

II INTERNATIONAL WORKSHOP: CULTURE, ENTREPRENEURSHIP AND FINANCE

CREATIVE PROBLEM SOLVING METHOD IN ORGANIZATIONAL INNOVATION

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Abstract:

This research focuses on the development of entrepreneurship projects, using the creative problem solving (CPS) methodology and aims at demonstrating its effectiveness in improving team commitment to entrepreneurship projects. The design follows an adaptation of the 8-step process of Basadur's problem solving approach (Basadur, 1997), into a 5-step procedure, consisting of *fact finding, problem definition, solution finding and action planning*. These steps are carried out in two four-hour sessions, using specific techniques that link creative people and management in order to develop a plan of action, thus initiating a system of transformation of the individual and team creativity into organizational innovation.

Forty M.A. students, organized in four groups (two in art education and two in tourist entrepreneurship) were submitted to a pre-post test regarding team commitment, prior and after two 4-hour problem solving sessions, following one objective provided by the course director. At the end of the sessions they were also required to fill in a form where they were asked to express their evaluation of the method. Each project designed is now under

implementation, and each group is registering all the necessary data to allow for the following up of the project.

Results indicated an improvement in individual attitude towards emotional team commitment, during CPS sessions, as well as positive evaluations of the method. The possibilities of making a joint project, using the CPS method, were also demonstrated. Further research is expected once the projects are carried away and more teams involve in the construction of original entrepreneurship projects.

Keywords: Innovation, Entrepreneurship, Creative problem solving, Commitment.

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MEASURES OF EFFECTIVENESS OF THE CREATIVE PROBLEM SOLVING METHOD IN ENTREPRENEURSHIP PROJECTS

Introduction

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 knowledge industries. 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).

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 organizational change is a significant feature of systems of innovation, which means that technological innovation and organizational innovation have become increasingly important. These are combined with more diverse knowledge requirements which include not only technical know-how, but also economic, organizational, and sociological knowledge and competencies. The second reason for the increased interest in non-technical innovations is associated with the connection between the organizational innovation and the corresponding learning capacity. The acceleration of change that is part of the globalisation process means that organizational 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.

Innovation has also been seen as the specific tool of entrepreneurs (Drucker, 1985), the means by which they understand the environment and identify the opportunity for a different business or a new combination of existing organizations (Schumpeter, 1942). As Sathe (2003) stated, the interest for individual (or group) entrepreneurship has regained interest recently, when, after years of downsizing processes, scholars and business specialists considered that the economy should develop together with the employment growth.

Entrepreneurship is usually described through a set of behaviours which include initiative, risk taking and failure acceptance, as well as taking and transforming situations and resources into practical and profitable product, service or business, or as Kurato (2009) defined, entrepreneurship is

a “dynamic process of vision, change, and creation. It requires an application of energy and passion towards the creation and implementation of new ideas and creative solutions. Essential ingredients include the willingness to take calculated risks, formulate an effective venture team, marshal the needed resources, build a solid business plan, and, finally, the vision to recognize opportunity where others see chaos, contradiction, and confusion” (Kuratko, 2009, p. 5).

Individual entrepreneurship refers to the creation of a new business; however, lately the concept has been extended to include the co-workers activities within the organization. This new perspective on entrepreneurship, receiving attention of academics and practitioners, is called *corporate entrepreneurship* and refers to the entrepreneurial activities and behaviours within organizations, closely related with organizational innovation.

But whether it refers to an individual, group or organizational process, entrepreneurship is clearly linked to creativity and innovation when authors recognize that entrepreneurship is enabled by innovation, developed through new perceptions and combinations of existing problems or identifying new problems (creativity), in a changing environment (Holt, Rutheford & Clohessy, 2007). Apart from individual and contextual factors, they emphasise the importance of a process to help project implementation. We will suggest a project approach to help the entrepreneur in the creation and implementation of an innovative plan or business plan.

Creativity, Innovation and Commitment

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 (Sousa, 2008).

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, and we refer to organizational creativity as a *system devoted to enhance creativity in organizations*, thus using the definition proposed by Basadur (1997).

