Developing Leadership in a Simulation-Games Environment

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Abstract - Leadership is a process of inspiring people in pursuit of various goals and various activities. Leadership is often discussed in the context of project management, and leaders referred to as being able to organize and motivate a group of people to successfully finish a given project. In order to inspire, organize and motivate others, leaders need to have advanced social skills. Successful leaders are constantly trying to improve their social skills and knowledge. Life-long learning is important for leaders, especially learning by experience and in a real-time environment. Simulation games enable participants to learn by doing which gives them the opportunity to understand real everyday situations and possible consequences better. During simulation games, users train, analyze and predict possible actions which help them in the decision making process. The goal of this paper is twofold. The first goal is to present and analyze the usage of simulation games in leadership, their desirable characteristics, advantages, and disadvantages in the area of leadership. The second goal is to present relevant platforms for using simulation games for leadership activities and to discuss them in the context of students learning.

Keywords – leadership, simulation games, life-long learning, social skills

I. INTRODUCTION

Definition of leadership has been changed over the years. Scientists argued that leaders were born with special characteristics that help them to influence others, however various research indicated that other elements are important for successful leadership process. Some of them are situational context, the readiness of colleagues to accept and follow the leader’s ideas [1]. According to situational context, leaders should aim to adjust their leadership styles according to the motivation of their employees, readiness, and competency of the colleagues, as well as specific characteristics, e.g., type and nature of a specific project or organization who differ for each particular situation. Leadership is a complex process that depends upon situation, project, organization, team members, social, cultural and economic factors [2]. Constant changes and complexities of knowledge society implicit new challenges and tasks for leaders, and require continuous learning and. Therefore, leaders should constantly educate themselves and improve their knowledge and skills through theoretical and experiential learning in a real-time environment [3]. In addition, organizations depend upon successful leaders who create a motivated and positive environment for all employees and encourage them to be efficient regarding business activities and to foster a social environment with good communication. Therefore, investigate in further education and development of leaders is cost-effective for organizations.

Simulation games are based on experiential models and offer users learning by doing which help them to understand real everyday situations better [4]. Participation in the simulation game enables users to make decisions and plans, interact with others and evaluate their results [1]. Therefore, simulation games have great potential in leadership development. Based on that proposition, we develop two research goals. First, we present and analyze the usage of simulation games in leadership, in the context of previous research. Second, we present relevant platforms for using simulation games for leadership activities and focus on two case studies of simulation games designed for specific leadership challenges.

Paper consists of four parts. After the introduction, in the second part of the paper, characteristics of simulation games, their advantages, and disadvantages, as well as usage in the area of leadership are described. Selected simulation platforms that offer leadership development games are presented in the third part. Case studies of presented simulation games are discussed in the fourth part. The fifth part concludes the paper.

II. BUSINESS SIMULATION GAMES FOR LEADERSHIP

Simulation games present a useful tool for facilitating learning using information and communication technology and enabling students to understand the situational context, to react properly, to expand possibility for action and to learn how to adapt to the new situation [5]. There are different objectives of simulation games, such as inciting learning in some specific business areas (e.g., trade, finance, supply chain management, production) and others for developing leadership skills and knowledge [2]. Learning through simulation games is experiential, enabling that participants learn-by-doing, while they practice how to make a decision in the real world in a safe environment. In addition, people learn and understand better if they are faced with real business situations and when they have the possibility to analyze their good or bad decisions [1]. However, it is important to emphasize that ex-cathedra presents a base for learning which should be supplement by simulation games.
Various modeling methods are used for developing simulation games, such as system dynamics, discrete simulation, and agent-based simulation. System dynamics is a simulation method used for modeling the long-term behavior of complex systems [6]. It provides a better understanding of real situations while presenting a model of the behavior of social, economic or political systems in a controlled environment and with feedback over time [7].

System dynamics is used to investigate characteristics of system behavior in order to suggest improvements and to evaluate the long-term impact of particular decisions to the system behavior [8]. There are many unpredicted factors in real life which enable qualitative prediction of our decisions [9]. Therefore, using system dynamics models, we can get much easier to forecast the consequences of decisions we have made, identify factors which influence the system’s growth and stability and analyze given results [10]. System dynamics models are often used to design and develop simulation games while they provide a very good overview of the structure and behavior of the system and elements of the system and relationship among them. Therefore, simulation models developed using system dynamics can be very simple or very complex depending on variables and relationship among them [11].

