

Gamification in production of a manufacturing firm in South Africa.

Stephanie Margaret Jooste

Student number: 752871

752871@students.wits.ac.za / 073 206 0204

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ABSTRACT

Gamification although an old concept, is only recently being adopted into various industries which have shown tremendous positive outcomes from the adoption of the concept. However, the manufacturing industry in South Africa lacks diversity and has failed to adopt the new concept. Therefore, it is critical to explore the potential of gamification in this sector.

The extant body of literature on gamification highlights the concept's beneficial consequences; yet, as no research has been done to document gamification's long-term effects, caution is advised. Leaving adopters uncertain about the duration of time they can enjoy the advantages of higher output and staff engagement.

The concept of gamification was investigated in the manufacturing industry to determine if adoption is a viable option. This research provided insights on the complexity of the workforce and the resistance towards change. The industry is hungry for a disturbance to drive productivity and employee engagement to the next level. A qualitative methodology was employed, with 4 participants from one manufacturing firm supplying information on how gamification might be implemented in the manufacturing sector and the potential impact.

The research findings provide insight into the difficulties the company would face if gamification was implemented. While highlighting the anticipated benefits, participants voiced concern about the workforce's divergent viewpoints. The overall viewpoint of the participants was that gamification can have a positive impact on productivity levels in the firm if introduced in a slow cautious manner.

One of the main recommendations was to implement gamification in the company in conjunction with a motivational theory as a means of assisting the employees in adapting to the shift. It was recommended that the change must happen slowly and purposeful, it is imperative that the workforce understands the change and what is to be expected from it.

DEDICATION

This dissertation is dedicated to my parents, brother, fiancé, and my unborn child. Completion of this course proves that anything is possible with God's amazing grace. RIP daddy.

ACKNOWLEDGEMENT

I want to thank God for giving me the strength that I did not know I wielded and for being a light I could look to as I sought wisdom on how to carry on through my MBA journey and life.

A special thanks to my mother for always believing in me especially when I did not believe in myself and for continuing to support me through life's challenges. A big thank you to my fiancé for always simply being there and being my best friend in the hardest times.

My last expression of gratitude goes to the MBA staff, supervisors, and colleagues. This course is not meant to be easy however through their support, time, and dedication to the program it has assisted many students through this journey of surviving the MBA course.

DECLARATION

I, Stephanie Jooste, declare that this research report titled 'Gamification in Production of a Manufacturing Firm in South Africa' is my work. I therefore confirm that all the ideas and knowledge that I sourced elsewhere have been referenced. This research is submitted in partial fulfilment of the requirements of the degree of Master of Business Administration at the University of the Witwatersrand, Johannesburg. This report has never been submitted to any other university before. I further declare that I have obtained the necessary authorization and consent to carry out this research.



Stephanie Jooste

Signed at Roodepoort: 20 February 2024

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LIST OF ACRONYMS

SDT – Self-determination theory

IMO – Input-mediator-outcome

SET – Self-Efficacy theory

CHAPTER 1. INTRODUCTION

1.1 Statement of purpose

The concept of gamification has been adopted worldwide; however, it is still a developing concept in South Africa where only several companies have adopted it. Studies have failed to consider it in the manufacturing industry in South Africa. This study explores the concept of gamification in a manufacturing firm based in Johannesburg called Abeco Tanks (Pty) Ltd. The focus of this study is to discover if gamification can increase production and if it is a concept manufacturing companies need to consider adopting in the future.

1.2 Background of the study

Gamification has been around since the late 1800s when retailers purchased stamps from marketers to reward their most loyal customers, in the 1900's The concept was explored by other industries such as STEM learning and career development where Boy Scouts were rewarded badges for being proficient in different activities (Shannon J. , 2022). Gamification then moved into the video game industry, books being published on productivity levels and motivating computer games, American Airlines introduced their frequent flyer rewards system which ultimately led to 2002 when the term gamification was born, being coined by Nick Pelling (Shannon J. , 2022).

