

## BUSINESS SIMULATION GAMES: A MINI LITERATURE REVIEW

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### ABSTRACT

Despite the high time cost, many researchers are said to have developed business simulation games. In different decades, an abstraction like the traditional method related to simulation games was repeated. The aim of this study is to reveal the reasons that pushed researchers to develop simulation games to solve the problems despite the high cost. For the literature review, the questions suggested by Herdman, the methods suggested by Rawley and Slack have been used. Among the reasons, why business simulation games developed, a distinction between theory and practice, the difficulty of teaching and learning things, making lectures fun, and upskilling have been found. It has been concluded that researchers are trying to solve similar problems by developing business simulation games. This study proposes new research to improve education on the difference between theory and practice and the use of simulations for integration into the education system.

**Key Words:** Business simulation games, Logistics education, Theory, Practice, Experiential learning

### 1. INTRODUCTION

Games have been used for thousands of years in the military and for many decades in business education (Andlinger, 1958; Burgess, 1991). Still, different researchers described a method that they called traditional (*lecture-book-case study*) in different decades (Chase, 1983; Arnanda, 2007; Feng & Ma, 2008; Allon & Van Mieghem, 2010; Carlson, 1966).

The main question in this paper is the problems that forced researchers to develop simulation games. Simulation games are defined as simulations by different researchers (Jackson & Taylor, 1998; Sparling, 2002). According to Pidd (1992), simulation development is costly. Thus, it is important to look into the problems that forced researchers to develop simulations.

The oldest example ever reached in this study is Vital Roux's game in the Touzet & Corbeil (2015) study. However, according to Burgess (1991), the oldest example of business simulation games is *Top Management Decision Simulation*.

Four different approaches were observed in the development of games (Touzet & Corbeil, 2015; Andlinger, 1958; Jackson & Taylor, 1998; Carlson, 1966; Sparling, 2002; Allon & Van Mieghem, 2010; Chan et al. 2009; Jiang, 2009; Mustafee & Katsaliaki, 2010; Wu, 1989):

- Games that are not played on computers
- Games that are not played on computers, but supported by computers
- Games that are played on computers
  - Online games
  - Standalone games (They are developed with programming languages such as VBA)
- Human simulations

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The games, which were mentioned by Andlinger (1958), Touzet & Corbeil (2015), Burgess (1991), Jackson and Taylor (1998) in their studies, were evaluated as the games that are not played on the computers. Methods and technologies for developing games were seen as important due to cost that was stated by researchers (Pidd, 1992; Andlinger, 1958).

As claimed by Carlson (1966), computers may be used for analysis for a game that is not played on computers. Sparling (2002) used a computer for supporting a game that is not played on the computer. An example of online games can be Allon & Van Mieghem's (2010) study. Games, which were developed by using spreadsheets and VBA can be found in the literature (Chan et al. 2009; Jiang, 2009; Mustafee & Katsaliaki, 2010). Kyrukov & Kyrukova's (1986) study also provides a classification for business simulation games.

During the review process, Pidd's (1992) and Arnanda's (2007) studies have been encountered and given a place in this study as they may be useful for business game development. Pidd's (1992) and Arnanda's (2007) studies are worth mentioning since they may be useful for developing business games.

Within the scope of this study, the focus is mainly on two theories; namely, experiential learning and organizational learning which can be found in Wenzler & Chartier (1999) Allon & Van Mieghem's (2010) papers.

In literature, there are also studies that have similar objectives to this present study (Wenzler & Chartier, 1999; Hallinger & Wang, 2020). The main question of the study is to find the reasons that push researchers to develop simulation games and it is aimed at developing insight into this topic. Hallinger & Wang (2020) advised further study on the learning outcomes and additional details included in this study can lead to further research.

## **2. METHOD**

In this study, the articles, found by searching a keyword such as simulation games, were reviewed. The reviewed articles' references were also used for reaching new ones. That is to say, the reviewed articles have been obtained through keywords and references. Different articles from different disciplines such as business, management, tourism, and medicine were analyzed. The articles were chosen randomly, which can be a weak point for the study. Herdman's (2006) questions were used in order to evaluate the articles within the context of this study. Every article was summarized by using an adapted method (Barzun, 1992, p.22). Rowley and Slack (2004) suggest that the articles should be reviewed and organized by taking notes. Cornell Method (Pauk & Owens, 2011, p.245) could make it easier to take and organize the notes. This study is the gathered form of these notes that have been obtained from the reviewed articles.

