Why so serious?
A comparative analysis of acquiring soft skills through the use of serious games in corporate training

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SCHOOL OF ECONOMICS, BUSINESS ADMINISTRATION & LEGAL STUDIES
A thesis submitted for the degree of
Master of Science (MSc) in Strategic Product Design/ Product Management

January 2019
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I hereby declare that the work submitted is mine and that where I have made use of another's work, I have attributed the source(s) according to the Regulations set in the Student's Handbook.
This is for you:

“Creativity is allowing yourself to make mistakes, art is knowing which ones to keep.”

(Scott Adams)
Table of contents

Abstract ......................................................................................................................................................... 5
Acknowledgement ........................................................................................................................................... 6
1. Introduction.................................................................................................................................................. 6
1.1 Context of the study ................................................................................................................................. 7
1.2 Focus and Objectives .............................................................................................................................. 8
1.3 Methodology ............................................................................................................................................ 8
1.4 Contribution of the Study ....................................................................................................................... 9
2. Literature Review...................................................................................................................................... 8
2.1 Serious Games ......................................................................................................................................... 9
2.2 Simulation Games .................................................................................................................................. 10
2.3 Simulation and learning ......................................................................................................................... 11
3. Research................................................................................................................................................... 12
3.1 Research context ................................................................................................................................... 13
3.2 Selected Serious Games ....................................................................................................................... 14
3.3 Analytic Presentation of Serious Games ............................................................................................... 17
3.4 Criteria describing each soft skill ........................................................................................................ 25
4. Results.................................................................................................................................................... 35
4.1 Charts of soft skills against games ....................................................................................................... 28
4.2 Qualitative Data to facilitate concept scoring .................................................................................... 30
4.3 Concept Scoring .................................................................................................................................. 33
5. Conclusion............................................................................................................................................... 41
6. Discussion................................................................................................................................................ 42
References.................................................................................................................................................... 37
Abstract
Due to the rapid technological development in information technologies (IT), digital game playing have predominantly flourished throughout the years. While most popular digital games are played for entertainment, many games are designed and played with more serious purposes, called serious games. This study is about the use of Serious Games in the context of corporate education. It seeks to depict the enhancement of specific soft skills while training employees through a variety of games in different business fields. Furthermore, an analysis on the importance of decision making attitude, communication and negotiation skills as well as evaluation and progress opportunities is being presented. In overall, the efficiency of serious games regarding these three aspects is explored and proposals for further evaluation are made.

Key words: ‘serious games’, ‘management’, ‘corporate training’, ‘decision making, ‘education for business’, ‘soft skills’
Acknowledgement

To begin with, I would first like to express my gratitude for my thesis advisor, Professor Korina Katsaliaki, an Assistant Professor in Technology and Operations Management at the School of Economics and Business Administration at the International Hellenic University. She consistently provided me with valuable feedback and vital pieces of advice, leading me to the right direction. She opened a completely new horizon for me on the topic.

Furthermore, I would like to thank my beloved parents and my best friends for providing me with consistent support and continuous encouragement throughout my years of study by approving my choices, and through the process of researching and writing this Thesis. This accomplishment would not have been possible without them. Thank you very much for your incomparable support.

Author,

Mouza Martha.
INTRODUCTION

1.1 Context of the study

With the rapid technological development in information technologies (IT), digital game playing have predominantly emerged throughout the years. While most popular digital games are played for entertainment, many games are designed and played with more serious purposes, called serious games. This study is about the use of serious games in the context of corporate education. Since living in the digital age there is a plethora of new technologies being offered (Negroponte, 1996). As Moore’s Law (Moore, 1998) proposes, IT has advanced at an accelerated rate, giving games the opportunity to provide new types of experiences to the players. In addition, the emerging digital generations, who are raised up with IT and who prefer interconnectivity and decentralization (Kline et al., 2003), cover the majority of the workforce. The digital generations are featured distinctively from the previous ones. They are exceptionally pragmatic and very visually oriented. They are also taught by doing and consider digital communications and interactions as the norm (Hunter, 2013). To their mind, traditional ways of communication and training in businesses are not as effective and even outdated. In such an environment, future business education and training should be readjusted in accordance with the new generation’s demands and needs. Thus, it is proposed that serious games be a very efficient method to approach to individuals as they are familiarized with them. Unfortunately, however, the academic literature on serious games, especially games used for business education and training purposes, is sparse. Consequently, addressing the use of serious games in corporate education as well as their efficiency so as for them to be more effective, seems imminent. This dissertation seeks to determine the effectiveness of serious games in corporate education by exploring the soft skills mostly important in today’s business world and as a result to offer better insight into the most desirable skills for today’s generations.
1.2 Focus and Objectives

The objective of this study aims to evaluate the promoted soft skills being examined to the users and create an environment suitable for further assessment. A major topic is the needed soft skills through various industries so as for employees to be better trained in the future according to what is mostly desirable. At the same time, a clear comparison of the features within a variety of serious games will be presented so as to find variables affecting their performance for the users and as a result a better understanding of the most crucial factors affecting it. More specifically, two questions are addressed

1. Which of the following soft skills is mostly promoted in business fields through Serious Games?
   - Decision making attitude
   - Communication and negotiation skills
   - Evaluation and progress opportunities

According to the results of question 1,

2. Why the mostly promoted soft skill is considered exceptional in various business fields?

1.3 Methodology

To assess the proposed soft skills being acquired through the use of serious games, qualitative data was used. A three-point scale system was created so as to assess the effectiveness of the criteria each game held. In that way, the efficiency each game has in relation to every proposed soft skill could be specified clearly. Furthermore, quantitative data was taken into consideration. A questionnaire was created and digitally distributed to adult business people, so as to determine the importance each criterion has for the overall effectiveness of the games. Consequently, the quantitative data could provide a complete system so as for a concept scoring to be facilitated. As a result, the three proposed soft skills were determined as concepts and the most promoted on is presented in comparison to the others.

