

## Creative decision making in leaders: A case of beer game simulation

Adeel Saqib  
Mohsin Ullah  
Shabir Hyder

*COMSATS University Islamabad, Attock Campus, Attock, Pakistan*

**Rashida Khatoon Malik**

*IQRA University, Islamabad Campus, Islamabad, Pakistan*

**Muhammad Imran Khan Khalil**

*University of Engineering and Technology, Peshawar, Pakistan*

### Abstract

The leaders play a vital role in the decision scenarios in any organization. A qualitative study was conducted using “Beer distribution game” simulation to create an environment of novel and uncertain conditions. Additionally, the study followed the group interviewing technique to explore the underlying patterns in the creative decision-making phenomenon taken by the leaders in complex situations. The findings of the study revealed three categories of factors that contribute to the creative decision making of the leaders. These categories consist of factors related to individuals’ personal characteristics, team-level factors, and process related factors. The study revealed during the group discussion that creative decision making occurs through a unique interplay of people, process and technology in the Pakistani context.

**Keyword:** Creative decision making, beer game, simulation, group interview technique

The current era is characterized by fast technological development, competition, and increased workplace diversity, which has altered the work processes and working conditions (Aydalot & Keeble, 2018; Avgerou & Walsham, 2017). These complex environments demand creative behaviors from employees in their sense-making, decision-making and job roles (Shin, Yuan & Zhou, 2017; Mumford, Scott, Gaddis & Strange, 2002).

Furthermore, the literature suggests creative behaviors have a considerable contribution to organizational success and maximization of innovative performance at both the managerial and organizational levels (Maurer & London, 2018; Baer & Oldham, 2006; Sommer & Pearson, 2007). This leads to the notion that creative behaviors and decisions not only solve the problems but also for the sustainability, but also contribute to changing the problems into opportunities and provide the competitive edge for the organization.

There is no uniform source of knowledge contributing to the theory of creative decision making, rather various concepts from different origins have played their role in the understanding of creative decision making (CDM) theory. One prominent study noted that leadership styles and practices in the project are important in the creative decisions making (Ford & Gioia, 2000) and their leadership style affects the creative behaviors of the subordinates or team members. Furthermore, other studies argue that the leaders’ creative decision making depends on motivation, experience, and creative thinking of the leaders. The possible mechanism suggested is that experience and creative thinking contribute to the motivation, which results in creative outcomes or decisions (Amabile, 1988, Amabile, 1996; Powell, 2011; Zhou & Shelley, 2008; Zhu, Gardner, & Chen, 2018).

The scholars contend that leadership decisions are affected by the individual personality, besides the team influence and processes in the organizational settings. Luthan (2010) also signifies the importance and precedence of the individuals over the other factors related to the team and process and identify the humans as the main source of creativity and decision (Luthan, 2010; Smith, Hill, Wallace, Recendes, & Judge, 2018).

The creative decisions are subject to the contexts of the decision-maker. Two important studies have discussed this issue in detail, for example, Ford and Gioia (2000) suggested that the decision-maker make different types of decisions in the managerial context. These decisions are categorized based on the criteria of four combinations of two qualities, i.e. novelty and value.

Furthermore, Sommer and Pearson (2007) noted the lack of research in managerial creative decision making in uncertainty. The study suggested that specific factors influencing creative decision making should be explored further. One important aspect highlighted by Sweetman et al. (2010) is that responses from subjects involved in creative outcomes in the uncertain environment should be assessed immediately soon after the decision. The immediate assessment would entail a clearer picture of the decision-making process.

It is in this background our study explores the creative decision making in an uncertain environment. Our study is unique in at least three aspects. Firstly, our study used the Beer distribution game (BDG) simulation to measure the decision making and behaviors of the employees by creating an uncertain environment. Previous studies have although used simulation based analysis but decision making in those environments lacks uncertainty (Uusitalo, Lehkoinen, Helle, & Myrberg, 2015).

Secondly, the study has modified the BDG by simulating the unconstrained supply chain in the production line. Thirdly, supply chain management literature largely focused on the individual and group interaction in creative decision making (Klumpp, Hesenius, Meyer, Ruiner, & Gruhn, 2019), The study findings reveal that a third element, i.e. technology also play an important role in the creative decision making.

The rest of the paper is divided into three sections. After the introduction section, the second section reviews the existing literature, the third section discusses the methodology and the final section includes discussion and concluding remarks.