## **3. RESULTS AND DISCUSSION**

According to Andlinger (1958), business simulation games are trial-based games consisting of a set of rules. Andlinger (1958) stated the main aim for developing business simulation games as upskilling. Andlinger's study deals with the usage of the games in organizations for decision making and discusses the cost of making games. There is an emphasis on real-life in this paper. However, the article does not include any results about the assessment and evaluation of the results of using business simulation games. Researchers generally conduct a questionnaire or make a personal assessment (Chase, 1983; Arnanda, 2007).

Wenzler & Chartier (1999) also try to answer similar questions to the ones that are touched on in this present article. They approach the subject within the context of organizational learning.

According to their experience, developing games and simulations is an efficient way of overcoming uncertainty.

Carlson (1966) states the simulations that are being used in firms. As also stated in the paper, games provide a safe environment for employees. According to Carlson, an employee from Boeing said that games were providing starter-level knowledge for employees. When the examples about training in Carlson's study are analyzed, the main idea for developing games is considered as upskilling.

According to Chase (1983), students can easily learn the effects of fixed and variable costs on profitability by using simulations. Chase's view is considered as a personal assessment method for the efficiency of simulations. Experiential learning is mentioned in this study. There is an emphasis on both making lectures fun and developing skills. In Chase's paper, a traditional method is stated, and The Management Game takes it one step further as a replication of reality. There is also an emphasis on the real world in the study. The game provides a risk-free environment for exercises, which is also stated by Hewat et al. (2020) for medicine and Carlson (1966) for management.

Burgess (1991) conducted a survey in order to find the simulation games which were used by universities. They found that the level of simulations games usage is more than %90 in England. One of the most important elements of this study is the contrasting ideas about business simulation games that are stated by Burgess in business.

Wu (1989) developed a simulation that is called *human simulation*. The human simulation was developed in order to compare *Just in Time* and *Optimized Production Technology*. According to Wu (1989), students had difficulties understanding lectures and were describing lectures as "*theoretical, boring and unnecessary*" before the simulation. Therefore, making lectures fun and overcoming the difficulty of understanding things are considered as the factors that push Wu (1989) to develop simulations. Wu's (1989) observations about the views of students were also considered as the personal assessment for evaluation.

Smith (1990) studied computer-based simulations for operations management education. According to Smith (1990), simulations can make education easier for students, thus the difficulties in learning are considered as the reason that motivates researchers to develop simulations.

Goodwin & Franklin (1994) used a game in order to teach systems thinking. According to them, there are difficulties in teaching systems thinking.

According to Hewat et al. (2020), simulation-based learning provides a safe learning environment for students. Their aim is to develop a simulation-based educational program in medicine and a roadmap can be found in their study. They discussed the integration of the simulations to the education system within this sense and this is the reason why it is included in this study, as well.

Jackson & Taylor (1998) described MIT's Beer Game as a simulation of a distribution channel. They defined Beer Game as an efficient tool for the students to learn the concept of the supply chain. Their view about the efficiency of simulation games is considered as an example of a personal assessment method for measuring efficiency.

Smith et al. (1998) state a distinction between education and practice. Their aim is to eliminate this distinction. In their view, students can experience *real-world* problems thanks to computer technology.

Chapman & Sorge (1999) studied the subject from the perspective of employers. Their claim is that employers look for real-world experience as well as education. They tried to distinguish the *traditional method* from business simulation games. They found a relation between the learning objectives and the simulation that they used. They regarded decision-making about *real life* as the main benefit of using simulations. They also included contrasting views in their study. They used Day et al. (1995) simulation, and so the reason for the use of this simulation is considered as upskilling students since simulations are beneficial for real-world experience.

As stated by Actenhagen (1999) and Lehtinen (2000), Lainema & Nurmi (2006) claim that higher education cannot teach students to get adopted to practical situations. They discussed the usage of learning materials in their study. The term *real world* can also be seen in their study. The reason for simulation game development is considered as upskilling due to the skills required for adaptation to practical situations.

According to Martin & Mc Evoy (2003), business simulation games make it possible to simulate *real-world* situations and provide an experience for real situation scenarios that are neglected in the lecture. Their simulation is evaluated by conducting a survey and found as an efficient tool.

Sparling (2002) stated difficulty in the understanding of the problems in the supply chain for students and managers. Sparling also described a simulation game as a simulation, and the Beer Game, which was developed by MIT, was set as an example for this. Sparling made a spreadsheet for the Beer Game and generated demand data by using this spreadsheet.

According to Anderson & Morrice (2000), Beer Game is used for teaching *complex* supply chain principles. They developed a business simulation game for the service sector.