In 1973 for the first time the concept of work being fun was brought up by an author called Charles A Coonradt who wrote a book addressing the fall in employee productivity, he suggested that work should be fun and games should be played to make work more interesting for employees, to increase their engagement and productivity levels (Engineering, 2019).

Game developers Roy Trubshaw and Richard Bartle 1978 created the very first text multiplayer game in which people could play a game together using only text messaging, this is believed to have created the first spark towards social gaming

and what it is today (Engineering, 2019). The first game console was released in 1994 by Sony called the PlayStation 1 and within the next two years the gaming industry started to get recognized and games were a word mentioned in every family's house (Chitroda, 2015).

Gamification gained popularity after the fourth industrial revolution was introduced in 2011. The first official gamification summit was held in San Fransico where the potential of gamification was showcased and attracted thousands of attendees (Spinify, 2024). The concept was then adopted by various industries such as education (Mposula, 2019), pharmaceuticals (Lowensteyn, et al., 2019), and SMEs (Krath, Morshheuser, & von Korflesch, 2022). This period was recognized for exploring new types of learning amongst children in STEM learning and development.

Gamification is explained as "the use of game design elements in non-game contexts" (Groh, 2019), this definition highlights a new way of thinking and working to push employees out of a state of boredom within their daily repetitive jobs, especially in manufacturing environment where tasks are repetitive. Repetitive tasks have been shown to reduce employee satisfaction, increase human errors as well as lower productivity (Salientprocess, 2023). The implementation of gamification seeks to eliminate repetitive tasks and create a fun environment, that fosters employee engagement and learning.

According to the website Growth Engineering (2021) when gamification strategies are implemented in the workplace, 85% of workers demonstrated to be more engaged and productive. Carstarphen (2022) supports this as it was found that gamification can increase motivation by 62%, decrease boredom by 29%, and lastly increase happiness in the workplace by 88%. This highlights the significant impact gamification can have in a company by enhancing employees' performance and fostering a more dynamic and motivated workforce.

Gamification can be seen in South Africa in the fitness and tourism industry. To encourage Vitality Health members to become more active and healthier, Discovery Health uses a point system and rewards program. Another example is

Virgin Active, the more a member goes to the gym they will receive a reduction in their monthly gym membership fee. The more a member flies, the more discovery miles they can accrue. When they have enough points, they can use these points toward a discount on their subsequent ticket purchase.

Gamification is a new concept in the manufacturing industry in South Africa, there are currently no firms practicing the concept. Gamification is underrepresented in the manufacturing industry not only worldwide as there are a limited number of articles and journals directly related to gamification in the manufacturing industry. This shows the importance of exploring the concept to gain new insights on the topic and explore if it is worth a company investing in.

1.3 Research problem

The South African manufacturing industry plays an important role in the country's economy, as it contributes a total of 12% of the country's GDP, 42% of the rand value in exports, and 12% towards formal sector employment (SARB, 2020). The industry's significance is evident, but it is falling behind because the sector has not succeeded in diversifying (SARB, 2020).

Previous studies conducted in the manufacturing industry indicated that gamification has had a positive impact, showing an increase in employee engagement and performance (Ulmer, Braun, Cheng, Dowey, & Wollert, 2020). Keepers, Nedbit, Romero, & Wuest, (2022) discovered that gamification improves an employee's enjoyment in the workplace as well as their motivation and efficiency in doing their tasks. Lastly, gamification was found to have a positive impact on learning (Stadnicka, 2019). As a result, gamification can significantly improve the sector.

The gaps that were identified in the above studies found that the manufacturing industry was severely underrepresented in the study of gamification, the long-term effects were unknown across all studies, and one study was done on an augmented reality manufacturing company. The gaps highlight an interest in the

industry to determine whether gamification is worth implementing and the potential impact it can have long term.

1.4 Research questions

The objective of this study is to determine if gamification is worth investing in. This will be determined by answering the following research questions.

