

Two levels are considered in the model: the overall, designated CPS1 – Outer Level; and the problem-specific one – CPS2 – Inner Level. As this last one can be repeated indefinitely for each project that comes out, an “i” was added (CPS2i).

The Outer Level (CPS1) includes four main steps:

Step I – Problem Finding

Is aimed at identifying the existent problems in the organization. The first action consists in a pre-consulting with the administration, aiming at gaining its involvement, so that the main problems may be identified. Next comes the organizational diagnosis, using a creative leadership questionnaire (Monteiro, 2008), based on Kelly’s Grids approach and the organizational climate assessment (Sousa & Andrade, 2007), in order to assess the existent management support to a creative climate in each organizational unit; this diagnosis
can be repeated after the intervention has completed its first project implementation, to measure the changes that may have taken place. The next action is interviewing creative managers and drawing their perceptual maps, to provide the administration with a deeper understanding of the identified problems. Finally, the designation of a first creative team (managers and employees), to initiate the CPS procedures.

Step II – Problem Solving

Is the implementation of the CPS methodology with the creative team. It consists of an initial action of training in CPS procedures, followed by the necessary work sessions, from problem identification until the definition of an action plan, within the framework defined by the administration.

Step III – Solution Implementation

Is the application of the action plan, made by other people than the CPS team, to produce a specific innovation project (process or product oriented). In this stage more personnel is included into the process, giving way to the training of further teams in CPS, in order to develop and maintain innovation sub-projects.

Step IV – Model Evaluation

Solution implementation will proceed with the development of management control measures, to evaluate the implications of each innovation project in the company’s performance. Organizational culture and employee commitment towards innovation will be subjected to pre and post-assessment, using the organizational climate survey and the creative leaders’ questionnaire. Also, the improvement in organizational communication and knowledge will be appreciated by qualitative evaluation, interviewing the same leaders that were interviewed in the first step, after a defined period of project development.

The Inner Level (CPS2i) includes two steps:

Step I – CPS Procedures

Following Min Basadur’s problem solving approach (Basadur, 1997): These consist of three distinct phases – problem definition, problem solving and solution implementation, and eight actions: problem finding, fact finding, problem definition, solution finding, solution evaluation, action planning, gaining acceptance and taking action.

Step II – Project Implementation

The project team will implement the innovation plan drawn out of the decision chosen together with the administration, thus providing opportunities to establish further project teams. This way, a system of transformation of the individual and team creativity into organizational innovation can be established.

Expected results for each company are: an increase in employee commitment (Hartel et al., 2003), as more and more people become involved in development projects; a systematization of explicit knowledge (Borghini, 2003), necessary to carry out CPS decisions; an improvement of formal and informal communication channels (Moss & Ritossa, 2007), due to the involvement of the whole organization in carrying the projects through; the use of management control measures (Adams, 2006), to evaluate the impacts of the innovation projects into the final results of the organization and, finally, the movement towards a culture of innovation, provided by increasing levels of creative leadership skills (Xu & Rickards, 2007), as the practice of project implementation values aspects like delegation, employee empowerment, trust and support to creative work.
7. CONCLUSION

This model of organizational creativity has proved to give useful contributions to organizational innovation, in the steps before solution implementation, due to the research and applications made (Sousa & Monteiro, 2005; Sousa, 2007). As the creative problem solving tools have already demonstrated their usefulness in finding solutions and helping organizations to improve, what remains to be proved is the value of selecting and organizing creative people in an organization, by giving them time, space, knowledge and the opportunity to team up and direct their individual creativity to the organizational problems. The process of developing organizational innovation and creativity is complex and non-linear with ups and downs, which can only give rise to a culture of innovation with the management’s total commitment. Future research will allow for testing of the model, in its wide complexity, and will provide new insights into the process of organizational creativity and innovation.

The use of management control measures, as described by Adams (2006), in order to evaluate the impacts of the innovation projects into the final results of the organization, provides the necessary frames of reference to evaluate the progress of other organizational variables. First, as Hartel et al. (2003) explain, an increase in employee commitment, as more and more people become trained in CPS procedures and involved in innovation projects. Then, a systematization of explicit knowledge (Borghini, 2005), derived from the team work necessary to carry out CPS decisions. Also, the improvement of formal and informal communication channels (Moss & Ritossa, 2007), due to the involvement of the whole organization in carrying the projects through; and, finally, the movement towards a culture
of innovation, through creative leadership level improvement, described by Xu & Rickards (2007), as the practice of project implementation values aspects like delegation, employee empowerment, trust and support to creative work.

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REFERENCES


