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Controlling Plus+ Institut (CPI) –
Institut für Performance Management & digitale Transformation

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Biographic Note

Alexandra Jülich graduated from the Berlin School of Economics and Law with a Master Degree in International Business Consulting in 2017. During this time, she experimented with the effects of interactive workshop design methods on the generated output of these workshops. Alexandra is now using this experience to improve the operational business in Berlin-based e-commerce company Contorion. She is also responsible for the Quality Assurance and Learning & Development of over 30 customer service agents. She continues to use her research results in her day to day working environment.

Prof. Dr. **Avo Schönbohm** researches and teaches as a Business Professor and founding Director of the ControllingPlus Institute at the Berlin School of Economics and Law in strategic performance management, leadership development and serious games. He can build on international practical experiences in the machine tool industry in multiple roles, like Vice President for Strategic Planning at Voith Paper GmbH & Co KG. With LUDEO, he created an agency to bring the power of games into companies through playful interaction design for strategy development, innovation and cultural change.

Alexandra Jülich schloss 2017 ihr Studium an der Hochschule für Wirtschaft und Recht Berlin mit einem Master in International Business Consulting ab. Während dieser Zeit experimentierte sie mit den Auswirkungen von interaktiven Workshop-Design-Methoden auf den generierten Output dieser Workshops. Diese Erfahrungen nutzt Alexandra nun, um das operative Geschäft des Berliner E-Commerce-Unternehmens Contorion zu verbessern. Dort ist sie für die Qualitätssicherung und das Learning & Development von über 30 Kundendienstmitarbeitern verantwortlich. Ihre Forschungsergebnisse setzt sie weiterhin in ihrem täglichen Arbeitsumfeld ein.

Prof. Dr. **Avo Schönbohm** forscht und lehrt als Wirtschaftsprofessor und Gründungsdirektor des ControllingPlus Instituts an der Hochschule für Wirtschaft und Recht Berlin in den Bereichen Strategisches Performance Management, Führungskräfteentwicklung und Serious Games. Er kann auf internationale Praxiserfahrungen in der Werkzeugmaschinenindustrie in verschiedenen Funktionen aufbauen, wie z.B. als Vice President für strategische Planung bei der Voith Paper GmbH & Co KG. Mit LUDEO gründete er eine Agentur, die die Kraft der Spiele durch spielerisches Interaktionsdesign für Strategieentwicklung, Innovation und kulturellen Wandel in Unternehmen bringt.

Business Model Analysis as a Serious Game

Alexandra Jülich

Avo Schönbohm

Purpose
Business model analysis has surged as a significant stream in strategic management. This paper analyses the benefits of structuring business model analysis as a serious game.

Design/methodology/approach
The researchers follow an action research approach with four consecutive workshops. Data is collected via triangulation of action research, focus groups and an anonymised questionnaire.

Findings
The results suggest that applied game mechanics increase participant motivation, improve their discussions, reduce cognitive biases, instil conceptual knowledge, foster procedural effectiveness business model analysis and allow them to perform the tasks individually.

Originality/value
The collected results encourage an active and reflected use of game and play within the strategic planning process and make a case for further research.

Link to management control research
A business model analysis is an essential element of strategic performance management and, hence, strategic control. Serious games and gamification are applied for performative work experiences and form a vital part of the new normal in the digital transformation.

Paper type
Research Paper

Inhaltliche Zielstellung
Die Analyse von Geschäftsmodellen hat sich zu einer wichtigen Strömung im strategischen Management entwickelt. In diesem Beitrag werden die Vorteile der Strukturierung der Geschäftsmodellanalyse als Serious Game analysiert.

Forschungsansatz/Methode
Einerseits wird ein Aktionsforschungsansatz mit vier aufeinanderfolgenden Workshops angewendet. Darüber hinaus werden Ergebnisse durch Triangulation von Aktionsforschung, Fokusgruppen und einem anonymisierten Fragebogen gewonnen.

Befunde
Die Ergebnisse deuten darauf hin, dass die angewandten Spielmechaniken die Motivation der Teilnehmer erhöhen, ihre Diskussionen verbessern, kognitive Voreingenommenheit reduzieren, konzeptionelles Wissen vermitteln die prozedurale Effektivität der Geschäftsmodellanalyse fördern und es ihnen ermöglichen, die Aufgaben individuell zu lösen.

Originalität/Theoretischer Beitrag
Die gesammelten Ergebnisse ermutigen zu einem aktiven und reflektierten Einsatz von Spiel und Spielmechaniken innerhalb des strategischen Planungsprozesses und sprechen für weitere Forschung.

Bezug zum Thema Controlling oder Unternehmenssteuerung
Die Geschäftsmodellanalyse ist ein wesentliches Element des strategischen Performance-Managements und damit der strategischen Unternehmenssteuerung. Serious Games und Gamification werden für performative Arbeitserfahrungen eingesetzt und bilden einen wichtigen Teil der neuen Normalität in der digitalen Transformation.

Klassifikation
Forschungsartikel

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1. Business Model Analysis as a Playful Endeavor

The idea of the business model as a concept of its own, promising the intelligent user a competitive advantage in a digitalised world, has been established by multiple researchers (Zott et al., 2011; DaSilva and Trkman, 2017, Wirtz et al., 2016, Foss and Saebi, 2017, Silva et al., 2020).

Simultaneously, research on serious games and the application of game mechanics in a business setting and their effect on business performance has emerged. Serious games engage participants in a simulation, encouraging collaboration, knowledge exchange and motivation while fostering creativity and innovation. They can consequently answer the perceived need to shape business environments that combine emotional and aesthetic aspects with the technical and rational dimensions (Schiuma, 2017). Although first exploratory studies on the combination of serious gaming and strategic planning exist (Aldea et al., 2014), there is, despite first conceptual papers (Gudiksen, 2015), still an empirical research gap at the junction of business model research and serious gaming on the level of the effect of various game mechanics.

