EXTERNAL VALIDITY OF BUSINESS GAMES: AN ANALYSIS WITH ELEMENTS OF ORGANIZATIONS

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RESUMO

Jogos de empresas proporcionam aos estudantes a experiência de conduzir um negócio de maneira simulada. A eficácia dos jogos de empresas pode ser medida pela validade representacional, ou seja, o quanto o negócio simulado se assemelha a um empreendimento real. O objetivo deste estudo foi verificar se os elementos que compõem uma organização, a saber: participantes, estrutura social, tecnologia, objetivos e ambiente, permitem avaliar a validade representacional de um jogo de empresas. Foram revisados conceitos relacionados à validade em jogos de empresas e elementos das organizações. Por meio de observação participante e um *survey* aplicado a 155 estudantes, que participaram de um jogo de empresas, foi possível concluir que os elementos que compõem uma organização permitem discriminar empresas que tiveram sucesso e fracasso no jogo de empresas. Esse resultado indica a utilidade destes elementos para estudos que analisem a validade representacional de jogos de empresas.

Palavras-chave: jogos de empresas; validade representacional; elementos das organizações.

ABSTRACT

Business games give students the experience of running a business in a simulated way. The effectiveness of business games can be measured by representational validity, or as a simulated business resembles a real company. The aim of this study was to determine whether the elements of an organization, namely: participants, social structure, technology, and environmental goals, are to consistent to assess the representational validity of a business game. Concepts related to the validity of business games and elements of organizations were reviewed. Through participant observation and a survey applied to 155 students, who participated in a business game, we concluded that the elements of organization are a consistent way to discriminate companies that had success and failure in the business game. This result indicates the usefulness of these elements for studies to examine the representational validity of business games.

Key-words: business games; representational validity; elements of organization.

1. INTRODUCTION

Business games have become a popular choice of pedagogical technique for teaching in higher education. Also, this technique have been used in management research (Keys

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and Wolfe, 1990). The objective of a business game is to offer students the opportunity to learn by doing, engaging them in a simulated experience of the real-world. There's a number of studies concerning the validity of business games as representative of real-world organizations (Faria and Wellington, 2005). These studies discriminate four forms in order to verify if a business game has validity: external, internal, educational and representational.

According to Carvalho (1991), external validity of a business simulation has been viewed as a measure of how well the business game models the real-world industry in which the simulation takes place. For Gosen and Washbush (2004, p. 273), internal validity concerns with perceived changes by the student in classroon settings when those changes was settled by instructors. Educational validity is related to effective learning in business games simulation. Representational validity concerns with the comparison of real firms performance with the performance of simulated companies (Stainton *et al.*, 2010).

In a literature review on studies that verified validity, Stainton *et al.* (2010) identified only one empirical study that analysed representational validity, which was performed by Faria and Wellington (2005). These authors compared the outcomes (profits) of simulated firms with predictors of real-world business firms outcomes using a specific database.

If the objetive of business games is to simulate real organization, the model of the game should contains the elements of real organizations. Daft (2014, p. 17) states that organizations have specific characteristics that structure an organization. The author called these elements "contingency factors" which are: culture, environment, objectives, size and technology. There's evidence that these elements are good predictors of firm's performance (Hansen and Wernerfelt, 1989). In order to contribute to the analysis of representational validity of business games, the following research question arises: Are the elements of organization a source of representational validity of a business game?

Following the approach used by Faria and Wellington (2005), in this paper we will present a comparison of cases of firms that had success and failed in a business games. In order to explain this outcome we relate the firm's performance with the elements of organizations to see whether these elements explain the success or failure of those firms. We assume that the business game conducted have representational validity (Stainton *et al.*, 2010) if firms that succed contain a consistent set of elements of organizations rather than firms that failed. In the next section the literature review on business game and elements of organization are presented. Next, the method is discussed. Following, the results, conclusions and also the limitations of the analysis are discussed, and finally we suggest futures studies to help understand the performance of firms in a simulated environment.