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), most authors agree that innovativeness, or organizational innovation, is a third important type of innovation, which represents the potential of the workforce to promote changes to benefit of the organization.

As Huhtala & Parzefall (2007: 299) 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’, and they also maintain that companies increasingly rely on the employees continuous ability to innovate. Also, even though innovation may take place through the adoption or development of an existing product or service, through investments in R&D or in technology acquisition, it is only through developing and sustaining a creative workforce that the organization will succeed in

maintaining the necessary potential to overcome difficult problems and situations that cannot be solved through investments only (Cebon, Newton & Noble, 1999).

This creative workforce potential is both the ability to retain creative managers and employees (McAdam & McClelland, 2002) 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). However, more elements are necessary in order to make people willing and able to contribute to organizational effectiveness. For instance, supportive leadership, knowledge acquisition, and team work procedures favouring creativity (Unsworth, 2005) can add to success. 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 creative people have a deeper understanding of the organizational processes, by being in a privileged position to identify, define and find organizational problems.

To a certain extent, all of this can be achieved by elevating the importance of creativity in the social and organizational context and providing a system through which individual potential may be channelled into profitable innovation. What are required are freedom to create, content and process skills to be able to create, and a supportive human environment (peers and team leader). The issues surrounding the potential of an organization to innovate are still in its beginnings, although Mclean (2005) and Puccio, Firestien, Coyle & Masucci (2006) and especially, Basadur (1997, 2000), did some empirical research. The major challenges are to define criteria to evaluate the impact of organizational innovation on process and product innovation (Wolfe, 1994).

Creative Problem Solving (CPS)

Several systems in creative team work are available since Alex Osborn (Osborn, 1953) introduced the brainstorming method to produce ideas. Sidney Parnes and Ruth Noller (Parnes & Noller, 1972), for example, worked on Creative Problem Solving (CPS) - a method that has been subjected to investigation by researchers like Isaksen, Dorval, & Treffinger (2000) and, especially, Min Basadur. Of the other methods, the more well known are *Six Sigma*, *Synectics*, *TRIZ*, *Soft Systems* and De Bono's *Six Thinking Hats*. As these do not possess the scientific research background that CPS does, they were not considered in this project.

From the 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 (*problem finding, fact finding and problem definition; solution finding and decision making; action planning, acceptance planning and decision implementation*). 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.

After a series of trials, Basadur's model was reduced to five steps (Figure 1), in order to adapt it to the three 4-hour session design. In the model we considered that the session's objective, defined by management during an interview, was not part of the cycle. The same happened with taking action, where the innovation project is implemented. The intention is that the implementation process may give rise to other CPS teams.