## Literature review

### Creative Decision Making (CDM)

#### *History of CDM*

There is increasing interest in the study of organizational factors that affect CDM. It is because creative actions usually diverge from the routine and established norms. These divergences gave rise to innovations and new ideas in products and processes. According to Ford (2000), the emergence of the concept of creative decision making (hereafter referred to as CDM) cannot be traced back to one particular field of study. These studies can be broadly classified into two broad categories i.e. creativity and decision making. However, according to Runco (2007), creative studies are multidisciplinary and their origin can be traced back into behavioral, cognitive, developmental, economic, educational, evolutionary, historical, organizational, and social perspectives.

Initial literature on creativity focused on individual aspects of creativity. The personal factors that contribute in creative outcomes vary from person to person according to Reiter-Palmon, Mumford and Threlfall (1998) the creative capacity is different for different individuals and depends upon the creative personality, self-efficacy, cognitive style, and personality characteristics such as orientation towards risk-taking, ability to understand problems and generalizing the ideas on the basis of previous solutions or experience (personal mastery). According to Powell (2011), on the basis of the work of Amabile (1998), Simonton (1995) and Csikszentmihelyi (1995) argue that cognition is vital predictor in the generation of novel ideas and advocate, that the novel ideas are the function of three elements personal mastery, creative thinking and motivation of an individual, where personal mastery and creative thinking collectively predict the motivation of the individual to generate novel ideas.

Later studies focused on the organizational context in complex decision-making situations (Amabile, 1988; Ford and Gioia, 2000). Literature found that the CDM process is essentially the outcome of personal and organizational interaction, for example, Amabile, et al. (1996); Amabile(1988); Amabile and Gryskiewicz (1987); Woodman, Sonoyer and Griffin (1993). Ford and Gioia, (2000) and later on Shelley and Oldham (2008) noted the gap in the literature which had so far ignored the creativity in a managerial context.

The concept of the CDM is a merger of two important literature streams i.e. creativity and organizational decision-making processes (Ford & Gioia, 2000, Sommer & Pearson, 2007). Decision making is a crux of the organizational functioning the main theme of Fayol's principles, revolves around the managerial decision making (Luthans, 2010). Mintzberg, Raisin-ghani, and Theoret (1976) explained the decision making as the step or process comprising of the identification, development and selection of alternatives. But, according to Kenney (1994), decision making is not limited to the generation and selection of the alternatives, when creativity is required. Because "the real creative decision-maker is one who creates decision opportunities". The scholars like Kenney (1994) and Lin, Mainemelis, and Kark, (2016) illustrating the CDM importance argue, that

the generation of the novel and unique solutions considering the value of the decision determines or fixes the boundaries of the decision.

### **Definition of CDM**

The CDM is considered as the generation of novel and valuable alternative solutions in the decision-making context (Lin et al, 2016; Sommer & Pearson, 2007; Keeney, 1994). The novelty of creative decisions lies in their unusual or unique context as compared to routine decisions. Whereas, the value of the decision represents the worth, effectiveness and success of the decisions (Sommer and Pearson, 2007).

According to Keeney (1994), conventional approaches to decision making focus mainly on the generation and evaluation of alternative solutions, where the generation of alternatives is the only means to achieve value which is actually the main aim of a decision. Therefore, the main focus during decision making should be on value and then on the generation of alternative solutions. Furthermore, Cleemen and Reilly (2001) identified that the alternative ideas/ solutions should focus on the objectives of the decision-making context and the objectives should be clearly defined to achieve the value of the ideas generated. Therefore, whenever there is a need for a CDM at the workplace, the objectives of the decisions must be clearly identified and then on the basis of these objectives, alternative solutions to the problem or opportunity should be generated to tackle the opportunistic or problematic situations under consideration.

According to Luthans (2010), personal and organizational factors are key to the CDM, however, technological factors are equally important. The pace of technological advancement has made the organizational environment more complex and uncertain.

To sum up, initially, the CDM was considered to be a function of the personal characteristics of decision-makers. Later on, the literature focused on the organizational environment where managers take decisions. This environment is made more uncertain by the rapid technological advancement, resulting in the changes in the processes which were comparatively simpler in the routine decision-making situations. From the above literature review, the study proposed that the factors affecting the CDM are important and there is a lack of investigation in the domain of managers or leaders. Furthermore, the capabilities required to make CDM in the uncertain conditions are not the same as they were in the past, the requirements for the twenty-first century are unique. The nature of creative decision making requires individual considerations as it is domain-specific. Therefore, the study adopted the qualitative approach to get a deeper understanding of the phenomenon as discussed in the preceding sections.