Secondary data were also retrieved through the university library using a range of information sources such as academic and commercial abstracts, bibliographic databases, and Internet search engines.
1.4 Contribution of the Study

The main contribution of the study is the assessment of serious games in a variety of business fields in relation to three crucial soft skills for future employees. The decision making attitudes, the communication and negotiation skills as well as the evaluation and progress opportunities are considered a core for the development of every business while the role serious games play in enhancing them is provided.

At the same time, a concept scoring of evaluating the effectiveness of serious games for corporate training is also presented, creating an opportunity for further examination on the topic.

2. LITERATURE REVIEW

2.1 Serious Games

“A serious game or applied game is a game designed for a primary purpose other than pure entertainment. The "serious" adjective is generally prepended to refer to video games used by industries like defense, education, scientific exploration, health care, emergency management, city planning, engineering, and politics.”

Wikipedia- Definition of Serious Games

The term, serious games, to those games holding a specific primary serious purpose, such as education, training, and/or research (Klabbers, 2003; Michael & Chen, 2006; Stone, 2008). Abt (1969) described them as games with an explicit and careful designed educational purpose, not focusing on entertaining merely. Kapp (2012) proposed serious game as “an experience designed using game mechanics and game thinking to educate individuals in a specific content domain. (p. 15)”. As a matter of fact, they include both entertainment and educational elements (Brandão et al., 2012). This is why it eventually provides individuals with more engagement in learning process than ever before (Mayer et al, 2013; Azadegan et al., 2012; Klabbers, 2009; Ben-Zvi, 2010; Charles et al., 2011). Serious games have been employed in a variety of industries for the past decades and they seem to revolutionize corporate training. In
other words, digital generation opts for multiple streams of getting informed, inductive reasoning, parallel and immediate interactions with content while managing sophisticated visual literacy skills (Van Eck, 2006). Another reason why SG appeal to the following generations is that they have characterized them as exceptionally pragmatic, being very visually oriented, efficient in learning by doing, and accepting digital communications and interactions as the norm (Hunter, 2013).

2.2 Simulation Games
Simulation games are simulations that entail game aspects (Hays, 2005) More specifically, they can be defined as “an exercise that has basic characteristics of both games and simulation…undertaken by players whose actions are constrained by a set of explicit rules particular to that game and by a predetermined end point (p. 3, Dorn, 1989)”.

Their design purpose and the fact they function their own game system distinguishes them for entertaining games. As simulation games are designed for players to learn a specific topic area by playing, its design purpose is different from entertaining games. By playing simulation games, players can learn about something while boosting their skills that can be used in the real world. For this reason, it is vital that reality exist in them (Barton, 1970). Instead, reality in entertaining games is not a central factor since they are not primarily designed to mimic and represent the real world. Rather, fantasy, which refers to fulfillment capability of a game that is not possible in the real world, can be important in entertaining games (Hays, 2005). Reality in entertaining game is a supporting tool so as to maximize enjoyment of users.

Furthermore, simulation games are distinguished by the existence of a game system. A simulation game is designed on its own system separated from the real world. The system of a simulation game incorporate all the elements of a game, so participants can have the feeling of entering another world that is somewhat similar to but distinguished from the real world. By simulating the way that a model of (i.e., a part of or reduced view of) the world works, participants can learn things that are relevant to the real world.
Besides simulation elements, simulation games include game-oriented elements, such as enjoyment, which enable them to engage people more than other instructional methods. Because of its pedagogic advantage, simulation games are used for multiple purposes. Hays and Singer (1989) recommend possible areas that instructional games can be used as follows: (1) to assess performance; (2) to provide instructional information; (3) to change attitude or behavior; (4) to organize learning prior to other forms of instruction; (5) to provide alternate forms of instruction; (6) to provide opportunities to practice; and (7) to illustrate the principles of a task.

Dorn (1989) also proposed that simulation games can be designed as tools in following fields: (1) Affective learning; (2) Cognitive and conceptual learning; (3) Enhancing cooperation, interaction, and communication; (4) Skills of decision-making, problem solving, and critical thinking.

2.3 Simulation and learning
Simulation and learning are two interrelated concepts throughout any educational procedure. The relation between the two aspects seems dynamically interactive and the Association to Advance Collegiate Schools of Business (2007) has proposed some features which should characterize the whole process in order for it to be efficient. On the one hand, the ethical dimension surrounding the topics must be taken into consideration while at the same time the members involved in the process should be capable of detecting and analyzing the complexity of any arisen issue. More specifically, a business simulation must offer highly designed mechanism so as to facilitate communication among the individuals involved throughout the game.