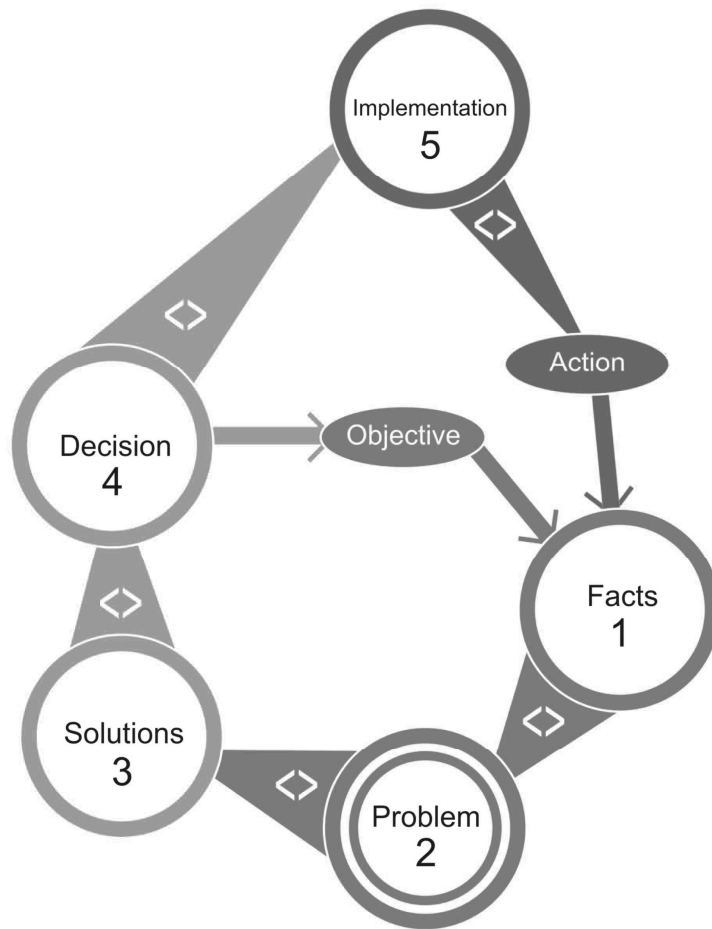


Figure 1. Simplified Basadur's creative problem solving method

According to Puccio et al. (2006) research, the impact of CPS in the workplace can take place in three areas: the individual's attitudes; the individual's behaviour and; its effects on groups. For example, in the study run by Basadur & Hausdorf (1996), they concluded that CPS procedures 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) reported several studies, concerned with CPS impact on organizational effectiveness, which revealed aspects like cost reduction, high revenue solutions, or a culture that inspired innovative design concepts.

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, Dorval, & Treffinger, 2000).

Therefore, it is necessary to understand how the success of the system in individuals and teams can help developing profitable and innovative entrepreneurship projects, either in the creation of start ups from scratch as from within established companies. One possibility is by identifying problems opportunities which, once solved, may contribute to organizational internal efficiency or to match market needs. And so, this research will focus on the development of team creativity, using the CPS methodology, aiming at demonstrating its effectiveness in providing team commitment and in using the individual and team divergent thinking improvement in identifying market opportunities.

Method

The CPS process was conducted with two groups of master students – artistic education and tourism entrepreneurship - in two faculties – fine arts and tourism – involving, 40 graduates (24 in fine arts and 16 in tourism), aged 24 to 49 (average age was 32), with the majority performing some kind of professional activity connected with the area of the master course.

The team members participated in two CPS sessions (four hours each), in two consecutive days: the first session to list facts pertaining to the overall objective and define the problem; the second to list solutions and define the action plan.

In each course, the director defined the objective related to the making of an entrepreneurship project for the whole group. This was taken as the objective (or a fuzzy situation) and presented to the team engaging in the process. The directors were kept informed of the process, intervening at the problem definition and decision stages, and whilst building the action plan. As the groups were too big, they were divided in two smaller groups, during fact finding and solution finding. During the rest of the steps the groups were kept united. Two facilitators run the session.

As stated above, the CPS process begins with the objective, engaging the team in active divergence to find the more relevant facts that will help to define the problem. The average

number of facts each team produced was 84. This was an important contribution to help bringing the team members' tacit knowledge into explicit knowledge and magnify the groups understanding of its organizational concerns. All this knowledge was registered and retrieved to the group members so that the problems could be fully analysed and the reflection could go on during the project implementation.

Also, a 13-item questionnaire, adapted from the Portuguese version of Almeida, Faísca, & Jesus (2007), from the original organizational commitment questionnaire of Meyer & Allen (1997), was administered twice, before and after the two 4-hour creative problem solving sessions. Each item had a 5 point scale (1 *totally disagree* to 5 *totally agree*) and the closer to 5, the closer to group commitment. The effects of the method (X) were tested comparing the gains from O_1 (observation before) to O_2 (observation after). The questionnaire was submitted to statistical analysis with SPSS software (version 17), enabling to assess the respondents' attitude evolution.

At the end of the second session, the participants were asked to evaluate the process and write their opinion about it. These responses, together with all facts registered by external observers, were submitted to content analysis, in order to reduce its complexity and aggregate them into a reduced number of categories, thus allowing for a deeper comprehension and to draw perceptual maps, using DTMc40 software. This statistical technique, as Hair, Anderson, Tatham & Black (1987) stated, allows the dimensional reduction and conducts perceptual mapping by associating sets of attributes.