### **Research Methodology**

To determine CDM related factors in the decision making in complex situations, the participants took part in a well-known management simulation, "The beer game". The sample for this study consisted of three teams, each team consisted of three participants (n= 12). The participants were Ph.D. scholars in the business studies program. The participant's profile reflected their leadership role experience or team members in different organizations. The study adopted the qualitative methodology as suggested by Bryman (2004) and Murphy & Ensher (2008). Both emphasized the use of the qualitative methodology in leadership and CDM.

#### ***The Beer Distribution (BDG)Simulation***

The beer distribution game was developed by Sterman (1989). BDG is a well-known technique to illustrate the complex decision-making process in the supply chain. The BDG simulates the production, distribution, and delivery of beer. The main objective of the BDG model is to develop an understanding of the different types of management principles like communication, attitude, and decision making in an uncertain environment (Hardman, 2009; Bartolomei, Silbey, Hastings, Neufville, & Rhodes, 2009). The BDG was used to replicate the CDM. The beer distribution game (BDG) simulation consisted of four stakeholders, namely Customers, Retailer, Wholesaler, and Factory, each with a well-defined objective to minimize cost. The goal of the game was to simulate the dynamic behavior of the participants in the challenging situations and decision scenarios to assess the factors contributing to the CDM. The discussion below illustrates the beer game layout mapping the supply chain from beginning to end in three parts.

#### ***Part I: Pre-game***

Before the BDG session, the authors introduced the participants about the basic rules. The participants were briefed about the different types of behaviors that are experienced while playing a role in a complex situation.

### **Overview of the production distribution system.**

1. The participants were asked to make three teams (Factory, wholesaler, and retailer) consisting of three members each, where one member was selected as the team leader for each team and One member was selected for the role of a customer.
2. Each position was identical and each had an inventory of beer and each team received the orders from the lower side.

### **Part II: During the Game**

The game started with the call from the authors "Week one", the consumer put order to the retailer in the form of an "order chit", which started the whole process. Initially, the retailer, wholesaler and factory (RWF) got consistent orders and were enjoying the equilibrium in the system. This also provided them the opportunity to make their selves aware of the processes and documents involved. After the fourth week, the upward hike in the orders disturbed the entire environment and produced oscillations in the orders and shipments, making the situation more complex for the participants to decide and forecast their orders. These situations also created backlogs and over-ordering, increasing costs and losses. Furthermore, the participants were restricted to not exchange their views, inventory situations, and orders with each other (i.e. between the teams). The different types of behaviors were observed using the video camera- that enabled the authors to further explore the verbal and non-verbal behaviors at different stages of the game. The game took two and a half hours and twelve rounds were completed in the whole session. During the game, all the members maintained their inventories and documents.

### **Part III: Post-Game**

After the game, participants were asked open-ended questions. The steps that were maintained in asking the questions were as follows:

- (a) Five open-ended questions were asked from each group.
- (b) Each question was asked from each group sequentially and recorded simultaneously. In case of ambiguity, questions were further explained.
- (c) After the completion of the question-answer session, the discussion started between the participants and the authors. This discussion helped authors to understand the behavior of the participants while taking decisions.
- (d) At the end of the discussion, various findings were discussed and key themes were identified.

### **Data Analysis and Results**

The group interview was recorded using the video recorder and through handwritten notes and transcribed on the same day, to maintain the actual sense of the data. Each transcript has been independently read several times so that the data is familiarized and the researcher can make sense of it. In order to reduce the data in a meaningful way, the inductive qualitative approach of thematic analysis was used as applied by Thomas (2006).

### **Findings and Discussion**

The findings of the study illustrate that the factors affecting the CDM can be divided into three main categories. These categories are individual, team and technological factors. The findings of the experiment consist of two main parts. The general outcome and verification of the behaviors and attitudes that are attached to beer game simulation conducted in different settings and contexts. Secondly, the specific outcomes or the results that are related to the decision-making behavior of the participants in the Beer game setting.