2. LITERATURE REVIEW

2.1 Validity of business games

For Keys and Wolfe (1990, p. 309), the first use of games for education and development was the war game called Wei-Hai, which originated in China about 3000 B.C. According to the authors, these games have similarities with Chess Game developed in the Middle Ages. For Keys and Wolfe (1990, p. 310) in the 1930s and 1940s the use of games in the military field raised rapidly. The pioneering use of business games have been at the University of Washington in 1957, which was the simulator Top Management Decision Simulation of American Management Association.

Feinstein and Cannon (2002) present the problem of validation as an effort of the Association for Business Simulations and Experiential Learning (ABSEL) during the decade of the 1990s that aimed at evaluating to find simulations that works properly. The authors state that the validity of business games will depend on how well it prepares students to understand, select, and use a set of business skills. Also, it should be used to assess students' business skills. In this way, Gosen and Washbush (2004, p. 275) states that to assess the validity of business games the outcome variables need to be defined, they must be objective, and appropriate for the experience being assessed.

The validity of business games, as an efficient tool, has been analysed by previous studies. Gosen and Washbush (2004) reviewed five types of studies that determined validity of business games. First, studies analysed representational validity and the capacity of participants reach conclusions similar to those of real world. Other studies assessed the performance of the business game in training specific skills in theirs participants. Comparing the performance of conscious decision makers with random decision were another set of studies. Another group of studies analysed if player's decisions were consistent with the decisions induced by the business game. Finally, there were studies comparing the performance of teams and individual with that of carrer-related results some years after the simulation.

For Feinstein and Cannon (2002) external validity refers to representability of external phenomena by the business game. Faria and Wellington (2005) state that two approaches have been used to examine the external validity of business games. The first approach focuses on the analysis of student's firm performance in the business game and it's real-world business performance. The second approach employs a longitudinal analysis of the a student's business game performance and some measure of subsequent business career success.

Internal validity relates to the capacity of the business game represent true causality in the relationships between the variables (Feinstein and Cannon, 2002). The internal validity of business simulations has been measured in two ways (Faria and Wellington , 2005, p. 261). Some studies state that if a simulation exercise is considered valid, better students should outperform poorer students (see Wolfe, 1987, for a review). A second way examines whether participant decision whether participant decisions in a simulation conform to the environment of the simulation (see Wellington and Faria, 2001, for a review).

Focusing on internal validity, Dickenson and Faria (1997) analysed "real firms", that made real decisions, and "not real", that made random decisions, and concluded that the "real firms" outperformed the randomic ones. Wolfe and Luethge (2003) found that "real" players that consciously made decisions outperformed players that copied industry leader's decisions and players who replicated initial decisions. These studies indicate that those simulations exhibited an appropriate level of realism (Gosen and Washbush, 2004, p. 275).

Representational validity address the questions if the simulation provide a valid representation of a desired phenomenon (Feinstein and Cannon, 2002). The authors state that to obtain representational validity, the structure and logic of a game must represent the business' environment which students are to learn. Finally for Feinstein and Cannon (2002), educational validity asks whether the simulation provide a valid learning experience and in what dimesion the learning can be assessed.

2.1 Elements of Organization

We reviewed management textbooks to build the framework of elements of organizations. In the first chapter of the Scott and Davis' book, they set the elements of organizations (Scott and Davis, 2007, p. 19) which are based on Nadler and Tushman's (1997) "congruence framework". They define what are the organizations' constituinces by stating elements: environment; strategy and goals; work and technology; formal organization; informal organization; and people.

According to Scott and Davis (2007, p. 19), Environment refers to the elements outside the organization that influence its ability to survive and achieve its ends. By strategy and goals the authors argue that it is the choices that organizations make about markets or clients, or the specific tatics the organization employs and the output goals it sets for itself. Work refers to the tasks that transform organization's goals to realities. Technology may be the machines or the technical knowledge, methods and skills of participants.