Also, regarding the regarding the facilitation of critical thinking among the participants, there should be effective environment so as to provide them with sufficient systems to apply and improve theoretical knowledge. Another aspect that should exist is the enhancement of team work and collaboration during the whole process of business simulation training. Moreover, it must offers a universal perspective that gives the individuals the opportunity to identify the risks and chances related to different aspects of societal, market as well as cultural discrepancies.
Given the above, there are two differentiated areas upon which simulations can provide avid learning. To begin with, they create a link between theory and practice while at the same time they offer the learners the chance to gain experience by participating and learn according to the actions they go for. This means that, they have the opportunity to handle real life situations and act or decide in a manner relevant enough so as to reach their goals (Armstrong & Hird, 2009; Witkin et al., 1977). Also, the whole process of simulating facilitates learning through the outcome that arises. The reasoning on which simulation is based, gives users the opportunity to examine the results while acquiring in-depth knowledge as well as developing creativity, critical thought and problem solving skills (Andreu-Andreu & García-Casas, 2014; Arellano, Hine and Thilmany, 2001; Kennedy, Fisher & Ennis, 1991).

Because of the lack of a universal theory on the issue of assessing the results of learning through simulators, (Sorensen, 2010), there have been several authors proposing different variables in order to determine their effectiveness in the field of business education as well as the scales enabling their measurement (Blunt, 2009; Freitas & Jarvis, 2007; Garris, Ahlers & Driskell, 2002; Gresse von Wangenheim, Savi & Ferreti Borgatto, 2012; Guillén-Nieto & Aleson-Carbonell, 2012; Wrzesien & Alcapiz, 2010; Yusoff, Crowder & Gilbert, 2010). This work studies three of these variables: evaluation of decision making process, assessment of communication skills as well as the opportunity to examine further evaluation and progress in the individuals.

3. RESEARCH

The following research aims to depict the extent to which specific soft skills can be acquired through the use of serious games in training employees. A comparative analysis, based on a three point scale system will be presented relating to 10 serious games offered in the market.
3.1 Research context
Two research questions were addressed:

1. Which of the following soft skills is mostly promoted in business fields through Serious Games?
   - Decision making attitude
   - Communication and negotiation skills
   - Evaluation and progress opportunity

   According to the results of question 1,

2. Why the mostly promoted soft skill is considered exceptional in various business fields?

A thorough search of serious games, related to business field, was conducted at the start of this effort. Several keywords were used in order to retrieve games, such as ‘serious games’, ‘management’, ‘corporate training’, ‘decision making’, ‘education for business’. Because of the variety of sites providing a wide selection of serious games for industries, institutions and real companies’ case studies having experienced specific providers, are taken into consideration. “Game Learn” and “Game Lab” is a case in point as it gives overall feedback of its clients’ experience of their services. Another research point was the one providing lists that academic institutions have created or used so as to improve student’s performance. For instance, the beer distribution game (also known as the beer game) is a business simulation game created by a group of professors at MIT Sloan School of Management in early 1960s. There are also sites providing serious games while depicting reviews from users having experienced their services in quantitative manner such as Crazy Games. In overall, those sites providing evidence and relevant feedback on the topic were carefully examined, and the search was finished when a critical number that could provide the effort with a sufficient picture i.e. the most appropriate games, had been collected. Accordingly, these games constituted the sample of this study. Those games relating to the examined business fields (supply chain management, HR, sales, managerial positions), being accessible (free registration or paid licensed), having number of layers (levels of complexity while proceeding in the game), explicit environment (structured and well defined games) as well as technical specs (number
of players, saving options, blogs within) have been included. The games that lacked information and features as well as relevance to the soft skills which will be discussed were excluded. Furthermore, those who exhibit to be simplistic for our purpose were also left aside.

During a thorough, yet comprised research in relation to business serious games, the selection includes a variety of games relating to multiple business domains. The following chart presents the summary of the chosen games so as to familiarize with them.

### 3.2 Selected Serious Games

<table>
<thead>
<tr>
<th>Serious Game</th>
<th>Description</th>
<th>Skills</th>
</tr>
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</table>
| 1. Pacific             | Pacific is an online video game course on leadership and team management in which users learn and apply strategies, techniques and tools to develop and improve their leadership and team management skills. | • Leadership  
• Negotiation  
• Time management  
• Personal productivity  
• Management  
• Training  
• Sales |
| 2. 2100                | 2100° is a futuristic adventure in which the student travels to the forward in time to begin from zero in a huge corporation. The goal is to become the company’s CEO. | • Real situation work  
• Decision- making  
• Communication skills  
• Networking |
| 3. Triskelion          | Triskelion is an online course based on a simulator that recreates real situations so that students can learn how to develop their own personal productivity | • Developing plans  
• Prioritizing  
• Boost efficiency  
• Time management  
• Research and development  
• Negotiation  
• Sales |
| 4. Marketing Management Simulation | It consists of eight customer segments in two market areas and a maximum of six different | • Advertising  
• Budget allocation  
• After sales services  
• Pricing  
• Sales forecasting |
<p>| | |</p>
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<tr>
<td>smartphone products that can be offered to the markets simultaneously. In order to encourage unique strategy creation and execution, participants start their companies fresh without any operations history.</td>
<td>• Marketing research  • Competitor analysis  • Research and development  • Profitability</td>
</tr>
<tr>
<td>5. SimVenture Classic</td>
<td>It is an authentic and flexible resource that can be used by individuals or groups to learn about how business really works. Teachers and Trainers can cover specific subjects within the software or engage students by allowing them to run a whole business.</td>
</tr>
<tr>
<td>6. Business Simulation Game</td>
<td>It is an extremely versatile browser game that allows you to experiment with various resources and test your skills against other players in the game. The goal of the game is to create a profitable and competitive business.</td>
</tr>
<tr>
<td>7. Beer Game</td>
<td>The Beer Game is a role-play simulation game that lets participants experience typical coordination problems of (traditional) supply chains, in which information sharing and collaboration does not exist. In more general terms, this supply chain represents any non-coordinated system where problems arise due to lack of</td>
</tr>
</tbody>
</table>
8. Pricing Game
In this simulation each team plays the role of a Revenue Manager and set prices in order to maximize their profit. The game consists in 5 rounds with increasing levels of difficulty: Customer valuation, Static and Dynamic prices, Capacity constraints and Segmentation. The winning team will be the one that generates the maximum revenue at the end of the game.