Simulation games are also useful in the development of various skills, such as active learning and collaboration [12]. Experiential learning which is based on simulation games has a strong impact on improving leadership expertise and knowledge [1], enabling leaders to improve their knowledge and skills learning through practice and observation [13]. Business simulations provide the participants with a safe and controlled business environment where mistakes have no negative effects in real life. The main advantage is that participant in the simulation experience situation and makes decisions using their leadership skills and knowledge [14]. Simulation games accelerate leadership learning, by encouraging employees to be proactive and to take on new challenges [15, 16]. Simulation games transform learning activity into a business environment where participants can achieve desirable leadership skills and technical expertise essential in today’s business processes [17]. Various software is available for developing system dynamics models and later transferred to simulation games, such as Vensim, iThink, and STELLA.

Capobianco Lopes with his colleagues [1] conducted a systematic literature review aims to identify business games used in leadership development and how they contribute to effective leadership. Firstly, they suggest that there is still an insufficient number of research using simulation games to foster leadership skills and knowledge. Secondly, they notice that the relationship between the theory of leadership and business simulation games is not clearly presented in the context of learning. They also noticed that participants are not eager to change their behavior or skills, even after finishing the simulation business game. In other words, using simulation business games as an active learning method does not automatically ensure effective education for leaders. It is likely that more qualitative business models and realistic business games will attract leaders and managers and improve leadership development using an active learning environment.

However, the results of their study provide insight into organizations that are creating simulations games. In order to provide a better picture of possibilities that simulation games offer and their importance it would be interesting and useful to do in-depth interviews with leaders after finishing simulation game. Their experience and later practicing what they have learned during simulation game, provide the role and advantages that simulation games offer to users.

Simulation games can also help participants to improve their specific leadership style which can help them in real business situations. People differ regarding personality traits, cognitive ability, motivation, and self-efficacy and simulation games have the potential to improve their knowledge and skills and to prepare them for real business situations [18].

III. SIMULATION GAMES PLATFORMS IN THE AREA OF LEADERSHIP

Simulation games are developed by various organizations, such as universities as well as companies that sell them to interested parties. Simulation games are usually offered using various platforms. Several specialized organizations are selling custom made simulation games for multinational companies and universities, aiming to help them in finding well-trained employees. They also offer free demo versions of their simulation games. Simulation games platforms offer various types of simulation games, focusing on learning in a specific industry (e.g., hospitality or telecommunications), or to development of specific skills, such as leadership.

For the purpose of this paper, we shall present the following platforms: Cesim, Forio, and Isee. In addition, there are platforms that offer only leadership development games, such as SimuLearn and LeadPro. Among them, Isee and Forio develop business simulation games based on system dynamics modeling approach [11]. Some of these companies cooperate, such as Isee and Forio, as is elaborated in the fourth part of the paper.

A. SimuLearn

SimuLearn offers products that enable better leadership skills through simulation training program [19]. At platform SimuLearn clients can choose among three main products: Blended learning products & bundles; Easily integrated self-paced modules and Custom development. Their games can be used by corporations and university classes and have already made programs and custom development which can be prepared according to clients’ wishes. Using the game, clients will work in a controlled environment through several weeks of practice real business simulations. At SimuLearn platform clients can also find games based mainly on leadership activities: vLeader Professional, vLeader Professional Supplemental Text, The Leadership Experience Instructors Compendium, vLeader Advantage and vLeader Essentials Supplemental Text. Those who are interested in their programmes can apply to a free webinar to find which simulation is the best for them.
B. Cesim

Cesim is also one of the organizations which offer different simulation games that can easily present business processes in a risk-free environment through an online platform [20]. Their simulation solutions start with Introduction, practice round, strategy and objectives, decision making, conclusion and analysis and are prepared for four business areas: Business, Management & Strategy Simulations, Marketing, Hospitality, and Industry specific.

Figure 1 presents the dashboard of one of the Cesim simulation games. Players make the decision using the dashboard, and see the consequences of their decision in virtual settings. Cesim offers to their client's demo version which enables them to have better insight into simulation games and to choose the right one according to their needs. All simulations are a competitive and present market with 3-12 teams including 2-8 members. All teams begin with the same start position and with similar market shares, profits and market conditions. According to their decisions, they will have positive or negative results at the end of the simulation.

![Figure 1. Cesim dashboard](Source: www.cesim.com [accessed February 22nd, 2019])

One of Cesim products dealing with leadership is a Project management simulation game focused on teamwork and leadership collaboration and communication. The simulation game is prepared in five languages: English, Finish, French, Spanish and Chinese. The main task for team members is to manage a project and to complete it with the highest quality, least cost, and on time. Through simulation game, participants will learn how to lead a project and how to organize given task and needs of team members; how to communicate with each other and how to collaborate with different team members according to unexpected situations. The success of the team depends upon the leader’s skills to manage task and team members.