To answer the research question "**Is a serious game an effective tool for analysing the existing business model?**" this paper is structured as follows: a conceptual model and the respective hypotheses are presented. A particular serious game was designed using accepted strategic management frameworks and established game mechanics. We tested the serious game with four companies of different sizes and analysed it using an action research approach. Furthermore, the research approach was enriched by conducting focus group interviews and an anonymised questionnaire.

The collected data offers an encouraging indication of the positive effects of using a serious game to initiate a company's strategy discussion. Participants were highly motivated. They recognised the improved facilitation of knowledge and appreciated the structured discussions reducing the effects of possible cognitive biases.

2. Literature Review: Business Models and Serious Games

2.1 Business Model Analysis and its Role in Strategic Management

Zott and Amit (2008) understand the business model as the structural template or the overall "Gestalt" of a company, describing how it operates internally and externally. They interpret the business model as a new systematic tool for analysing how companies "do business," focusing on how businesses capture and create business value (Zott et al., 2011). Affuah und Tucci (2003) refer to the business model as the link between company performance and competitive advantage, describing it as the method applied to create value using company resources and capitalising on them. Richardson (2008) directly links the business model to strategy formulation and implementation, as it describes the company activities that are the means to execute corporate strategy. Others come to a similar conclusion, interpreting the business model as reflecting a firm's realised strategy (Casadesus-Masanell and Ricart, 2010; Morris et al., 2005).

This understanding of the business model leads to the assumption that firms can compete through their business model (Casadesus-Masanell and Ricart, 2010). This implies that companies can also utilise their business model as a source of competitive advantage (Christensen, 2001; Zott et al., 2011; Markides and Charitou, 2004). Cosenz and Noto (2017) warn that defining a static perspective regarding the business model might limit the level of experimentation that entrepreneurs and managers conduct to enhance or innovate their business model. Bojovic et al. (2017) stress the value of business modelling as a continuous activity involving managers in cognitive processes, eventually exploring different scenarios and strategic decisions. In any case, it can provide a new lens for strategic management (Lanzolla and Markides, 2021).

2.2 Serious Games in the Business Environment

Creating business experiences that melt emotional and rational knowledge into creative innovations seems to be a key challenge for effective innovativeness (Schiuma, 2017). While many institutions appear to be hesitant about using serious games, several researchers suggest applying games in business to encourage on-the-job training and learning (Larson, 2020; Allal-Chérif and Makhlouf, 2016; Zichermann and Linder, 2013; Jacobs and Statler, 2006). Gudiksen (2015) conceptualised and brought up examples of applying serious games in business model innovation.

A serious game can be understood as a complete game used for other purposes than mere entertainment (Deterding, 2011). Carvalho et al. (2016) define a serious game as not only being more than entertainment but by including that these types of games usually involve challenges and "use reward systems in order to motivate the users to continue until the purpose is reached". The definition Agogué et al. (2015) developed is also more detailed. They add to the common understanding of serious games by stating that they entail a simulation of reality roleplay and encourage participants to develop strategies to achieve goals, all in one immersive experience. In line with these definitions, Radu et al. (2014) also conclude that they consider a game serious when it supports the personal development of the players. As a serious game does not aspire to be a game as understood by the entertainment sector, developers often make use of gamification, meaning that they use game mechanics to make tasks more engaging and enjoyable. Although first exploratory studies on the combination of serious gaming and strategic planning exist (Aldea et al., 2014), there still is an empirical research gap at the junction of business model research and serious gaming. This is especially true for the analysis of the effect of various game mechanics. A list of standard game mechanics is presented in Table 1.

Game Mechanic	Description	Source
Points	Points are awarded to individual players or teams. A point system is simple to develop and visualize. Points are assigned for different characteristics: experience, skill, karma or reputation	Zichermann, G.; Cunningham, C. (2011) Seaborn, K., & Fels, D. I. (2015)
Leaderboards	Leaderboards are used to visualize points to allow players to compare their performance to peers.	Seaborn, K., & Fels, D. I. (2015). Blohm, I., & Leimeister, J. M. (2013)
Levels	Levels are an effective representation of achievements and status, engaging a player and progressing his abilities.	Seaborn, K., & Fels, D. I. (2015).
Time pressure	Reducing the available time leads to facilitation as it can increase player focus and encourage different decisions.	Blohm, I., & Leimeister, J. M. (2013)
Collaboration	Acting together to achieve a common goal can motivate people.	Gatautis et al., (2016) Seaborn, K., & Fels, D. (2015)
Competition	Competition allows players to prove themselves either individually or in a team	Gatautis et al., (2016)

Table 1: ***Overview of commonly applied Game Mechanics***

Visualisation, structure and design and the materials used within a serious game can provide a framework that gives the game meaning and purpose and organises the applied game mechanics in an experience-creating way. The MDA framework (Ruhi, 2015), as depicted in Figure 1, is often used to describe a way to create meaningful gamification or serious games. The previously listed game mechanics are seen as the first step in the design process. Then, game dynamics and aesthetics are shaped. In this study, elements of visualisation, special materials and the overall structure and design of the serious game are created and implemented to achieve the desired game dynamics and aesthetics.