- Revenue management
- Marketing
- Operations management
- Microeconomics

9. Coalition Game
In this simulation each player represents a shipping company, and the challenge is to obtain the largest savings through a coalition with one or more players. Once the alliances are established, the companies must negotiate how to share the savings and to reach an agreement before the time is up. The game is set in 3 stages with increasing levels of complexity.

- Operations management
- Logistics
- Negotiation
- Information sharing
- Revenue management
- Budget allocation

10. Monopoly
In this version of Monopoly, thanks to new technologies, you can now play this classic board game through your web browser and compete to build a monopoly on the property developments and learn about budget allocation.

- Property management
- Revenue management
- Communication
- Negotiations
- Budget allocation
3.3 Analytic Presentation of Serious Games

Game Learn

1. Pacific
   Description: Pacific is an online video game course on leadership and team management in which users learn and apply strategies, techniques and tools to develop and improve their leadership and team management skills. The game’s survival adventure setting challenges the student to escape with a team from a desert island where they are stranded following a plane crash. The chances of escaping with their lives will depend on the student’s ability to manage and motivate the team.
   Skills: Leadership, negotiation, time management, personal productivity and customer service and skills with a direct impact.
   Gamification techniques: storytelling, badges and levels to generate ‘engagement’. Rankings and challenges to increase motivation in the participant. Sophisticated simulators representing real situations.
   Available languages: Spanish, English, French, German, Dutch, Italian, Portuguese, Chinese, Russian, Arabic and Turkish
   Environment: Private Platform

2. 2100
   Description: ‘2100’ is a futuristic adventure in which the student travels to the forward in time to begin from zero in a huge corporation. The goal is to become the company’s CEO. Your success or failure will depend on your capacity to listen to, help and take care of your customers.
   Skills: ‘2100’ is the first simulator specializing in developing customer service skills and recreates up to 27 “real” situations to work on a total of 17 skills.
   Gamification techniques: storytelling, badges and levels to generate ‘engagement’. Rankings and challenges to increase motivation in the participant.
Available languages: Spanish, English, French, German, Dutch, Italian, Portuguese, Chinese, Russian, Arabic and Turkish

Environment: Private platform

3. Triskelion

**Description:** Triskelion is an online course based on a simulator that recreates real situations so that students can learn how to develop their own personal productivity and time management systems.

**Skills:** developing plans, prioritizing, boost efficiency and performance, time management, maintain productivity, negotiation

**Gamification techniques:** storytelling, badges and levels to generate “engagement”

**Available languages:** Spanish, English, French and German

**Environment:** Private platform

Cesim

4. Marketing Management Simulation

**Description:** The marketing simulation game consists of eight customer segments in two market areas and a maximum of six different smartphone products that can be offered to the markets simultaneously. In order to encourage unique strategy creation and execution, participants start their companies fresh without any operations history.

**Skills:** product life cycle management, segmentation, positioning, distribution channel investments, advertising budget allocation, after sales services, pricing, sales forecasting, marketing research, competitor analysis, research and development, and profitability

**Gamification techniques:** Participants are provided with a decision making tool that helps them to try and practice with different scenarios as well as analyze the outcomes of their decisions and projections. In addition, the simulation generates a range of reports that will help the teams to analyze and benchmark their own performance against their competitors.
Available languages: English, French, German, Italian, Lithuanian, Mandarin Chinese, Portuguese, Romanian, Russian, Spanish, Turkish

Environment: web-based simulation, private platform

Modules of the game:

Tasks: A significant part of the decision making challenge is to actively manage the product portfolio by matching both qualitative and quantitative features of products with the selected target segments’ preferences. Moreover, pricing, promotion and channel selection need to be set based on the segments’ preferences. In addition, teams manage the after sales and research and development decisions.

Factors: The essence of Cesim SimBrand simulation is to mirror a fast developing smart phone market that is driven by short product life cycles and innovation; where constant attention to core competences, timely product development, segmentation, positioning, and marketing communications are the keys to success.

Outcome: As an outcome of the marketing strategy simulation game, participants will fully comprehend the different parts of the marketing decision making process, their relationship with each other, and their impact on the company’s overall results. In addition, participants will gain invaluable experience in teamwork and problem solving.

SimVenture

5. SimVenture Classic

Description: SimVenture is an authentic and flexible resource that can be used by individuals or groups to learn about how business really works. Teachers and Trainers can cover specific subjects within the software or engage students by allowing them to run a whole business. Small groups and individuals can test their own ability and knowledge or compete against each other.

Since SimVenture engages users from the start (as well as providing in-depth support information) teachers and trainers save significant time and effort preparing and running lessons/courses. The software also includes feedback
and self-evaluation materials so that any learning can be monitored and assessed efficiently and effectively.