- I. Does gamification have the potential to increase/decrease a worker's productivity level in the manufacturing industry?
- II. Understanding Gamification in the Manufacturing Industry.

1.5 Rationale

Understanding the effects of gamification in South Africa can help businesses decide whether it is an idea worth investing in. This study will make a significant contribution to our understanding of modern motivation, employee engagement and productivity retention to contribute to theoretical studies. The findings can be used in practical studies to decide whether gamification is worthwhile applying at different organizational levels and whether different generations of employees are more adaptive and easily driven by a futuristic working environment.

1.6 Delimitations of the study

The study focuses on a case study being done at a manufacturing firm based in Johannesburg called Abeco Tanks (Pty) Ltd. This company was chosen as they are currently considering introducing the concept of gamification.

1.7 Definition of terms

The following definition is used in this study.

- Gamification

Gamification, which is the use of game design principles in contexts other than games, offers motives and experiences that are comparable to those found in games, making it an effective strategy to encourage good behaviour (Bassanelli, Vasta, Bucchiarone, & Marconi, 2022).

1.8 Assumptions

This study is predicated on the idea that all participants will be aware of the possible advantages of gamification, but they will also be aware of any potential drawbacks that could affect output. The rationale for this is that a manufacturing delay has a negative financial impact on the organization, which makes innovative ideas that could raise worker productivity more difficult to embrace.

1.9 Chapter Outline

The study will follow the following structure:

Chapter 2: Literature Review and Theoretical Framework - This chapter explores the theoretical framework of the study. It also describes the numerous studies and past research that are relevant to gamification in the manufacturing industry, as well as the reason for the study's importance.

Chapter 3: Research Methodology - This chapter explains the research paradigm that is applied in this study. It covered the research design and methodology employed. It further discusses the study population, sample, sampling method, and measuring tools. The procedure of data collection and analysis was also highlighted. Finally, this chapter addresses ethical considerations.

Chapter 4: Data Analysis – This chapter examines the data and identified key themes.

Chapter 5: Discussion of Results – This chapter summarized the study's findings and provided answers to the research questions raised.

Chapter 6: Recommendations – This chapter reviewed the literature and presented the study's findings. The study concluded with a discussion of its implications, limits, recommendations for further research, and general conclusions.

CHAPTER 2. LITERATURE REVIEW AND THEORETICAL FRAMEWORK:

2.1 Introduction

The literature review serves as an introduction to the research problem and argument of the study. Section 2.2 looks at previous research done on gamification in the manufacturing sector. Section 2.3 explores the theoretical framework related to motivational theories linked to gamification. Section 2.4 further describes the positive and negative impacts on workers. Section 2.5 considers different theories that have come from the implementation of gamification. The final section discusses the chapter's overarching conclusion.

2.2 Previous literature on gamification in the manufacturing sector

A recent study on gamification by Keepers, Nedbit, Romero, & Wuest (2022) examined 17,000 publications on the impact of gamification on operational tasks on the factory floor, of which 16 were selected. The study's findings indicated that gamification was notably underrepresented in the manufacturing sector, indicating that gamification has not been widely embraced by manufacturers.

An additional writer (Ulmer, Braun, Cheng, Dowey, & Wollert, 2020) investigated why there aren't any gaming frameworks for manual activities. The study employed a single augmented reality company as an example, and the findings indicated that introducing gaming to manual labourers would boost their job performance and workplace engagement.

Stadnicka (2019) examined gamification as a means of enhancing learning in lean manufacturing. A total of 114 people answered the five different surveys and the results showed that gamification helps to promote a learning environment in the manufacturing sector. A summary of the research is reflected below in Table 1.