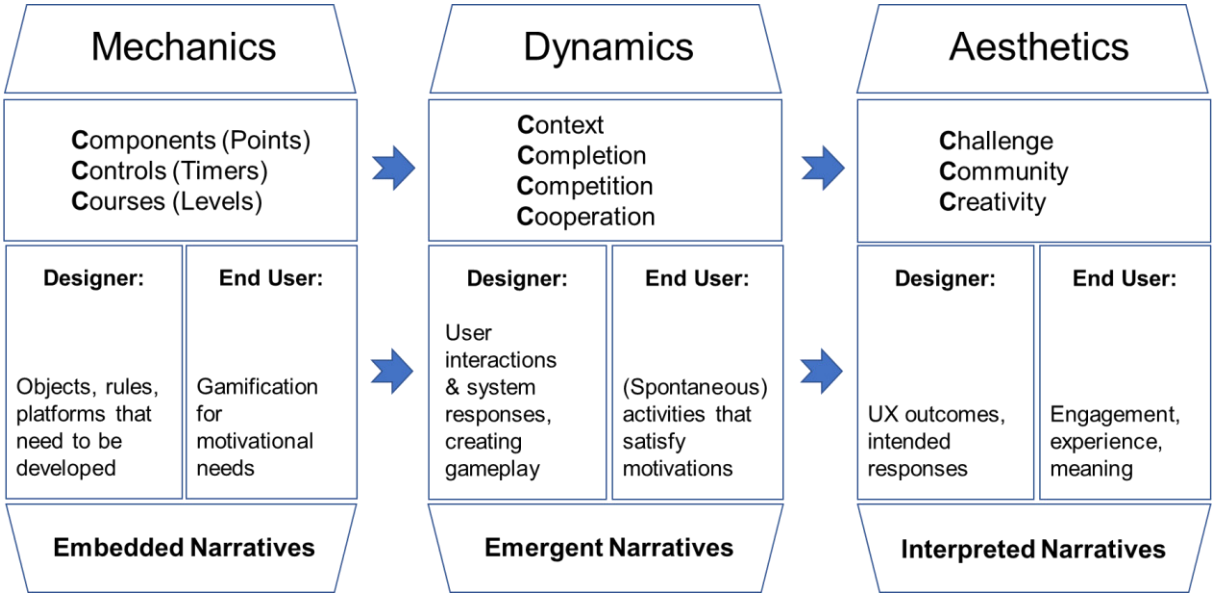

Figure 1: ***Integrated MDA framework*** *(based on Ruhi, 2015)*

It can be argued that games are motivating because they fulfil basic human needs: they give the player a feeling of competence, the ability to make their own decisions grounded in the framework of the game rules, and they feel related not only to the topic they involve themselves with but also with their co-players (Dagnino et al., 2015). Kelley and Johnston (2012) state that serious games can foster intense passion, work ethic and collaboration in their participants. When a serious game succeeds in effectively

simulating a real-world situation the participants face, rapid and sustainable collaboration can be observed (Agogué et al., 2015). Therefore, it can be assumed that serious games function as facilitators – both socially and intellectually – of collaboration, serving as the basis for creativity and innovation (Adamczyk, 2012; Kolfschoten et al., 2007). Game mechanics also increase participants general attention and concentration, allowing for higher learning success (Agogué et al., 2015). By having the chance to repeat a serious game as many times as necessary, different strategies can easily be tested and feedback collected, allowing participants to understand better the game and the real-world problem (Hugos, 2010). This allows a level of learning and iteration that otherwise might never be possible due to the cost and risk constraints (Carvalho et al., 2016).

2.3 A Conceptual Model of a Serious Game for Business Model Analysis

Based on the insights mentioned above regarding business models and serious games, the researchers developed the conceptual model, as seen in Figure 2. The conceptual model illustrates how a serious game can be used to create a process for successful business model analysis while simultaneously explaining the concept. Firstly, through its format, the serious game allows for a specific form of visualisation, design and structure, and the use of non-typical workshop material – altogether providing a solid framework for the later use and application of game mechanics like points and time limits. These game mechanics are applied in a way that they support the objectives of the serious game: achieve the short-term goal of increasing participant motivation, contribution and factual knowledge as well the long-term goal of providing the participants with a conceptual model that allows them to understand the fundamentals of business model analysis and that enables them to repeat the process themselves. Throughout the entire process, game mechanics encourage and support the cognitive involvement needed when performing analyses and essentially making decisions. Testing the effect of different game mechanics on specific learning outcomes should provide valuable insight for future research (Wilson et al., 2009), as serious games should not be regarded as a panacea (Van Eck, 2006, Burke, 2014).