**Skills:** Marketing Promotions, Advertising, Direct Marketing, Public Relations, Networking, Website, Events and Exhibitions, Recruitment, Selection, Management, Training, Time Management, Efficiency

**Gamification techniques:** key considerations included within every page, tips & traps, ‘Real World’ information, virtual advisor, video tutorials, playing instructions, ‘Solve a Problem’, tutor notes, player hints and tips, links to other key features and websites

**Available languages:** English, Spanish, Italian, Romanian, Chinese

**Environment:** private software

**Modules of the game:**

Working in monthly cycles, for up to 36 simulated months, users make decisions in all areas of their virtual computer manufacturing company and receive ongoing feedback to learn the consequences of their actions. Users manage 4 key business areas:

- Sales & Marketing
- Finance
- Operations
- Organisation

**Other Business Game Features**

- Scenarios covering a selection of business problems
- Save and Load
- Monthly Reports, Profit & Loss, Cash flow, Balance Sheet
- Historical data, Charts
- Unexpected events
- Multiple Currency options
- Custom Content, Tutor Alerts
- Interactive Business Planning Guidance and Template

**SimCompanies**

6. Business Simulation Game
**Description:** It is an extremely versatile browser game that allows you to experiment with various resources and test your skills against other players in the game. It is also considered a business simulation strategy game aimed at giving you the fun and experience of managing a company using real world economic principles. The goal of the game is to create a profitable and competitive business.

**Skills:** teamwork, business operations, leadership, business development, negotiation, retail management

**Gamification techniques:** decision making, penalties, simulation of the real market, storytelling, feedback, monitoring in-game communication

**Available languages:** English

**Environment:** browser game- free

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**Supply Chain Academy**

7. Beer Game

**Description:** The Beer Game is a role-play simulation game that lets participants experience typical coordination problems of (traditional) supply chains, in which information sharing and collaboration does not exist. In more general terms, this supply chain represents any non-coordinated system where problems arise due to lack of systemic thinking.

**Skills:** information sharing, supply chain management, and collaboration in the supply chain, time management

**Gamification techniques:** decision making, monitored feedback, hints and traps, evaluation options

**Available languages:** English

**Environment:** private software

**Modules of the game:**

The object of the game is to meet customer demand for cases of beer through the distribution side of a multi-stage supply chain with minimal expenditure on back orders and inventory. There are four stages, manufacturer, distributor, supplier, retailer, with a two-week communication gap of orders toward the upstream and a two-week supply chain delay of product towards the downstream. There is a one-point cost for holding excess inventory and a one-point cost for any backlog (old backlog + orders - current inventory).
Verbal communication between players is against the rules so feelings of confusion and disappointment are common. Players look to one another within their supply chain frantically trying to figure out where things are going wrong. Most of the players feel frustrated because they are not getting the results they want. Players wonder whether someone in their team did not understand the game or assume customer demand is following a very erratic pattern as backlogs mount and/or massive inventories accumulate. During the debriefing, it is explained that these feelings are common and that reactions based on these feelings within supply chains create the bullwhip effect.

The bullwhip effect
The bullwhip effect is a well-known symptom of coordination problems in (traditional) supply chains. It refers to the role played by periodical order amounts as one moves upstream in the supply chain toward the production end.
Even when demand is stable, small variations in that demand, at the retail-end, tend to dramatically amplify themselves upstream through the supply chain. The resulting effect is that order amounts become very erratic. Very high one week, and then zero the next.
As a consequence of the bullwhip effect a range of inefficiencies occur throughout the supply chain:
• high (safety) stock levels
• poor customer service levels
• poor capacity utilization
• aggravated problems with demand forecasting
• ultimately high cost and low levels of inter-firm trust

The game is used to illustrate one of the links between System Dynamics theory and the Feedback Control Theory which inspired it - that system with negative feedback loops and time delays can lead to oscillation and overload, a pattern of behavior observed in many real-world systems.
For a complete understanding, the game is played not only within a supply chain, but two or three supply chains are set up (when there are enough players and
volunteers to help). The team or supply chain that achieves the lowest total costs wins.

**Game Lab Education**

8. **Pricingame**

**Description:** In this simulation each team plays the role of a Revenue Manager and set prices in order to maximize their profit. The game consists in 5 rounds with increasing levels of difficulty: Customer valuation, Static and Dynamic prices, Capacity constraints and Segmentation. The winning team will be the one that generates the maximum revenue at the end of the game.

**Skills:** Revenue management, marketing, operations management, microeconomics

**Gamification techniques:** decision making, figure representations, statistic examples, goal setting

**Languages available:** English

**Environment:** Private platform- web based simulation

9. **Coalition Game**

**Description:** In this simulation each player represents a shipping company, and the challenge is to obtain the largest savings through a coalition with one or more players. Once the alliances are established, the companies must negotiate how to share the savings and to reach an agreement before the time is up. The game is set in 3 stages with increasing levels of complexity.

**Skills:** Operations management, logistics, negotiation

**Gamification techniques:** decision making, profiling, hints and storytelling

**Available languages:** English

**Environment:** Private platform- web based simulator

**Crazy Games**

10. **Monopoly**
Description: In this version of Monopoly, thanks to new technologies, you can now play this classic board game through your web browser and compete to build a monopoly on the property developments and learn about budget allocation.

Skills: Property management, Revenue management, communication skills, forming alliances, negotiation skills, budget allocation, sales

Gamification techniques: decision making techniques, graphic representations, role-playing

Available languages: English

Environment: browser game that uses WebGL technology

Modules of the game:

Every aspect of the game has been recreated – you can choose from one of the eight original playing pieces including the car and dog, roll the dice and buy properties.