Table 1 – Summary of previous research

Author (Year)	Organisational Problem	Research Problem	Conceptual Framework Used	Population and same	Research Gap
Ulmer, J, Braun, S, Cheng, C, Dowey, S & Wollert, J. (2020)	A lack of gamification frameworks for manual tasks	Manual labour-intensive activities and tasks are rarely considered for gamification.	Introducing gamification in the manufacturing industry can bring about valuable information to improve engagement and performance among employees	1 existing augmented reality company	Tested on an existing augmented reality manual workstation
Keepers, M, Romero, D, Hauge, J & Wuest, T. (2020)	How does gamification affect operational tasks on the factory floor	Current trends in gamification in the manufacturing industry	Keepers, M, Romero, D, Hauge, J & Wuest, T. (2020)	17000 papers and a sample of 16 were chosen	The manufacturing industry is underrepresented in the study of gamification
Stadnicka, D & Deif, A. (2019)	How to increase learning in lean manufacturing	How does gamification affect knowledge acquisition in lean a manufacturing environment	Participating in games has a positive impact on learning	5 different questionnaires were developed and there were 114 respondents	The use of gamification in the long-term

2.3 Definition of topic or background discussion

Motivational theories show that motivated workers are more engaged in their work, provide the basis of the theoretical framework that explains this research (Ulmer, Braun, Cheng, Dowey, & Wollert, 2020).

2.1. Motivation and productivity

The underpinnings that will be considered are motivation theories by Ryan and Deci (2000) called Self-determination theory (SDT), touching on the flow theory. as well as the Self-Efficacy theory by Albert Bandura (1977). Under operational tasks, a framework that was developed by Ulmer, Braun, Cheng, Dowey, & Wollert (2020) will be closely analysed. The input, mediators, and output (IMO) model developed by Ilgen, Hollenbeck, Johnson, and Jundt (2005) will be analysed.

2.3.1 Self-determination theory (SDT)

A study conducted by Fulton (2019) suggests that the following motivational theory is linked to gamification due to the foundation of learning. The first theory is the Self-determination theory (SDT) which was developed by Ryan and Deci (2000), the theory considers human needs such as autonomy, being relatable and one's determination, growth, and health as the most important factors to focus on to create a learning environment. Ulmer, Braun, Cheng, Dowey, & Wollert (2020) are in support of Fulton (2019) that SDT is the most commonly used motivational theory when it comes to gamification, they further proposed a manual tasks framework for gamification based on SDT. It was found that coaches who had adopted this style of motivation, their athletes won over 30% more medals (Oliveira, 2023).

2.3.2 Flow Theory

The second theory is that of Mihaly Csikszentmihalyi which was first introduced in the 1970s called the flow theory – this theory states that when an individual's skills are challenged and there is a risk involved while performing the activity (Biasutti, 2017). The flow theory is seen as an individual being in their zone of work, this zone can be achieved by doing any task or activity, and the person does not necessarily need to be rewarded for their work. The activity or task is done out of enjoyment for the experience that will be gained. When it comes to the manufacturing industry a lot of tasks are repeated daily to meet the various quality standards of the product being manufactured, due to the repetition of operational tasks a worker will not achieve the flow theory or be in the zone as their abilities will not be challenged very often. Therefore, the flow theory will not be considered further in this study.

2.3.3 Self-Efficacy theory

The next theory is that of Albert Bandura (1977) called the Self-Efficacy theory, this theory talks about how an individual can visualize themselves as being capable of having the skill capacity to perform and complete the required task.

This theory of motivation is very impactful as it requires the individual to see themselves in the future performing tasks that they do not necessarily have the skill to do the task today, but they see themselves performing the task therefore creating a dream-like desire where they wish to be in the future. Fantasy is a quality associated with gamification; it causes the player to behave by the imagined character (Oliver, 2017). A study done by Abun (2021) found that “Self-efficacy affects only the positive behaviour and not the negative behaviours” and concluded that self-efficacy could not exist without a supportive work environment.

2.3.4 Operational Tasks

The below framework was developed for an existing augmented reality manufacturing manual workstation that manufactures electrical longboards, each board can be customized to the customers’ requirements (Ulmer, Braun, Cheng, Dowe, & Wollert, 2020).