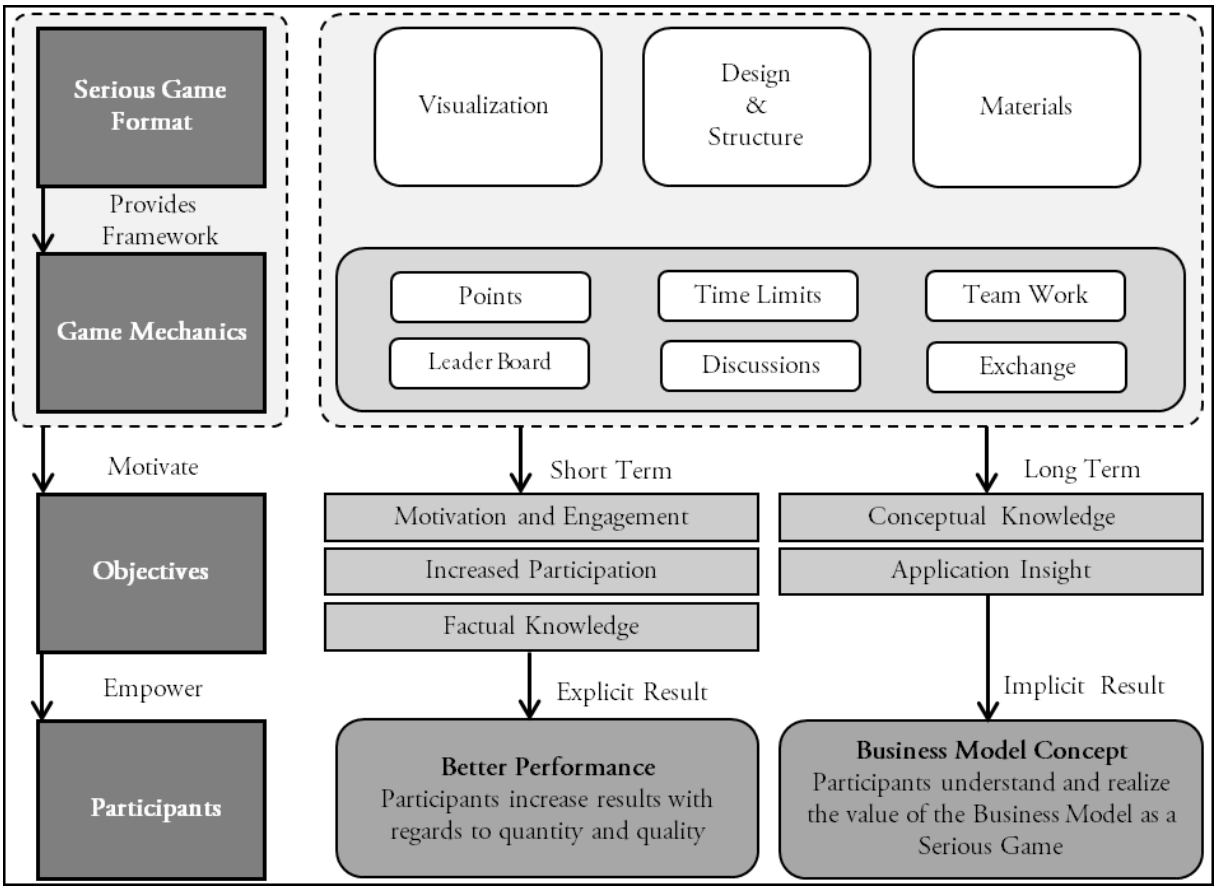

Figure 2: ***Conceptual Model***

Following the conceptual model and the overall research questions, the following heuristic hypotheses were developed:

H1: Game mechanics such as points, leaderboards, and time limits are motivating within business model analysis as they drive internal competition and provide the participants with a feeling of mastery.

H2: Group work as a defining game mechanic creates motivation and facilitates an exchange-oriented atmosphere in business model analysis.

H3: Game mechanics facilitate business model analysis, minimising the influence of decision-making biases.

H4: As a whole, the serious game encourages intellectual facilitation, increasing both the conceptual and factual knowledge of the participants in the business model analysis.

H5: Choosing a serious game as a strategy workshop format allows for the engaging visualisation and management of produced content, which is further supported by the use of colourful and unconventional materials.

3 Research Methodology: Triangulation of Action Research, a Survey and Focus Groups

This research project followed an action research approach since the workshop can be considered fieldwork, and its iterations were analysed based on its observations. However, to support the observations, the participants were asked to fill out a survey after the workshop and participate in a quick focus group interview. With the use of triangulation, the underlying research object is examined and analysed from different angles with different research methods, the intersection of the results defining the final result, supporting its validity (Flick, 2012; Mayring, 2001). A similar approach was followed by Schönbohm & Jülich (2015) to test the effectiveness of the application of gamification in the risk management of SMEs. An Overview is depicted in Figure 3.

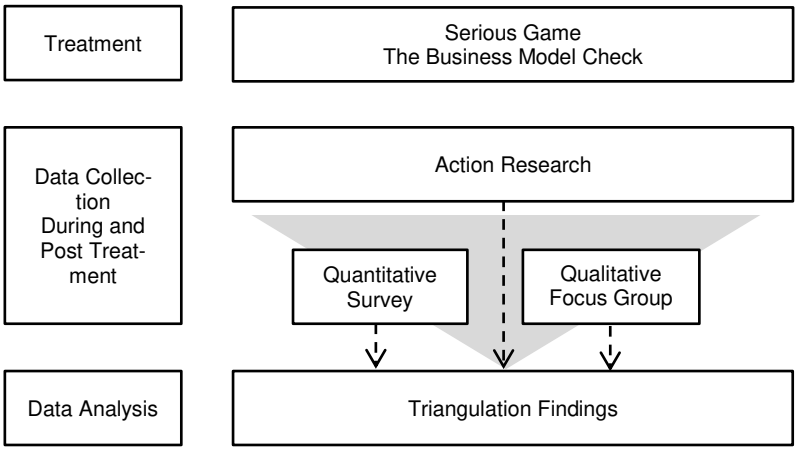

Figure 3: ***Research Methodology***

The goal of this study was to test the effects and the results of a serious game addressing the topic of business model analysis. The serious game is considered the treatment in this research approach, as it is the tool used to enable participants to learn how to analyse their current business model and give them the conceptual knowledge for future application. The serious game was developed by the researchers exclusively for this study.

The canvas itself was inspired by the business model canvas (Osterwalder and Pigneur, 2010). However, thoughtful adjustments were made to create a better fit for the given situation and the researchers' intention of developing a business model workshop that can be the starting point of a practical strategy discussion. As Hacklin et al. (2017) point out, the business model and its respective analysis are often conducted without considering industry dynamics and the evaluation of the resulting strategic choices available to the company. Therefore, the elements "competition" and "risks", as well as a SWOT analysis, were added, as shown in Figure 4.