Results

In presenting the research results the focus was twofold: the first referred to assessing the CPS effectiveness in bringing in more commitment at team level, by comparing the responses to the questionnaire, before and after the process, and analyzing the participants' evaluations as to the method effectiveness; and the second aimed at giving an insight into the problems which, once solved, might lead to innovative company creation.

The questionnaires filled in were submitted to factor analysis, which extracted two factors, i.e. *moral commitment with the team* (explaining 30% of the variance), with six items

such as: *Even if it could bring advantages to me I feel it would not be correct to leave my team right now; I would feel guilty if I left the team right now; I would not leave my team right now, as I have an obligation towards the people in it* (Cronbach's Alpha .74). And *emotional commitment with the team*, explaining 23% of the variance) with another 5 items like, for example: *I like to talk about my team outside the university; This team has a great meaning for me; I really feel the team's problems as if they were mine* (Cronbach's Alpha .71). Because they did not fit this 2-factor structure, 2 items were left out, thus reducing the 14-item questionnaire to twelve items.

A paired sample *t* Test showed significant differences in each factor in both moments of application (Table 1).

Table 1 – *Mean and test significance for mean differences, in moral commitment with the team, and emotional commitment with the team, before and after the creative problem solving sessions.*

Moment	N	Factor			
		Moral commitment		Emotional commitment	
		<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Before Sessions	40	4.6	1.0	4.1	.83
After Sessions	40	4.7	1.0	4.3	.72
Sig.		.45		.01	

As can be seen from the table, only one factor showed a significant improvement after the creative problem solving sessions, meaning the team members think they are more committed to the team, in emotional terms, than before the eight hours CPS sessions. In this case, the difference in the first factor was not meaningful enough to bring a real difference, which might be understood because it is a moral duty (obligation) to the team.

The questionnaire submitted to the participants, at the end of the sessions, included an open question asking them to express their opinion about the three session process. Each participant wrote an evaluation of the creative problem solving session and their comments

were submitted to a content analysis and categorization, in order to reduce the corpus, and a correspondence analysis was carried out. The perceptual map may be analysed in Figure 2.