According to Siddiqui et al. (2007), simulations are efficient tools that are useful for skill development. They considered simulations as efficient teaching tools. They referred to simulations as reinforcing the things that were learned theoretically in lectures. Therefore, both upskilling and the distinction between theory and practice might be considered problems for researchers. An emphasis on the real world can also be found in their paper.

Feng & Ma (2008) evaluated a simulation that developed by Professors Sunil Chopra and Philipp Afeche. Their claim is that the *traditional method* teaches the supply chain concept, but it does not mean that they can imitate the problems that are encountered by managers. They tested their simulation by conducting a survey. An emphasis on the real world can be found in their paper. They claimed to have discussed the integration of simulation tools into an undergraduate supply chain management class.

Chan et al. (2009) developed a simulation game in Excel as other games are not sufficient for their subject. They also included steps of simulation game development in their study. Experiential learning was also cited in their study.

Jiang (2009) studied the educational uses of spreadsheet programs. According to Jiang (2009) spreadsheets can be efficiently used in logistics education. A simulation was developed by Jiang (2009) in order to model inventory management.

Mustafee & Katsaliaki (2010) developed a business simulation game by using Excel VBA. They stated difficulty in supply chain management education. They said that lectures and textbooks might be inadequate for teaching supply chain concepts.

Allon & Van Mieghem (2010) stated a difficulty about teaching dual sourcing by traditional method. Therefore, they developed an online business simulation game. Experiential learning is also cited in this study.

According to Touzet & Corbeil (2015), Vital Roux developed an approach like experiential learning long before Americans. The views about theory and practice can be found in their study.

Vanany & Syamil (2016) developed a game for teaching supply chain management. Vanany & Syamil (2016) Kaminsky and Simchi-Levi (1998) stated that students could focus on the mechanism of the game. Therefore, they claimed that there were some limitations and a research gap about Beer Game.

Shovityakool et al. (2019) developed a game that might be personalized. They intended to teach supply chain management. Students might have a chance to apply their knowledge in a real-world situation by using games. They used a spreadsheet in order to develop the game. Their study was included as they developed a game that can be personalized.

Dong & Boute (2020) underlined a distinction between theory and practice. In their study, students and managers had difficulties in the application of lectures into practice. They developed the game in order to reach some educational objectives.

Arnanda (2007) defined seven stages for simulation development. In this paper, simulation usage was approved for strategic decision-making education. The time required for simulation development for strategic management courses can be also found in this paper. According to Arnanda (2007) Caddotte (1995), there is too much emphasis on theory, and ten years later from Cadotte's study, *lecture-textbook-case study* became the primary method.

This study has some weaknesses considering the imprecise method that is used for sampling; additionally, there may not be an article for each game that is developed for commercial uses. Therefore, there might be different teams that try to solve different problems. Still, reviewing different articles from different disciplines and looking at their common points can be accepted as the strength of this study.

#### **4. CONCLUSION AND RECOMMENDATIONS**

In conclusion, four problems forcing researchers to develop simulation and simulation games considering the articles reviewed have been observed. These problems are summarized as follows:

- A distinction between theory and practice
- Difficulty in learning or teaching something
- Make lectures fun
- Upskilling

These are the problems summarized in this study, but there may be other problems such as filling a gap by developing a game that offers different things from other games. In some studies, business simulation games are presented as a replication of reality, and some of the researchers point at the theoretical lectures, too much emphasis on theory and the inability to provide real-life

experience. Therefore, the main problem in developing business simulation is considered to be the distinction between theory and practice.

The term traditional method is constantly repeated in the papers published in different decades. Therefore, considering the problems that researchers have been trying to solve, more research on the topic is offered within the scope of this study. Researchers have been developing business simulation games for decades. As a conclusion at the end of this review, there arises the question of whether the problem is solved by developing business simulation games. Another question is if we need more research about the integration of tools for practice in education programs considering the distinction between theory and practice.

A few articles contain contrasting ideas about simulation use and the effectiveness they have been discussed in this study. Studying the effectiveness of business simulation games may help to achieve improved results considering the problems that force researchers to develop simulations and simulation games, especially considering the time cost that researchers stated. Simulation games are told to be efficient for upskilling the starter-level skills in one of the articles. Therefore, whether any difference between the level of skills in terms of the effectiveness of simulation games exist can be searched.

Different studies including the integration of simulations in education programs or usage levels of simulations in education take part in literature. Similar research in specific fields may improve the effectiveness of business simulation games.

To sum up, business simulation games are not a new research area, but there are some repetitions observed in the literature. Therefore, further research about the effectiveness, integration, and usage of games can be proposed in order to improve the results for the problems that researchers try to solve.

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