C. LeadPro

LeadPro is offering virtual experience through simulations regarding different leadership styles [22]. Through their simulations, they offer the experience of practicing leader skills in a virtual environment about decision making. Participants get a chance to practice their decision-making process in a controlled environment. After finishing the simulation game, users get instant feedback and data analysis regarding their decision process. The dashboard is presented in Figure 2. They also offer a demo version to interested clients in order to try a simulation and decide whether it is suitable for their needs.

![Figure 2. LeadPro dashboard](Source: http://www.leadprosim.com [accessed February 22nd, 2019])

D. Isee Systems

Isee systems were founded in 1985 by Barry Richmond one of many experts in system thinking [23]. In 1989 they invented model building and simulation tool, STELLA. Software iThink was developed in 1990 for business activities and strategies and in 1991 Isee systems created the first Management Flight Simulator. They successfully continued they work in the area of simulation modeling and in 1995 introduced the first Learning Environment and in 1999 provided the first conversational systems thinking workshop in 1999. In 2015 they delivered software Stella Professional, which allows real-time analytics with Stella Live.

Isee systems offer different modeling and simulation software which enable a better understanding of the world. By using Isee systems’ Dynamic Modeling software, participants develop system diagrams that can be simulated over time which enable them to understand the behavior of the system and recognize possibilities for progress. Isee systems offer not only software but also online courses, workshops, one-on-one modeling support, free webinars, and tutorials. They offer simulation solutions in different areas: development, economics, environment, health care, human resources, policy, social, urban dynamics. At the Isee Directory, clients can find more than 200 simulations published by their customers which
they can search by specifying Title, Description, Keywords or Author. One of the simulations in the area of leadership is SysQ where they highlight the importance of systems thinking and systemic intelligence for successful leaders. Participants can get insight into the simulation model, how feedback loops are developed and what are relationships in the model. In their games, system dynamics models are also presented in order to increase learning. Figure 3 presents the example of elaboration of the system dynamics model in the simulation game SysQ.

Figure 3. Elaboration of system dynamics model for the game SysQ
Source: https://exchange.iseesystems.com/ [accessed February 22nd, 2019]

E. Forio

Forio has been founded in 2001 and creates software products that enable simulations, data explorations, and predictive analytics [21]. They have three main categories of products: Epicenter-platform to create & share powerful web-based simulations; Performer-offer soft skills through online role-playing and Ready-to-Run Simulations-simulations for higher education or corporate training. Forio presents games developed with system dynamics modeling. It is possible to upload the game using Vensim, ithink, or STELLA software. Various organizations are using Forio platform.

Several simulation games are free to run, and Figure 4 presents examples of such games.

In the area Ready-to-Run Simulation they have several categories, such as Capacity & Supply Chain, Entrepreneurship, Finance & Accounting, Group Communication, Innovation, Leadership & Management, Market Growth, and others.

There are several simulations in the category Leadership & Management that are suitable for corporate training or higher education: (i) Leadership and Teamwork: Everest, (ii) Cybersecurity: Cyber Attack!; (iii) Organizational Behavior: Judgment in a Crisis; (iv) Global Collaboration: Tip of the Iceberg; (v) Change Management: Power and Influence; (vi) Renewable Resource Management: Fishbanks; (vii) Project Management: Scope, Resources, Schedule; (viii) Startups and Entrepreneurship: CleanStart; and (ix) Network Externalities: Video Game Platforms. Forio is also interesting for university studies while offering many demo simulation games in different areas.

Figure 4. Forio games showcases
Source: https://forio.com/simulate/showcase [accessed February 22nd, 2019]

Figure 5 presents the dashboard of the Leadership and Team Simulation: Everest Demo, which is hosted on Harvard Business School platform.

Figure 5. Leadership and Team Simulation: Everest Demo
Source: http://academic.hbsp.harvard.edu/everestv3 [accessed February 22nd, 2019]

The simulation is about climbing to Mount Everest and all unexpected situations that could happen during climbing. Team members have to work together and make decisions about climbing to the next camps, hiking speed, distribution of supplies and oxygen bottles, weather and health conditions.

Team members and team leader have to work together, communicate, share information and collaborate in order to get on the top of the mountain without any negative consequences on team performance.
IV. CASE STUDIES OF SIMULATION GAMES FOR LEADERSHIP DEVELOPMENT

In order to better elaborate usage of simulation games for leadership development, we present two examples of simulation games, available as free games over Forio platform.

A. Headcount strategy game

The Headcount strategy game was developed using software iThink. The software provides to users to test their decisions, to apply different strategies and to see results of their own actions and possible consequences in a safe environment. The program is user-friendly and enables to players visualization of each step and a better understanding of decisions they made. The game is available through Forio platform.