The graphics are fantastic and the game play is smooth; furthermore the controls are simple and you can play with up to three other friends on the same browser. All the original properties are present including Pall Mall, Fleet Street and Mayfair, together with the stations and utilities. If you love Monopoly, then you are sure to love this amazing multiplayer browser based version so why not give it a try today and challenge your friends to the ultimate game of property management!

Gameplay

- Play both private and public games against multiple opponents
- Classic properties and pieces of the original board game
- Fun game play and ability to chat with other players

Tips & Strategy

- Don't simply buy every property straight away!
- Think tactically and block your opponent from gaining full sets
• Consider if the stations are actually profitable
• Don't buy the Water Works or Electricity Plant!
• More expensive doesn't always mean a better investment

### 3.4 Criteria describing each soft skill
Criteria featuring each soft skill in a point scale

After the presentation of the games, the selection of criteria which will determine the efficiency of each soft skill is provided. All discussed criteria are classified into a three-point scale, forming categories of varied quality. The system will be explicitly described and the criteria are being ranked accordingly. The analysis of ranking is based on the nature of each criterion considering its subjectivity as an experiential study.

**Decision-making attitude**

Criteria:

1. **Problem solving tasks**
   - Users don’t have to solve problems in order to proceed (0 points)
   - Users have to solve problems, choosing among given solutions (1 point)
   - Users have to solve problems, inventing solutions by using the provided information (2 points)

2. **Level of involvement**
   - Absent (0 points)
   - Low (1 point)
   - High (2 points)

3. **Design elements of user interface**
   a. Chance of intervention while simulating
      - Simulation in one run (0 points)
      - Discrete periods (1 point)
      - Continuous (2 points)
   b. Sequential nature of decisions
      - Absent (0 points)
      - Strict sequentiality (1 point)
      - Explorative (2 points)
c. Nature of users’ decisions
   - Absent (0 points)
   - Qualitative (1 point)
   - Quantitative (2 points)
d. Internal time
   - Absent (0 points)
   - Haste (1 point)
   - Present (2 points)

4. Levels
   - There are not different levels (0 point)
   - There are different levels but not of increasing difficulty (1 point)
   - There are different levels of increasing difficulty (2 points)

5. Setting the parameters
   - The progress depends on some given scenario (0 point)
   - The progress depends on a particular scenario (1 point)
   - The progress depends on the parameters, set by users (2 points)

6. Active participation
   - The game progress doesn’t depend on users’ decisions (0 points)
   - The game progress depends sometimes on users’ decisions (1 point)
   - The game progress depends on users’ decisions (2 points)

7. Characteristics of users’ decisions
   - Arbitrary (0 points)
   - Policy oriented (1 point)
   - Decision oriented (2 points)

Communication and negotiation skills

1. Knowledge
   - Knowledge is provided and is auxiliary (0 points)
   - Knowledge is provided and is prerequisite to proceed (1 point)
   - Knowledge is constructed by users while proceeding (2 points)

2. Attitudes
   - It promotes no attitudes/behaviors (0 points)
   - It promotes specific attitudes/behaviors (1 point)
• It encourages users to develop their own attitudes/behaviors (2 points)

3. Systems Thinking
• The game progress depends only on one factor (0 points)
• The game progress depends on various non-interrelation factors (1 point)
• The game progress depends on various interrelated factors (2 points)

4. Class collaboration
• It doesn’t promote users’ collaboration (0 points)
• It promotes users’ collaboration but there are not instructions for teachers/trainers (1 point)
• It promotes users’ collaboration and there are instructions for teachers/trainers supporting the use of the game (2 points)

5. User relation/community
a. Interactions among players
   ➢ Absent (0 points)
   ➢ Indirect (1 point)
   ➢ Direct (2 points)

b. Player composition
   ➢ Single player (0 points)
   ➢ Single team (0 points)
   ➢ Two players (1 point)
   ➢ Two teams (1 point)
   ➢ Multiplayer (2 points)
   ➢ Multiteam (2 points)
   ➢ Massive (2 points)

c. Evaluation
   ➢ Individual (0 points)
   ➢ Team (1 point)
   ➢ Both (2 points)

d. Role-playing
   ➢ Absent (0 points)
   ➢ Low (1 point)
   ➢ High (2 points)

e. Players’ community
   ➢ Absent (0 points)
   ➢ Rare (1 point)
   ➢ Present (2 points)

f. Alliances
   ➢ Not present (0 points)
   ➢ Not foreseen (1 point)
   ➢ Foreseen (2 points)

Evaluation and progress opportunity

1. Games’ goals
• Games’ goals are given only at the beginning (0 points)
• Games’ goals can be seen anytime by clicking a button (1 point)
- Games’ goals are always displayed and their achievement is marked (2 points)

2. Rules
- The rules are not provided (0 points)
- The rules are provided from the beginning (1 point)
- The rules are discovered by users during the playing depending on the progress (2 points)

3. Score
- There is no scoring (0 points)
- Users can see their score only at the end of the game (1 point)
- Users can see their score constantly or at the end of each stage (2 points)

4. Saving options
- It cannot be saved or paused (0 points)
- It can be paused (1 point)
- It can be saved to be continued later (2 points)

5. Feedback
- Absent (0 points)
- Final (1 point)
- Immediate (2 points)

6. Level of feedback
- Absent (0 points)
- Incomplete (1 point)
- Complete (2 points)

4. RESULTS

4.1 Charts of soft skills against games
The following chart (Chart 1) depicts the rating each game has received towards each criterion based on a binary system. Each game was carefully considered according to its characteristics and the features it can offer to the player. Decision making soft skills can be measured accordingly.