Formal organization is splited in three elements: human resource practices; job design; and organization structure. The first element is related to the routines performed by the members of organizations. Job design is related by the work attributed to each participant and organization structure that divide the work of teams grouped by some criteria as function or result (Scott and Davies, 2007, p. 23). Informal organization is the aspects of organization that are not evident in the elements of formal organization. One common feature is the culture that describes the pattern of values, beliefs and expectations shared by the members. Also the social networks, which are the informal connections among individuals that arise out of work patterns that are not formalized in the organizational chart. The last element is the people wich bring to organization several elements with subjective issues. The topics generaly studied in this element is leadership, the teams and the relationship between members.

Mcfarland and Gomez (2013, p. 6) considers the elements of organization like core analytics features to study organizations' problems. The authors describes five elements: Participants; Social Structures; Goals; Technology; and Environment.

For the authors the participants are the firm's social actors and can be the employees and stakeholders. Also you can define by the individuals that make contributions or derive benefits. The Social Structure concerns features of the relationship of participants. The authors considers the formal and informal structures as constituencies of social structures. Formal structures entail clearly prescribe social positions and informal structures emerge from unplanned ones. The Goals are the desired ends that participants attempt to achieve. Technology are the means by which organizations accomplish the goals. The authors also considers processes and methods as forms of technologies. The last element is the Environment defined by the physical, technological, cultural and social context in wich and organization is embedded (Mcfarland and Gomez, 2013, p. 8).

Hampton (1992, p. 39) argues that the elements of organizations are: participants; informal organization; and tecnology. In participants, the author argues that the main aspect is motivation. In the informal organization the author argues that are the role of unplanned positions. Finally by technology, the author argues that it is the process that governs tasks in organizations.

According to these authors we set the organizational elements, the definitions and its correspondent element in the business game as presented in Table 1.

Table 1 - Review of elements of organization

Elements	Authors	Definition	Element in the business game
Participants	Hampton (1992); Scott and Davis (2007); Mcfarland and Gomez (2013)	Individuals members of organization	Students in each team
Social Structure	Hampton (1992); Scott and Davis (2007); Mcfarland and Gomez (2013)	Formal and informal relationships in the organization	Relationships occurred by formal functions and informal ones
Goals	Scott and Davis (2007); Mcfarland and Gomez (2013); Daft (2014)	Desired ends that organizations want to achieve	Teams goals
Technology	Hampton (1992); Scott and Davis (2007); Mcfarland and Gomez (2013); Daft (2014)	Process that govern tasks in organizations	Process or methods employed to do tasks
Environment	Scott and Davis (2007); Mcfarland and Gomez (2013); Daft (2014)	Elements outside the organization	All elements that are not controlled by simulated firms

Source: elaborated by authors

The elements commum in the three authors (Hampton, 1992; Scott and Davis, 2007; and Mcfarland and Gomez, 2013) was participants, social structure and technology.

Goals and Environmnet were present in Scott and Davis (2007), Mcfarland and Gomez (2013), and Daft (2014).

3. METHOD

In the business game analysed in this paper 155 students of Business Administration, Information Systems and Accounting of a private college in Brazil were ramdonmly assigned to a team of 6 members which competed at different simulated industries of 7, 6, 5 and 4 firms respectively. Each round, the team had to take 8 decisions (price; level of marketing; level of research & development; maintenance; level of production; amount of raw material; investment on equipments; and dividends. Each team were incentived to divide their work in 6 functional tasks (Chief Executive Officer; Marketing; Finance; Production; Human Resources; and Planning).

In the analysis of cases, as recommended by Pozzebon (2012), we maximized the similarities of cases, in the perspective of student profile (undergraduate), number of individuals in teams (simetric with 6) and number of periods (14). Also, we maximized outcome's differences (firms that succed and failed) in order to make a significantive comparison (Table 2).

Table 2 – Methodology of cases' analysis

		Maximize outcome's differences	
		Case(s) of success	Case(s) of failure
Maximize similar conditions	Student profile; game; number of individuals and periods	firm(s) X	firm(s) Y

Source: adapted from Pozzebon (2012).

The business game analysed in this paper is called Management Laboratory (Sauaia, 2013). This game presented internal validity in previous studies (Sauaia and Kallas, 2003; Silva and Sauaia, 2013). After each team took decisions, the professor launched them in the simulator and results were returned with performance indicators like profit, sales' volume and avaliable cash. A manual with simulator's explanation were provided. Each group decided for 14 rounds and in the end it was possible to discriminate between teams that succeed and others that failed.