### **General Findings of the beer game process**

The observations of the inventory record sheets and the responses during the interviewing session revealed that the sudden increase in the orders affected their inventories badly resulting in backlogs. The buildup of backlogs made the participants proactive, resultantly they started making high volume orders than the preceding session in order to maintain their stock adequately. According to Senge (1992), it is the result of learning disability and called it "the illusion of taking charge", and named this type of proactive behavior as "reaction in disguise". Hardman (2009) noted that due to this behavior, industry experiences fluctuating patterns of under and over-ordering resembling the cyclical behavior of economic booms and bust.

Furthermore, we observed that the build-up of backlogs among different participants created uncertainty, resulting in the phenomenon of "blaming others". According to Senge (1990),

the phenomenon can be termed as “ the enemy is out there”, where in fact it is the change in participants' own decisions that resulted in the said uncertainty.

The general finding of the BDG experiment illustrates that most of the teams (CRWF) did not felt any desperation with few exceptions. This observation is slightly different from the findings of Sterman (1989), where participants felt emotionally exhausted. Hardman (2010) noted that there was a sense of helplessness over their lack of control of the system. However, as we have slightly modified the experiment with an unconstrained supply chain, therefore, it can be inferred that unconstrained supply reduces the level of desperation. Furthermore, some participants were of the view that although this experiment was realistic enough, however, it lacked a system of rewards and punishments. The desperation level would have been different if the experiment included a system of rewards and punishments.

### **Findings related to CDM**

The findings related to the factors contributing to the creative behavior of the decision making of the leaders and team members, come under four main categories that are individual, team, process and globalization.

#### **Individual Factors**

We observed that the experienced individuals during the experiment showed more creativity in decision making. Even as a team member they influenced the decisions of team leaders. It can thus be inferred that individuals' creative behavior is highly influenced by their experience. This experience, in turn, depends firstly on their learning both from training and practical observations and secondly, their social background including formal education and interaction within society (Shelley & Peter, 2008).

Secondly, because of the elimination of controls due to unconstrained supply, participants showed a marked increase in creativity. This increase in creativity can be attributed to divergence from the routine controlled environment. Amabile (1996) noted that a higher level of control hampers creativity, while a lesser degree promotes it.

#### **Team level outcomes**

We observed two different kinds of decision making. The majority of the team leaders showed participative decision making. Post experiment discussion revealed that those team leaders considered participative decision making as more effective in solving problems. This is because the more the ideas the better decision would be. Luthans (2010) advocated that the participative type of decision-making strategy help in decision making.

While few team leaders showed a contingency approach in creative decision making. They contended that initially, they opted for participative decision making, however, relying on the input from members may sometimes be not a better method. It is because members might have myopic views of the situation, while the leader has a holistic view. It is, therefore, more rational to decide on one's own intuition. Furthermore, during a rapidly changing environment, it was not possible to consult each member. These results are consistent with Michel Jackson (2004) who supported the holistic view of leadership. While McKee & Calson (1996) supported the notion of keeping pace with the environment while taking decisions.

Both these observations lead to the creativity paradox, where more autonomy leads to errors and lesser resulted in lack of creativity as noted by Andriopoulous (2003). This paradox shows that the BDG when constraints are dropped needed some sort of punishment and reward structure that could check the autonomous behavior of leaders by creating creative tension.

#### **Technology Related factors**

Initial BDG experiments relied on constrained versions and common observation was constrained time and supply created stressful conditions for the stakeholders (Hardman, 2009). We tested the BDG experiment in a scenario where constraints were lifted gradually i.e. both in the short and long term. Initially, we started with the constrained version. After, some rounds we started lifting the constraints. As constraints were removed it was observed that supply started increasing as the fixed supply became variable. At this stage, we assumed that the plant is working below its full capacity and with a decrease in constraints plant moved towards full capacity. It can be inferred that in the very short term, better technological methods can considerably reduce the delay both in terms of time and production, i.e., in less time we can have more supply. The increase in demand can be met for shorter periods of time by increasing the plant to work at its full capacity. This minor technological innovation however, can work only in the very short term.

In the later stages i.e. in the long run, we observed that demand started exceeding the supply at the full capacity level. At this point, a participant opined that plant production capacity can be increased in the long run by a major technological breakthrough; as major technological innovations are possible only in the long run. Thus in both scenarios of a very short and long time, technological innovations can play its role.