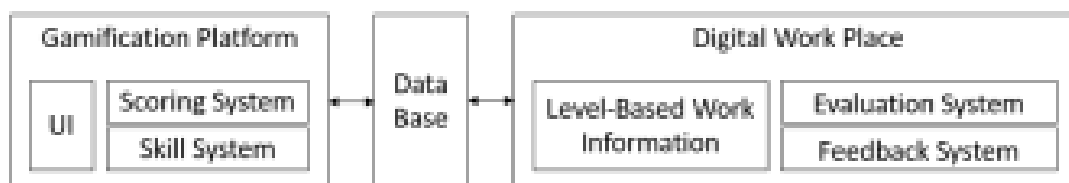


Figure 1 - The framework for gamification of manual tasks (Ulmer, Braun, Cheng, Dowe, & Wollert, 2020)

The framework points out how gamification is used in the augmented reality company. The first important step is that the platform needs to be designed with a user interface (UI) that is user-friendly for everyone in the company. The UI should have five different views: Profile, skill, high scores, target view, and lastly statistics (Ulmer, Braun, Cheng, Dowe, & Wollert, 2020). A scoring system is then determined, are teams or individuals going to be scored based on which tasks are performed lastly under the gamification platform, the employees who performs harder tasks/tasks that require knowledge / a certain level of skills, are these employees rewarded more points based on this if the task is completed. The scoring system will be linked to the employees KPI's.

Once the gamification platform criteria are determined then a database needs to be able to capture, score, and fetch all this data to bring up on the UI when an employee is checking their statistics. The data case is a critical part of gamification, as an employee should be able to open the UI and check their scores as well as check where on the leaderboard they are compared to their colleagues –doing this will spark competition as well as intrinsic motivation to try out perform the person that is ahead of them.

The digital workplace uses all the data that was captured on the employee and is used as an evaluation system to determine if the employee is working and performance is above, meets, or is below expectations. A feedback system is integrated for employees to find out where they are lacking and where improvement can be made to score higher in the future.

2.3.5 Input-mediator-outcome (IMO) team effectiveness model

Teamwork is seen as one of the most important factors in every organization as it is a powerful concept that can drive an organization to meet and exceed goals, it can also be a driving force behind continuous improvement in manufacturing companies. The team effective model developed by Ilgen, Hollenbeck, Johnson, and Jundt (2005) called the input, mediators, and output (IMO) model (Figure 2) will be looked at.

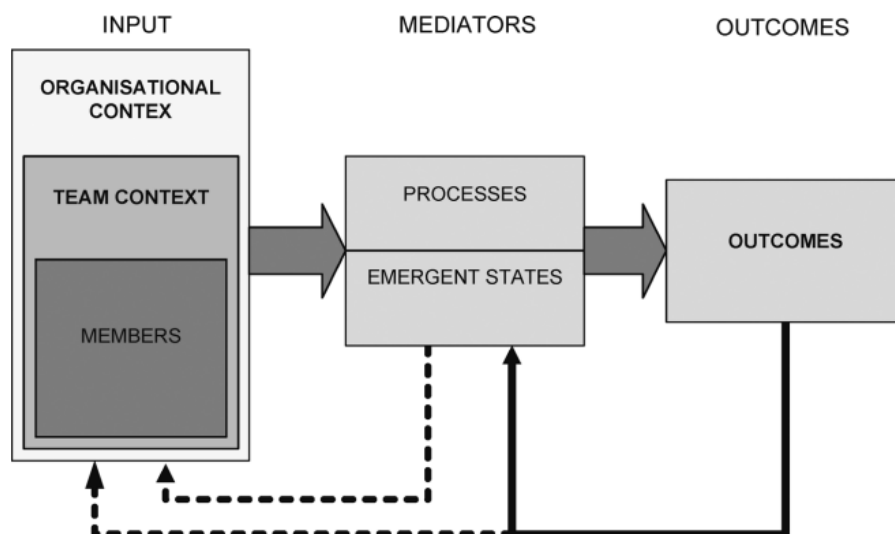


Figure 2 - Input-mediator-outcome (IMO) team effectiveness model (Ilgen, Hollenbeck, Johnson, & Jundt, 2005)