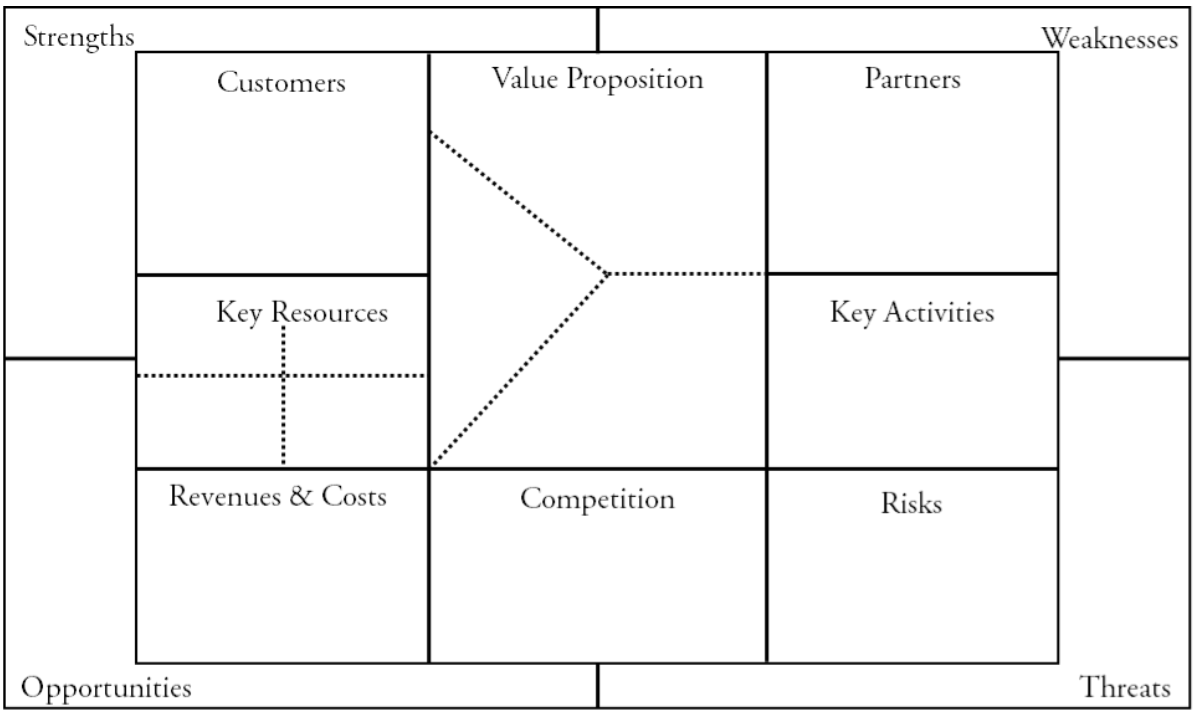

Figure 4: *Serious Game Canvas*

The different segments of the canvas represent the levels of the game. This chosen format of depicting the canvas on a large scale is created to be visually engaging and encourage participant movement throughout the game as an activation method. Progress is visually documented by this, as more and more canvas segments are filled, provoking a feeling of achievement and completion in the participants. Throughout the nine levels of varying complexity and difficulty, multiple game mechanics are applied to create a motivating and engaging process for the players and facilitate their participation results. The participants play the levels as single-player levels or as team levels. Throughout the whole game, players can earn points and show their results on a leaderboard. Points can be earned simply by the quantity of produced outcomes and by providing quality ideas that other players upvote. The team levels are applied to create a feeling of relatedness in the players and encourage direct exchange. Each of the levels has a time limit, ensuring the continuous flow of the game. Additionally, these time limits also have a motivational aspect as they often create excitement. The rules for the different levels are listed in Figure 5.

The Business Model Check – Rules of the Game

Level 1: SWOT Analysis. 10 Minutes. Single Player.

- The participants will be provided with colour-coded *idea cards,* which they can use to fill out the fields of the SWOT analysis.
- Each idea card is awarded one point
- A leaderboard is prepared by the researchers, showing the top three players with their respective points.

Level 2. Customer Analysis. 15 Minutes. Multi Player.

- Participants are randomly divided into groups
- The groups will be provided with customer profiling templates designed by the researchers
- The groups are then asked to develop as many suitable customer profiles as they can within the set time.
- The groups will present their customer profiles.
- Each group member will receive 3 points for every novel (but accepted as suitable) customer profile.
- Afterwards, the participants will award up to three points each to the customer profiles they find most important.

Level 3. Value Proposition. 15 Minutes. Multi Player.

- The groups will work on the customer profiles that were previously defined as most important.
- The teams then have to come up with ideas for the sections "pain relievers", "gain creators" and "products and services" with which the company might best address the chosen customer profile.
- Per the filled out section, the group will receive five points.

Level 4. Resources. 10 Minutes. Single Player.

- The participants are provided with idea cards to brainstorm company resources in the categories: physical, intellectual, human or financial.
- One point will be awarded for every card.

Level 5. Value Activities. 5 Minutes. Single Player.

- Each participant receives 5 points that they can stick on the presented Porters Value Chain
- There, they can evaluate which of the primary and supporting value activities are the most important for their company by sticking stars to the respective fields. Each participant will receive 5 Stars and can allocate them either to different or to similar segments if they want to emphasise the importance of a specific segment. Results will be discussed.

Level 6. Partners. 10 Minutes. Single Player.

- The participants are provided with idea cards in order to brainstorm potential partners.
- The ideas are clustered by the participants while hanging them on the wall.
- The participants will again award a total of three points to the potential partners they find the most promising or interesting.
- The points awarded for good ideas will earn the writers of the ideas extra points.

Level 7. Revenues & Costs. 10 Minutes. Multi Player.

- For this level, the group will again be split into two teams.
- The two teams will take turns in always stating one item for the category cost or revenue driver.
- The round is over when one team does not have any viable ideas anymore.
- Then the other team can score points for any idea they still have left.
- All participants are asked to individually rate the ideas according to the importance for the company right now and in 3 or 5 years from now.

Level 8. Risks. 10 Minutes. Multi Player.

- In this level, the risks and threats previously identified in the SWOT analysis will be further analysed to determine their importance. For this, the participants will remain in their groups and each group will be assigned half of the risks. Both groups must position their assigned risks on the provided risk map and present their result in a set time limit. If the other team accepts the positioning of the risks, the group earns points.