<table>
<thead>
<tr>
<th>GAMES/CRITERIA</th>
<th>Pacific</th>
<th>2100</th>
<th>Triskelion</th>
<th>Marketing mng sim</th>
<th>Simventure</th>
<th>Business Sim.Game</th>
<th>Beer Game</th>
<th>Pricing Game</th>
<th>Coalition Game</th>
<th>Monopoly</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Problem solving tasks</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>1</td>
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</tbody>
</table>
Likewise, the following chart (Chart 2) presents the ranking of each game towards the selected set of criteria so as to enhance Communication and Negotiation soft skills to the players. The binary system is used to depict the comparative features each game holds.

**Chart 1**

<table>
<thead>
<tr>
<th>2. Level of involvement</th>
<th>1</th>
<th>2</th>
<th>1</th>
<th>2</th>
<th>2</th>
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<th>2</th>
<th>1</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>3. a-intervention while simulating</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>b-sequential nature of decisions</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2</td>
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<tr>
<td>c- nature of decisions</td>
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<td>2</td>
<td>1</td>
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<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
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<td>2</td>
</tr>
<tr>
<td>d- internal time</td>
<td>2</td>
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<td>0</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>2</td>
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</tr>
<tr>
<td>4. Levels</td>
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<td>1</td>
<td>2</td>
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<td>2</td>
<td>2</td>
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</tr>
<tr>
<td>5. Setting the parameters</td>
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<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
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<tr>
<td>6. Active participation</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
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<tr>
<td>7. Characteristics of users’ decisions</td>
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<td>1</td>
<td>1</td>
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</tbody>
</table>

**Chart 2**

<table>
<thead>
<tr>
<th>Games/Criteria</th>
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<th>2100</th>
<th>Triskelion</th>
<th>Marketing mng sim</th>
<th>Simventure</th>
<th>Business Sim.Game</th>
<th>Beer Game</th>
<th>Pricing Game</th>
<th>Coalition Game</th>
<th>Monopoly</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Knowledge</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>2. Attitudes</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>3. Systems Thinking</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
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<td>2</td>
</tr>
<tr>
<td>4. Class collaboration</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>5. a-interactions among players</td>
<td>2</td>
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<td>0</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>b-player composition</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>c-evaluation</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>d-role playing</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
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<td>1</td>
</tr>
<tr>
<td>e-players’ community</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>
Accordingly, Chart 3 presents the evaluation of each game towards the set of chosen criteria. In this way Evaluation and progress skills which can be gained through serious games have been assessed based on the binary system.

Chart 3

<table>
<thead>
<tr>
<th>Games/ Criteria</th>
<th>Pacific</th>
<th>2100</th>
<th>Triskelion</th>
<th>Marketing mng sim</th>
<th>Simventure</th>
<th>Business Sim.Game</th>
<th>Beer Game</th>
<th>Pricing Game</th>
<th>Coalition Game</th>
<th>Monopoly</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Game’s goal</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>2. Rules</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>3. Score</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>4. Saving options</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>5. Feedback</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
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<tr>
<td>6. Level of feedback</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

4.2 Qualitative Data to facilitate concept scoring

After the comparative assessment of each game against the selected criteria, a relevant weighting score has been attempted to be specified through a questionnaire. The use of qualitative data is essential so as to determine the weight each criterion holds. The following questionnaire was answered by 36 adult online game players and enables the creation of a closely realistic scoring system so as to verify the features the games combine as well as the most promoted soft skill based on the proposed set of criteria.

The results of the weighted percentages are presented on the charts below:
Decision making attitude criteria

1. Problem solving tasks
2. Level of involvement
3. Intervention while simulating
4. Sequential nature of decisions
5. Nature of decisions
6. Internal time

4. Levels
5. Setting the parameters
6. Active participation
7. Characteristics of users' decisions
**Communication & Negotiation skills**

**Criteria**
- 1. Knowledge
- 2. Attitudes
- 3. Systems Thinking
- 4. Class collaboration
- 5.a. Interactions among players
- 5.b. Player composition
- 5.c. Evaluation
- 5.d. Role playing
- 5.e. Players' community
- 5.f. Alliances

![Pie chart showing the distribution of criteria weights](chart1)

**Evaluation & Progress opportunity**

**Criteria**
- 1. Game's goal
- 2. Rules
- 3. Score
- 4. Saving options
- 5. Feedback
- 6. Level of feedback

![Pie chart showing the distribution of criteria weights](chart2)
4.3 Concept Scoring

After the allocation of weight in each criterion, a scoring system is possible so as to depict the realistic advantage each aspect holds. The following charts present the Scoring System to evaluate each soft skill under examination in detail and provide the survey with viable results. The system is based on a combination of statistical examination of independent variables in relation of the binary system which was previously developed for the completion of the study.

More specifically, each criterion is measured according to its binary score (0-1-2) by being multiplied with its relevant weight previously determined. Each game’s weighted scored was added and the total score of each and every criterion is given. To gather the Total Score of each soft skill, all scores were added leading to an overall score individually.