As each class were divided into 2 groups (Monopoly and Oligopoly) that competed indnependently, here we present the analysis of 3 simulated firms that succeed (GLX; ConectWorld; and Cellsite) and other 3 that failed (Infinity; AdTech; and Gama) (Table 3).

Table 3 - Average Profits in 14 rounds of cases

Simulated Firms that succeed	Average profits ($)	Simulated Firms that failed	Average profits ($)
GLX	572,889	Infinity	263,264
ConectWorld	238,667	AdTech	-778,318
Cellsite	179,396	Gama	-172,618

Source: elaborated by authors (2014).

The data was collected in two ways. First by participant observation which we could see the behavior of each team in each round. Second, by a survey with all students in order to have objective and quantitative data. Questions 1 throught 4 asked participants to rank their judgment in a scale of 1 (low) to 7 (high): Question (1) were about one's simulator's knowledge; (2) personal commitment with the simulated company; (3) the relationship between the members of the team; and (4) purpose of the simulated company, since beggining, to have superior performance. Question (5) asked about the technology that the team used to analyse information and planning decision. Question (6) asked if there were reunions extra-class. Question (7) were about hours spent analizing the results and planning the decisions. Finally in question (8) participants were asked to rate (in a 1 to 7 scale) how strong they follow the chart (6 functions mentionned). Our may hyphotesis is that, in terms of organizations' elements, if the simulated firms that are more look like "real" firms, they will outperform the others.

4. RESULTS

In the participant observation it was possible to see the process that led firms to succeed and others to fail. Many observed cues was marked to differentiate firms that consciously managed the firm to succeed and others that failed.

We will relate the comparison by two firms listing the firms that succeed and failed in each industry [e.g. GLX and Infinity were in the same industry]. Starting by the firm that succeed, **GLX** had very participative members. Four of six members not missed the classes, and one of them, by his knowledge, was invited to be consultant of another team's industry. Also, two of the participants were elected as best managers by theirs peers. They also used eletronic sheet to plan theirs decisions and also sad that they used excel at question (5). They also affirmmed that did extra-class reunion spending on average 4,83 hours analizing the results and planning decisions. The team also had a good relationship between participants with no conflict between the members.

In contrast, in **Infinity** not all members were participative. One participant stayed out of in all class discussions. Half of the team had missed some classes. They did not used eletronic sheet to work with the values. Only half of them affirmed that did extra-class reunion spending 4,66 hours in analysis and decision planning. Also one member of the group reported that he had trouble relationship with the team and was wondering let them. Comparing the quantitative numbers of the survey (Table 4) the average score of GLX was higher than infinity in all scales (knowledge; commitment; relationship; purpose; and chart following).

Table 4 - Quantitative results of the survey

Firm	Question (1) [knowledge]	Question (2) [commitment]	Question (3) [relationship]	Question (4) [purpose]	Question (8) [follow chart]
GLX	4,0	5,8	6,8	6,6	5,6
ConectWorld	4,33	5,33	6	6	5,33
Cellsite	5,2	5,4	6,4	6,8	4

Infinity	3,5	5	5,75	6,5	5
AdTech	3	5,8	6,8	6,4	4,4
Gama	4,8	6,4	5,8	6,2	5,4

Source: elaborated by authors (2014).

Conect World was another firm that succeed in the business game. This firm had a highly motivated president that declared he was enjoying the activity because it was practical instead of theoretical. The relashionship of the group was good, and no participant reported insatisfaction. This firm had not participative paticipants [e.g. only one in five didn't missed any class]. This firm did not used excel for its planning and decision activity. Only one participant reported that did extra-class analysis spending on average 4,5 hours.

The firm that failed in this industry was **AlphaLTDA**. The participants exibited many technical doubts during the rounds demonstrating poor self-lerning capacity or integration as a team. They exhibited also some signs of low motivation. The team were participative since only two of five missed only one class. The majority of the team declared they had extra-class analysis and decision planning spending 3,33 hours. They didn't used also eletronic sheet to analyse the results. Analysing the quantitative scores only "knowledge" and "follow chart" scores of Conect World were higher than AlphaLTDA.