Figure 5: *The Business Model Check*

The structural and visual design combined with the applied game mechanics forms the serious game that was created to achieve three goals:

1. Increase participant motivation and engagement to augment the produced content.
2. Encourage exchange and critical discussions to reduce the effect of cognitive biases and to improve decision making.
3. Through encouraging idea facilitation and knowledge exchange, the participants will gain more knowledge and insight regarding their business model while simultaneously learning how to use the business model as a conceptual tool for future analysis.

The previously elaborated hypotheses were tested with the research methods described in the following to test and analyse if the serious game achieves these goals.

Action research is a research approach of the critical social sciences that is understood as problem-centred research, aimed at studying social systems by changing them, and came to vast popularity through the research projects of social psychologist Kurt Lewin in the 1970s (Afify, 2008; Burnes, 2004; Hammersley, 2004). Action research, therefore, motivates researchers and practitioners to collaboratively encourage change (Afify, 2008; Nogueira et al., 2013). Action research consists of four main stages that are repeated until the research goal is achieved, creating a spiralling process (Hammersley, 2004; Devlin and Murphy, 1988). The problem is identified in the planning phase, and a strategic plan or treatment to overcome it is developed. In the action phase, the treatment is implemented and later observed and monitored in the observation phase. In the final reflection phase, the results are evaluated, leading to input for the next following planning phase. This cycle is repeated until enough data is collected (Nogueira et al., 2013). Researchers like McTaggart (1997) conclude that the inclusion of other research formats should support action research and increase the validity of results through triangulation (Coughlan and Coghlan, 2002).

The survey conducted after the workshop was used to collect anonymous feedback from the participants containing 14 rating questions using a Likert scale, providing the respondents with the options: strongly agree, agree, neutral, disagree and strongly disagree. The quantitative data received from the survey are presented using descriptive statistics, allowing proper visualisation and analysis.

A focus group, sometimes called a 'focus-group interview', is a group interview that focuses clearly on a particular issue and encourages interactive discussion amongst participants (Carson et al., 2001). The narrow focus allows the collection of relevant data in a short period of time. To achieve this, the focus groups are usually steered by the researchers with the help of a semi-structured interview guide (Saunders et al., 2009).

In the transcripts of the interviews, the workshops were indicated with the abbreviations WS1 to WS4, and the participants were indicated by using P1 to P9 respectively to ensure participant anonymity while still allowing the researchers to track the statements. Then, the content of the interviews was categorised. These categories were defined to sort the contributions made in all interviews in accordance with the developed hypotheses.

The workshops were conducted with a very heterogeneous group of companies. As this was a very explorative research approach, the researchers wanted to gain as many insights as possible rather than confirming the appropriateness of the workshop for only certain homogenous profiles. The workshop was tested in two startups, one of which was a B2B software vendor and a seller of specific health foods. The other two companies were a publicly listed e-commerce company and a medium-sized public company active in the postal industry and in desperate need of a business model reinvention. The participating companies asked to remain anonymous. Table 2 gives an overview of the four workshops.

	Workshop 1	Workshop 2	Workshop 3	Workshop 4
Serious Game	6	7	8	11
Survey	6	7	7	9
Focus Group	6	7	7	9

Table 2: Population of the study

4 Discussion of Results

4.1 The impact of a serious game on participant motivation and engagement

Hypothesis 1: Game mechanics such as points, leaderboards, and time limits are generally motivating as they drive competition and provide the participants with a feeling of mastery.

41% of the participants agreed or strongly agreed that the points motivated them and encouraged them to produce more content. Only 17% stated that the points were not motivating, and 42% remained neutral about the effects of the points. The observation of the workshops further elaborated this result, as it was shown that points are highly motivating for competitive player types but ignored by others.

This was also reflected in the focus group interviews. Some participants realised the points as strong motivators to participate, whereas others did not see them as a mechanic of value:

> WS3_P2: For me personally, the points were not so… well, I believe, I would have participated just as much if they had not been there.
>
> WS2_P2: You could not just sit there and drink a coffee because in the end, it was visible if you did something and used your time, because the stattys had a different colour and there was a number on them for the points. So you couldn't just relax, you felt like you had to participate.

Therefore, a point system can encourage participant motivation and engagement; however, it has to be elaborately developed to appeal to competitive players while simultaneously not discouraging non-competitive players.

With the leaderboard being perceived as motivating by almost half (48%) of the participants and only 10% of the participants disagreeing, it seems to have a similar effect as a point system. However, taking into consideration the observations of the workshop, a leaderboard appears motivating only when the underlying point system is understood easily and perceived as fair, and the leaderboard is shown in a consistent way. This was also confirmed by the participants:

> WS1_P6: Unfortunately, I have to say that the one element that interested me most, the competitive element, was a little cut short since the scoring on the leaderboard didn't quite work in some levels. Still, I think that this was a very good exercise.

The leaderboard seems to be an acceptable game mechanic to encourage participation, especially for competitive player types, but its influence should not be overestimated.

The use of time limits on the other hand proved as a powerful tool to drive the flow of the game. 62% of the participants actually found the time limits motivating, whereas 21% did not.
These differing opinions were evident during the workshops as well as in the interviews:

> WS2_P1: What I found useful, I used to participate in these brainstormings in previous jobs and you had to put down stickers, everybody gets ideas, and it took the whole day and it was so boring and it was so slow and here if you are really into it and make it a game and stop the time, that was really good. And what we did today, in this company probably it would have taken the whole day, what we did here in one or two hours.
>
> WS4_P1: I thought the time limits were a bit unfortunate because in the customer segment we only wrote down existing customers and didn't come up with new ones because the time was up.

Therefore, in the setting of a serious game, the time limit seems to be a fundamental game mechanic as it encourages participants to remain concentrated on the task at hand.

Generally, while merely 41%, 48% and 62% of participants expressively perceived the respective game mechanics – points, leaderboards and time limits – as motivating, only a relatively small fraction of participants (10%, 17%, 21%) objected to the same mechanics. Therefore hypothesis 1 can be considered at least partially supported by the findings, as competition and mastery generally led to a higher level of engagement.