*Chart 1: Decision making attitude scoring system*

<table>
<thead>
<tr>
<th>GAMES/CRITERIA</th>
<th>Weight</th>
<th>Pacific</th>
<th>2100</th>
<th>Triskel</th>
<th>Marketin</th>
<th>Simventu</th>
<th>Business</th>
<th>Beer</th>
<th>Pricing</th>
<th>Coalition</th>
<th>Monopoly</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Problem solving tasks</td>
<td>10</td>
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<td>10</td>
<td>2</td>
<td>20</td>
<td>1</td>
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<td>2</td>
<td>20</td>
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<td>1</td>
</tr>
<tr>
<td>2. Level of involvement</td>
<td>15</td>
<td>1</td>
<td>15</td>
<td>2</td>
<td>30</td>
<td>1</td>
<td>15</td>
<td>2</td>
<td>30</td>
<td>1</td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td>3. a- Intervention while simulating</td>
<td>5</td>
<td>1</td>
<td>5</td>
<td>1</td>
<td>5</td>
<td>1</td>
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<td>b- Sequential nature of decisions</td>
<td>8</td>
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<td>1</td>
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<td>2</td>
<td>16</td>
<td>2</td>
<td>16</td>
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<tr>
<td>c- Nature of decisions</td>
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<td>7</td>
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<tr>
<td>d- Internal time</td>
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<td>0</td>
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<tr>
<td>4. Levels</td>
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<td>30</td>
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<tr>
<td>5. Setting the parameters</td>
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<td>2</td>
<td>24</td>
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</tr>
<tr>
<td>6. Active participation</td>
<td>15</td>
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</table>
### Chart 2: Communication and negotiation soft skills

<table>
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<tr>
<th>Games/Criteria</th>
<th>Weight</th>
<th>Pacfic</th>
<th>2100</th>
<th>Triskel</th>
<th>Marketing Sim</th>
<th>Simventure</th>
<th>Busines Sim.Game</th>
<th>Beer Game</th>
<th>Pricing Game</th>
<th>Coalition Game</th>
<th>Monopoly</th>
<th>Score</th>
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<tbody>
<tr>
<td>1. Knowledge</td>
<td>10</td>
<td>2</td>
<td>20</td>
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<td>1</td>
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<td>1</td>
<td>10</td>
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<td>2. Attitudes</td>
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<td>2</td>
<td>20</td>
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<td>3. Systems Thinking</td>
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<td>16</td>
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<td>5. a-interactions among players</td>
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<td>7. c-evaluation</td>
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<td>8. d-role playing</td>
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<td>30</td>
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### Chart 3: Evaluation and progress opportunity scoring system

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<th>Games/Criteria</th>
<th>Weight</th>
<th>Pacfic</th>
<th>2100</th>
<th>Triskel</th>
<th>Marketing Sim</th>
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<th>Beer Game</th>
<th>Pricing Game</th>
<th>Coalition Game</th>
<th>Monopoly</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Game’s goal</td>
<td>15</td>
<td>1</td>
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5. CONCLUSION

After careful examination, there is a clear categorization of the three soft skills being discussed: decision making, communication and negotiation as well as evaluation and progress.

Regarding research question number 1, the results of the concept scoring depict that the soft skill mostly promoted through serious games is decision making. Among the three, the former gathers 1402 points while the second most important is communication and negotiation as a soft skill, with a point score of 1393. The least favorable is evaluation and progress reaching 1100 points on the scale system.

Furthermore, in answer of research question number 2, the factors affecting the prominence of decision making soft skill on training employees through serious games include the nature of the criteria that describe it. Firstly, there is a significant relevant advantage in active participation and the existence of levels throughout the chosen games, despite referring in different business fields such as Property management, Sales or even Marketing. This signifies the importance of facilitating an active role and involving of individuals while at the same time it underlines the prospect of enhancing members’ self improvement. Also, there is prevalence in problem solving situations which is boosted while offering serious games to the members of a company. In other words, the importance of training individuals so as for them to be efficient under pressing conditions seems to be by far more significant in multiple business domains.

To fully comprehend the relevant importance of Communication& Negotiation soft skills as well as Evaluation& Progress in business fields, the lack of vital criteria in the existing serious games must be taken into account. More specifically, the absence of team playing in multiple games leads to eliminate the opportunity of collaboration
and thus the development of communication and negotiation skills among individuals. Furthermore, the lack of saving options, scoring or even providing the rules and goals in advance, affects the ability of training members to evaluate themselves negatively.

In overall, it seems that serious games in different business fields share as well as lack a variety of characteristics, leading to infer that the soft skill most wanted in business world include those that create decisive and well rounded individuals, willing and efficient to facilitate and promote each and every business.

6. DISCUSSION

As it is clearly depicted, decision making attitude is mostly promoted while communication and negotiation skills are right after. Evaluation and progress opportunity seems less favorable. A hypothesis could be that in today’s technological world the need of managing multiple tasks and thus, taking immediate decisions is found to be prominent through the range of business fields, despite their nature.

Another assumption could be that serious games are designed to engage learners in corporate training on a base where individuality is promoted. Yet, an opportunity for assessing and improving their design in order for them to be more effective in communication and negotiation skills is provided. Accordingly, there is also clear indication of the features affecting evaluation and progress opportunities, giving better understanding on the changes that can additionally be made in serious games for corporate training.

In conclusion, the results of the study can lead to alternative approaches for the evaluation of games’ use in business world not only on the part of the designers but also of that of users.
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