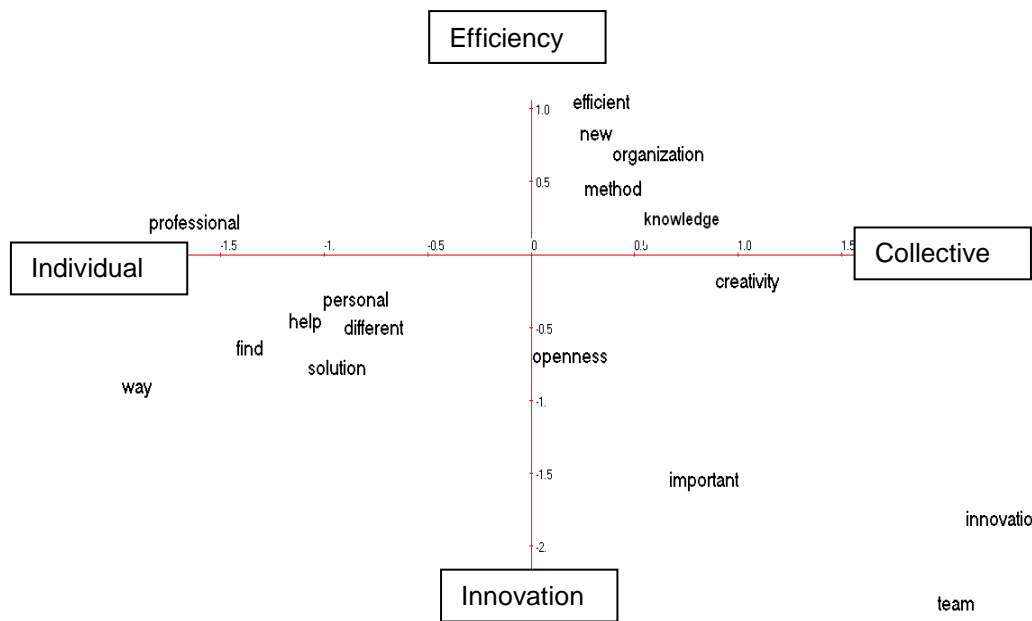


Figure 2 - Perceptual map of the evaluations produced during the CPS sessions

As can be seen in the figure, the first two axes organize the participant's perceptions in four quadrants: the horizontal axis opposes *efficiency to innovation* and the vertical axis *individual versus collective perspective*. The participants thought the method was necessary and useful at four levels of analysis, i.e. personal, professional, organizational and at the team level, but in different ways. The method was seen as useful at the *organizational* level by fostering *efficiency newness*, and *knowledge*; at the *team* level by promoting *openness to ideas*, *creativity* and *innovation*; at the *personal* level the participants thought the process could *help* them to *find different solutions*; at a *professional* level the participant's perceptions were quite similar to the individual level.

It seems the method was seen as changing the individual, in his personal and professional sphere; as a new method, useful to bring creativity and innovation at team level, and as a means to foster organizational knowledge and efficiency.

Problem Identification

Each course director stated the objective that was meant to start the team CPS process. The arts course was supposed to work under an objective of setting a multimedia installation for a conference; the tourism course had the objective of setting an innovative tourism company. The two groups produced an average of 80 facts and the defined problem was “*In what ways might we create a participated installation throughout the city?*”. After producing an average of 60 solutions, the groups converged in the decision “*To make a creative laboratory (artistic residence and inverted logic of participation in art installation throughout the city)*”. The acceptance plan was defined and the following tasks were distributed among small teams, to be executed in a specific time limit: go and meet the site, define participants, create contact database, define activities, define materials, calculate the budget, define possible sponsors, define activities co-ordination teams, establish the design, establish communication, set the installation, define needed logistics, establish event registration,

The two groups of the tourism course produced an average of 70 facts and the defined problem was “*In what ways might we transform tourism information into knowledge appropriate for company creation?*”. After producing an average of 55 solutions, the groups converged in the decision “*To create a SME association to collect information appropriate for company creation* “. The acceptance plan was defined and the following tasks were distributed among small teams, to be executed in a specific time limit: identify pertinent SMEs, contact identified help, identify gaps in the team’s knowledge, establish the information needed, define complementary activities, define substitution activities, write a tentative project

Discussion

The creative problem solving method has proved to be able to provide effectiveness in changing the individual’s attitude towards team commitment, namely by stressing emotional links with the team; also the subjects agreed as to the method’s capability in providing a professional, efficient way of organizing knowledge in such a way that can help individuals to

find original solutions to problems, and an important instrument to lead teams to creativity and innovation.

By providing the identification of facts and solutions pertaining to organizational problems, the method allowed for a diagnosis of the main areas of concern in each objective, as well as many possible options that may be used in the project's development.

The increase in team commitment is one guarantee that team members found the sessions important to make them collaborate towards a common project. As it can be seen through the protocols of the sessions, what is important is not to have the best possible innovative ideas about star ups or projects, but to analyse the whole environment related with this issue, so that team work may have a plan that will not need to be changed or re-planned in order to support the action. The knowledge that exists among the team members is not enough to come up with really innovative ideas, simply because it is not possible to have ideas without pertinent information, and it is during project execution that the team will have to learn, thus increasing the possibilities of coming up with something really original and useful.

We think that if instead of teams of students who did not have any common project, we could have worked with a team devoted to the creation of a single company or project, the results might have been even better.

This problem solving model has already proved to give useful contributions to organizational innovation (Sousa, Monteiro & Pellissier, 2008), and demonstrated its effectiveness in improving the attitude as to divergent thinking (Sousa, Monteiro & Pellissier, 2009). 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 organizing each project in the way they were organized in this experiment, with real teams, so that interesting and innovative companies, or initiatives, may come out of it.

Further research is needed by bringing in more real teams and about what follows solution planning, i.e. project development, in order to analyse what can be done to improve its effectiveness in developing innovative star ups.

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