Hypothesis 2: Group work as a defining game mechanic creates motivation and facilitates an exchange-oriented atmosphere.

Not all game mechanics have to encourage competition to be motivating. Working in a team can be motivating as well, as it allows social exchange and creates a feeling of belonging and relatedness since individuals now stand in direct contact with the content as well as with peers. The motivational effect of the group work was very apparent during the game, which was positively confirmed with the results of the survey: All participants agreed that the teamwork was motivating, 59% even strongly agreed. Participants also confirmed that the new approach of using teamwork was motivating:

> WS4_P6: What I really liked is how the teams worked together and that we also had a really good exchange between the two teams.

It was visible that the participants were eager to perform well, both as a team and as an individual member of a team. This led to a heightened level of participation and discussion. This was strongly confirmed by the survey results, where 69% of the participants stated that they strongly agreed, and 28% agreed that they wanted to contribute to their team activities and that they enjoyed the exchange within the team. Also, some participants stated that they enjoyed the group work as a form of stress reliever:

> WS2_P1: I think it was very nice, the switching [between group and single-player levels]. It relieves the stress. The single-player games are stressful.

The surveys and the focus group interviews clearly and strongly support hypothesis 2, showing team work to be an important game mechanic to create motivation and facilitate an exchange-oriented atmosphere.

4.2 Impact of a serious game on result quality and learning objectives

Hypothesis 3: Game mechanics facilitate business model analysis, minimising the influence of decision-making biases.

Almost all participants (93%) confirmed that they could openly voice their ideas within their teams. This is an important initial step, as the serious game is intended to create a friendly environment, encouraging all participants to contribute freely, reducing a possible hierarchy or authority bias that some groups or organisations are faced with.

Additionally, the time limits were mentioned again as a game element benefitting the team discussions:

> WS2_P2: That's how it was, actually. From the first group task, we were all a bit hesitant, so quiet and basically searching for someone to take the lead, but in the second time it really turned out that just everybody pitched because we did not have time, so there was really a learning process.

This leads to the conclusion that other biases like groupthink and conformity bias can also be addressed by the implemented game mechanics, as participants did not hold back ideas for the sake of harmony within the team. Through the discussions within and between the groups, more ideas are voiced and critically reflected upon – as incentivised by the point-system - reducing both the availability bias and potentially the anchoring of first ideas.

> WS4_P1: We identified that we have strong silo structures in this company here. And even though I have been here only for a few consulting days, I have realised that myself as well. But what was clear today, is that this method completely overrides this issue.

The notion that the serious game could be well used to bring together different departments for a more vivid exchange was also voiced in the other focus groups:

> WS1_P5: I would argue that it is important to have someone from each department, in order to see the different views from different departments, concerning products and services and so on.

The results, therefore, support hypothesis 3.

Hypothesis 4: As a whole, the serious game encourages intellectual facilitation, increasing both the factual and conceptual knowledge of the participants.

The participants produced a high amount of ideas as input material and, in the group discussions, iterated on them for further development. This revealed the implicit knowledge of each of the participants and made it available across the group. This revelation of knowledge led to 66% of the participants agreeing that their knowledge regarding their company's business model increased throughout the workshop. This is also supported by the previous results and the observations of the workshops.

> WS4_P8: I have to honestly say: What we talked about here, doing that in two hours – well I thought that is going to be tough. But now I have to say that I am positively surprised by how much we achieved, even if it is just a snapshot of our situation, and that's also what I expected, but I really didn't think that we would generate so much insight and could bring so much to the canvas.

The result is also supported by 83% of the participants agreeing that they have now learned how to use the business model canvas presented in this serious game as a tool for analysis.

> WS4_P5: I think it's good to have a framework we can use, also in future projects. I didn't expect that today we have the time for a complete strategy or project organisation, but I think that in those two hours you really can't do any more. But it is beautiful to see all the complexity visualised on this one canvas and that we now have a framework on how to approach these kind of projects. That is excellent.

Achieving the participants' realisation that this continuous tracking might be valuable and provide new forms of insights regarding company performance is a very elaborate and promising result of this serious game. Considering the quotes from the focus groups stated above, it can be assumed that the openness for using the business model as a tracking device has been heightened and encouraged.

The participants were convinced by the immediate results of the workshop and received the knowledge to autonomously conduct a business model analysis, which was confirmed not only in the observations but also in the focus groups:

> WS1_P3: That [repeating the workshop] would be rather intriguing, comparing, like, once a year: okay: last year, we saw our strengths and weaknesses like this and now like that. (I don't know) Especially the topics infra-structure, human resources, (Value Activities): It is obvious that right now, everything is set to technology. That could be a thing to compare. I can imagine that this comparison is fascinating.
>
> WS1_P1: Yes, I believe it is about recognising your own weaknesses and to-dos, and regularly checking them.
>
> WS3_P1: I do think it would be interesting because, if we say now, Customer X is our most important customer, then this is our focus. If we look at it in a year, for example, if we have reached our goal, what we wanted to reach and have we acted according to what we found out here – it might be exciting to see the progress.

Participants from the larger companies, however, did point out that, as this serious game was very limited with regards to the time spent with it, the results might not be detailed enough to track small changes:

> WS4_P1: I think it would have been good, maybe with previous preparation, to talk about new topics, new customers and how to implement that in the teams, therefore I would definitely answer the question, if the workshop should be repeated with yes, but then with the focus not remaining on existing customers.

Overall, hypothesis 4 is supported by the research results.

4.3 Impact of organising game mechanics in a serious game

Hypothesis 5: Choosing a serious game as a workshop format allows for the engaging visualisation and management of produced content, which is further supported by the use of colourful and unconventional materials.

In general, the feedback of the participants was overwhelmingly positive, strongly indicating that creating a business model check in the format of a serious game is valuable. For better analysis, some questions regarding the framework design of the game were asked.