### Globalization

Another interesting finding while running the unconstrained version of the BDG experiment involved the lifting of constraints on alternative supply channels. Some participants observed that globalization can play a role in enhancing supply. It was observed with the lifting of another source constraint, fixed supply could also be improved if the required goods can be obtained from other sources. From one producer perspective, supply remained fixed, but producers from outside the system can increase the supply in both short to medium term. It is evident that in the short to medium term, imports from outside the country can help increase the fixed supply. Although, not applicable in the case of goods that cannot be imported, in the majority of cases, producers from other countries help increase the supply through imports. Globalization can also help in the transfer of technology, thereby increasing supply. Thirdly, globalization involves the movement of people across borders, which can enhance new ideas in organizational decision scenarios. Thus globalization works through three mechanisms, i.e., through international trade and transfer of technology and transfer of intellectual capital. Creative decision making is a domain-specific in which sometimes the process is given priority over the individual capacities and technology, while on the other time the other factors like technological advancement may become important depending upon the domain or the context of the decision scenarios e.g. in case of globalization as a mechanism the study infers that the three mechanisms of process, people and, technology are parallel to the mechanisms of international trade, intellectual capital and transfer of technology.

### The proposition of Dynamic model of CDM based on People, Process and globalism perspective

The BDG simulation was conducted, which is a tested source to measure behavior and decision making styles in complex and uncertain situations. The study aimed to find out the factors that affect the creative decision making in the complex or uncertain conditions in organizational settings. On the basis of the findings discussed above the authors inferred that the findings of the research process could be divided into three main categories people process and technology, which contribute in the creative decision making exactly follows or relates with the people process and technology framework a socio-technical model based on the long tradition of established research (Taylor & Felton, 1993; Nadler & Tushman, 1997; Morgan & Liker, 2006). (The Toyota product development systems integrating people, process and technology).

As illustrated in figure 1. Based on our findings and the work of Keen and Sol (2008), the study infers that people, process and technology are increasingly interdependent. People make decisions, their skills, values, experience shape the decisions, and the decision process influence the likely hood of their making effective decisions and the technology can provide multiple.

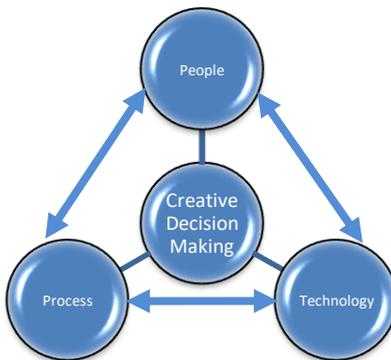


Figure 1. People, Process & Technology and Creative Decision Making Model

The three levels of support to both the people and the process. Improving the combination of all the three factors in decision making creates a substantial impact on the value of the decision a dimension of the creative decision making in the organizational settings. According to Keen and Sol (2008), in general, they do not move together and, may even be in conflict. People may resist process, and process may limit people especially if it inhibits free expression or imposes what they see as artificial procedures. Common examples can be the use of the internet, Emails, extranet, web 2.0 and social networks that create a holistic view, and allow managers to see out of the box.

The factors related to the people working in the services sector organizations were further categorized into two categories, individuals and team level factors as discussed above. Furthermore, in the globalized world which is characterized by change, adaptability, and technological development can be considered as the influential factor in making a creative decision. The study would contribute to the literature, research and practice. The model developed through this research would provide a foundation and framework for the leadership, operations management and decision making literature. Moreover, the managers and leaders working in projects and uncertain conditions would get more benefit from the findings and implications discussed and utilize this knowledge for the creative action.

## Conclusion

The study intended to find out the factors that affect the creative decision making of the leaders working in teams in the services sector organizations of Pakistan. A qualitative study was conducted using the BDG simulation to create an environment of novel and uncertain conditions and then group interviewing technique was used to explore the underlying patterns in the creative decision-making phenomenon taken by the participants in the complex and uncertain conditions. The findings of the study illustrated that there are mainly three categories that contribute to the CDM of the leaders, the individual, team level and process related also from the study. The group discussion revealed that the interaction of people, process and technology play an important role to make creative decisions in the service organizations in Pakistan.

## Limitations and Future Research Directions

The research is qualitative in nature, hence subject to generalizations, which require to be studied quantitatively to minimize the biases. Secondly, the model developed in context-specific and requires to be tested through the mixed type of studies which would enhance its scope and replicability. The future research should be conducted in environments where automated systems are implemented and where the actual decisions take place as the simulated environments are unable to cover all the risks in the environments. The CDM is a complex process and should be studied considering it's radical and incremental.

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