Figure 6 presents the model structure of the game. The game was uploaded by Isee company to the Forio platform and is available for free usage.

![Figure 6. Elaboration of the system dynamics model for the Headcount strategy game](https://forio.com/simulate/netsim/simple-headcount-dynamics/run/ [accessed February 22nd, 2019]

Players define the firm’s strategic goals. However, they have to be careful in defining strategic goals which should not be in conflict with one another and which all together should contribute to efficient business strategy. Players have a wide range of different scenarios regarding business strategies which are based on real business situations prepared in co-work with example consulting company called TWBC.

Description of the model is as follows: (i) Company employs juniors while their intention is to increase mid and upper management; (ii) Consultants can be promoted to managers, or they can resign; (iii) Managers can be promoted to officers or they can resign; and (iv) The top managers are officers and each year few of them leave the organization. In presented model, if employees tend to prosper quickly through junior and consultants and spent a long time as top managers, the system will distribute a larger portion of the total headcount to the Senior's stock. In a situation when growth slows, headcount will distribute itself in proportion to the relative size of each stock's residence times which enable employees to become top managers. One of the possible solutions is to prolong consultant and managers promo times.

Figure 7 presents the dashboard for the Headcount strategy game. Players make the following decisions by moving the sliders at the dashboard: (i) consultant promo time, (ii) manager promo time, and (iii) officer residence time. Based on these times, the consultant to manager ration and managers to officer ratio has been calculated. Scenarios can be further complicated with different levels of market growth rate, depending on the general economics situations. The goal is to establish a balanced growth with the minimum costs. Different consequences of bad decisions can occur, i.e., if the ratio of managers to officers is too high, the clients can be dissatisfied, since they are not served by the most experienced experts.

![Figure 7. Dashboard for the Headcount strategy game](https://forio.com/simulate/netsim/simple-headcount-dynamics/run/ [accessed February 22nd, 2019]

B. Business Cycle Dynamics game

Business cycles and the process can be studied in different industries while market demand peaks one year only to drop a year or two later and after a negative business period, the industry demand peaks again. Figure 7 presents the dashboard of the game, where players define the value of two variables defining the supply chain behavior: (i) normal capacity utilization, and (ii) capacity acquisition delay. As well as the Headcount strategy game, the game was uploaded by Isee company to the Forio platform and is available for free usage.

![Figure 7. Dashboard for the Business Cycle Dynamics game](https://forio.com/simulate/netsim/business-cycle-dynamics/run/ [accessed February 22nd, 2019]
Business Cycle Dynamics game was developed by Henk Akkermans, Professor of Supply Network Dynamics at Tilburg University, who noticed that capacity investment in new factories would typically start at the peak of the market which during several years leads to an excess of production capacity. Reducing utilization of existing capacity has delays and leads to an excess of inventories for up to two years.

In the Business Cycle Dynamics game, the players investigate the behavior of delays in supply chain and late responding to market demands. In this simulation, the supply network is based on four interrelated processes: Order Handling, Production Process, Capacity Management Process, and Production Planning.

V. CONCLUSION

In leadership simulation games, participants compete with others, communicate, make decisions and strategic plans, and analyze their actions in a safe environment. Participants can see the consequences of their own decisions immediately within the setting of the simulation games, while in the real world it would take months and years until the real effects of their decisions would become visible.

In this paper, we discuss leadership simulation games. Based on the results of our analysis, business simulation games play an important role in improving leadership skills and knowledge while enabling leaders to manage team members in a controlled environment without any consequences and with detailed data analysis at the end of the simulation. We present various platforms offering business simulation games, among which several are aiming at developing leadership skills. Presented platforms are Cesim, Forio, Isee, Simulaern, and LeadPro. Cesim, Forio and Isee systems provide simulations in many business areas not only for leadership development, while Simulaern and LeadPro provide only simulations for developing leadership skills. The disadvantage of all presented platforms is their price, which is all high-priced and is in most of the cases affordable for companies with sufficient budget, which use them for training their leaders or selecting new employees. However, Cesim and Forio demo simulations are suitable for playing with students during the class. They do not offer all features of full simulation, but demo versions are suitable for playing them among students during the class. At the end of the game, students can see their final results according to decisions made during the game. In addition, we present two case studies of leadership simulation games. One game supports the players in learning the dynamics of human resources management in a consulting firm, while the other support the players in learning the dynamics of business cycle dynamics.

The presented overview of leadership simulation games is situational since we presented only selected platforms distributing business simulation games, while we did not conduct the systematic search for such games. However, the results of our analysis can be useful to higher educational institutions teaching leadership in their curriculum, as well as corporations seeking to utilize simulation games in attracting and detecting new talents in their organizations.

REFERENCES