First of all, even though it was visible that the participants sometimes preferred different game mechanics, 93% of the participants stated that they enjoyed the serious game format and engaging in the game. This is important to realise, as especially established companies are often hesitant to implement new methods and approaches to learning. This notion was also visible in workshop4, which was conducted with a larger, more traditional organisation. The participants were more critical and doubtful initially, which changed throughout the workshop. Therefore this result is extremely positive and a good indication that serious games have the potential to be effective in any corporate setting.

This was also confirmed by the focus groups:

> WS3_P2: Generally, I, too, find it a nice idea that it [the workshop] is structured like a game and, as she said, that you jump [from topic to topic] and then walk over [to the wall, where the risk map is located].
>
> WS2_P6: I liked the organisation. You tested the group game and the individual game and we saw how we learned after playing the levels, so we got better from round to round, learned how to trick the game into generating as many ideas as possible. So for me, it was very well organised.

As a lot of time was spent developing the business model canvas applied in this workshop and developing an engaging way of visualising it, it was tested whether this effort actually created extra value for the participants. With 97% of the participants agreeing that the workshop was visually engaging, it can be definitely said that spending time on developing an engaging form of visualisation is an important factor for motivating participants to perform in a serious game (Anderson, 2011).

The visualisation was also something the participants recognised as special:

> WS1_P1: I thought, by means of the used materials it was very engaging. Also, having this whole thing presented in a different form, other than the usual whiteboard, very nice; it just looks good. Content wise as well as visually this result is just a good summary. In that sense, it was a lot of fun.

The game made use of many different materials for a more engaging and visual effect. The business model canvas was drawn onto the wall with colourful tape and static foils instead of flipcharts. The effort of this design approach was rewarded, with 69% of the participants stating that they were more engaged due to it.

Overall, the feedback collected regarding the serious game was very positive and encouraging. Therefore, hypothesis 5 is also supported, showing that a serious game as a workshop format allows for the engaging visualisation and management of produced content, which is further supported by the use of colourful and unconventional materials. An overview of the hypotheses testing is provided in Table 3.

Heuristic Hypothesis	Result
H1: Game mechanics such as points, leaderboards, and time limits are generally motivating as they drive competition and provide the participants with a feeling of mastery.	Partially Supported
H2: Group work as a defining game mechanic creates motivation and facilitates an exchange-oriented atmosphere.	Supported
H3: Game mechanics facilitate business model analysis, minimising the influence of decision-making biases.	Supported
H4: As a whole, the serious game encourages intellectual facilitation increasing both the conceptual and factual knowledge of the participants.	Supported
H5: Choosing a serious game as a workshop format allows for the engaging visualisation and management of produced content, which is further supported by the use of colourful and unconventional materials.	Supported

Table 3: ***Overview of Heuristic Hypotheses Testing***

Even though the competitive game mechanics must be implemented with care and in the right amount, if done so, they are motivating and encourage engagement, especially of competitive players with the task. All participants immensely enjoyed the tasks performed as teams and engaged in exchanging knowledge and discussions with team members or the other team.

The game mechanics successfully reduced the effect of cognitive biases and improved the quality of the generated content. This way, the participants were enabled to achieve a new level of knowledge regarding their business model. Additionally, they learned how to apply the business model as a concept for further analysis and realised the value of doing so. The contribution of this paper is twofold. On the one hand, it enlarges the theoretical field of serious games analysis to the sphere of business model analysis. On the other hand, it demonstrates the practical use-case of applying serious games in strategic analysis and its positive effects on the analytical process.

4.4 Research Limitations

Like many qualitative research methods, action research is prone to researchers' bias. The researchers have carefully developed research objectives and a treatment, in this case, the serious game, and observed the participants' reactions with a specific outcome in mind. This might lead to them weighing observations confirming their theory more heavily than other observations contradicting the assumptions. Additionally, even though action research claims to be as immersive as a social science can be, the participants will still always realise that they are performing for a research project and that they are being observed. This might alter their behaviour (Bradley, 2009). Also, participants might have tried to help the researchers achieve their goals.

Even though four iterations of the serious game are quite extensive for action research as well as for focus group interviews – multiple researchers have concluded that after three or four interviews, no new insight is gained – the sample size of 29 participants for the quantitative part of this study is rather small (Saunders et al., 2009). Therefore, this study should be understood as a systematic exploratory study encouraging further research.

5 Conclusion: Summary and Outlook

The results of the data analysis support the research hypotheses and encourage a positive answer to the posed research questions. It was apparent that the participants enjoyed both the design of the serious game with regards to structure, format and visualisation and the game mechanics that were applied. These game mechanics had either a motivational effect, encouraging participant contribution, or a facilitating effect, encouraging the participants' knowledge exchange with regards to their own business model and the business model as a concept for analysis. The participants also appreciated the use of special visualisation tools. The conducted research motivates that a serious game can function as an erudite business model analysis tool, promising high motivation and engagement of participants, improving result quality, and facilitating implicit and conceptual knowledge. The serious game has received positive feedback and positive, constructive feedback in all four workshops encouraging further iterations.

The results also support other researchers' findings suggesting a positive impact of applying games to business interactions (Allal-Chérif and Makhlouf, 2016; Zichermann and Linder, 2013; Jacobs and Statler, 2006). Therefore, expanding gamification and serious games from on-the-job training and learning to more strategic activities like business model analysis seems promising.

This research claims to be an introductory research experience, opening the path for extensive further research by developing long-term studies collecting valuable insights regarding the effectiveness of the serious game with regards to its motivational and facilitative character. The researchers could also imagine further elaborating on the generated results to develop the serious game into one that can be directly played by the respective companies without the help of an external moderator or researcher. This way, an out of the box serious game would be developed, including the necessary instructions for the interested companies. This would add to the value presented by the serious game and encourage its perception as such.

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