Competing in another industry, **Cellsite** obtainned superior performance. In this firm participants exhibited strong knowledge of the simulator's rules and a great capacity of analysis using excel and charts to explore the relationship between the variables. In terms of participation in class, all participants missed at least one class. Only one participant declared they did extra-class meeting spending 3,5 hours. There were also no relationship problems between the members.

In this industry, **Gama** had the lowest average profit (Table 1). This firm was conducted by dispersed participants that demonstrating little desire to improve their position in the ranking. There were relationship problem of one participant that reported previous conflict with another team's member. The participants were no present at all, only one didn't missed classes. They didn't used any eletronic sheet to analyse the results nor extra-classes meeting, and declared 2,6 hours of extra-activity. In relation to the quantitative scores Gama had greater scores than Cellsite only in "commitment" and "follow the chart" ratings.

5. DISCUSSION

The comparison performed in the last section described the cases that succeed and failed in the business game analysed in this paper. Using participant observation, we can state that in-class participation is not a element related to performance (e.g. GLX and AlphaLTDA had high level). The participant's knowledge seems to be a strong indicator of firm's performance since it became evident in the cases related and in the quantitative results of the Table 4. Another element that deserves to be highlited is the motivation in relation to the activity, as related as high in Conect World and low in AlphaLTDA. The

rate of commitment didn't exhibit consistent correlation with the winners (e.g. Gama had higher scores than Cellsite).

The relationship of the participants appeared as a source of conflict in some groups that had low performance (e.g. Infinity and Gama). This result may be robust since the winners didn't show relationship problems. Measured quantitatively this measure exhibited only one inconsistency (e.g. Adtech was higher than ConectWorld).

The desire to win the business game may be a measure of the effort made by the team to achieve a better position. This was not captured by qualitative observation but presented sign of robustness (e.g. the firm that failed exhibited higher that the one that succeed only once). The use of technology to improve the analysis of results and planning decisions appeared as a consistent indicator since it was used by 2 of 3 firms that succeed (GLX and Cellsite), and not used by all firms that failed.

In the analysis we didn't found any sign that could be related to the environment element of organization instead the market structure (Monopoly; Oligopoly) that influenced the profits earned (e.g. GLX and Cellsite were runned by Monopoly while ConectWorld were runned in a Oligopoly). In Table 5, we summarize the observed elements in firms that succeed an that failed.

Table 5 - Observed elements in the firms that succeed and failed

Elements of organizations	Firms that Succeed	Firms that failed
Participants	Exhibited strong Knowledge and motivation	Exhibited many doubts and low motivation
Social Structure	No relationship problems	Previous or current relationship problems
Goals	Desire to achieve better position	Inertia in achieve better position
Technology	Use of eletronic sheet for analysis	Not use of eletronic sheet for analysis
Environment	Market structure: did not influenced compared performance	Market structure: did not influenced compared performance

Source: elaborated by authors (2014).

6. CONCLUSION

In this paper, we presented 6 cases of firms that succeed and failed in a Business game activity runned with undergraduated students at a private college in Brazil. The literature review stated 5 elements that are present in organizations. We analysed in each element what are the aspects of firms that succeed and failed in the Business game.

Generally the firms that succed exhibited **participants** that had strong knowledge of the simulator's rules and also were motivated in the activity. In terms or **social structure** they had no relationship problems between members. They also had a clear **goal** to achieve a better position and used eletronic spreadsheets as **technology** to improve theirs analysis and decision making. In terms of **environment** we could only indicate whether the market structure were a Monopoly or Oligopoly, but these didn't affected the compared performance of the teams.

We consider two main limitations in this study. First, the data collected lies on weak methodology rigorosity. Participant observation can generate a biased analysis since the professor that conduct the discipline is also the researcher. Second, the quantitative data of the survey relied on subjective ratings which lack reliability. Futures studies could overcome these methodological issues or address new methods to study elements of organization in a simulated environment.

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