A study done by Jaca, Viles, Tanco, Mateo, & Santos (2013) using the IMO model found that manufacturers focused more on the performance of the organization than on individual and team performance. Teams of experts with knowledge, skills, and abilities (KSA) were carefully selected to focus on ongoing factory development. Another key finding is that manufacturing companies often did not consider diversity to be an important factor in teamwork performance whereas authors such as Jankelova, Joniakova, & Prochazkova (2022) argue that diversity management is one of the most important factors for employers to consider as there are a multitude of advantages to having a diverse workforce such as innovation, employee retention, increasing number of customers, increased profits and competitive advantage.

The model is significant to this study as it considers the input from an individual, team, and organizational level before the work is done, as well as what factors mediate the processes of the inputs while the work is being done and lastly the outcomes of the processes once the work is completed (Jaca, Viles, Tanco, Mateo, & Santos, 2013). This model can be closely linked to the manufacturing industry as all the three inputs are nested together in one block showing how there is a strong link of teamwork between individuals, teams, and the organisation.

2.4 The impact of gamification on workers' productivity?

The section aims to determine whether gamification can increase or decrease workers' productivity in the manufacturing sector.

Growth Engineering (2021) pointed out that there was an increase in 85% of workers who participated in gamification who displayed higher productivity levels, therefore gamification was found to have a positive impact on workers' productivity within the company. The graphic below (Figure 3) illustrates how gamification affects workers and the advantages it can provide for a person's working environment.

The Impact of Gamification



Figure 3 - The impact of gamification (Growth Engineering, 2021)

Author Stewart K. (2022) identified a further three positives in the implementation of gamification, firstly increase in learner engagement - games have the power to make boring material fascinating and engaging, to promote healthy competition among coworkers, and to make students feel proud of themselves for finishing a course following a series of gamified chores and challenges. The second positive is that instant feedback is provided - gamers can track their progress during the game and may even get intrinsically driven to finish it successfully by adding instant feedback into the gameplay and even linking this input to the game's conclusion. The last positive that was identified is an increase in motivation due to rewards such as badges - badges in gamified learning materials can be as basic as virtual ribbons, stickers, or awards that players receive after finishing levels or activities in the game.

As the workplace becomes more gamified, ideas like badges and the ability for staff to view their performance and get immediate feedback on how they are doing for the month and whether they are hitting their goals will be introduced. Another advantage is that participants typically find the concept entertaining and inspiring (Gupta, 2022).

Tado, Valle, and Isotani (2018) examined many gamification research studies over time and discovered that a recurring unfavourable theme emerged. Loss of performance is the primary drawback associated with the gamification notion, followed by undesirable behaviour (Tado, Valle, & Isotani, 2018).

Author Stewart K. (2022) identified three negatives. Firstly, the cost of development is high - Extra effort, money, or both may be needed to obtain extra resources like sound effects and music, stock images and videos, and even original animations and graphics that enhance the game. The next difficulty with gamification, according to authors Stewart (2022) and Gupta (2022), is that it is expensive to design, implement, and maintain. Lastly, they note that gamification loses value over time, so to keep participants interested, the system must be updated and redeveloped often to feel fresh.

2.5 What are the effects of gamification on teamwork and collaboration among manufacturing workers?

The second research question seeks to determine the general understanding of gamification in the manufacturing sector.

According to Ilgen, Hollenbeck, Johnson, and Jundt (2005) by implementing the (IMO) model team effectiveness will sufficiently increase resulting in individuals focusing more on teamwork and togetherness rather than increasing their capacity as an individual. Therefore, based on this model, linking up to gamification teamwork should be positively impacted.

Research done by Algashami, et al., (2018) identified various risks involved with gamification that can have a negative impact, figure 4 below shows all the risks related to gamification in a teamwork setting. Therefore, there is a chance that the deployment of gamification will harm the organization due to the level of possible risk involved.

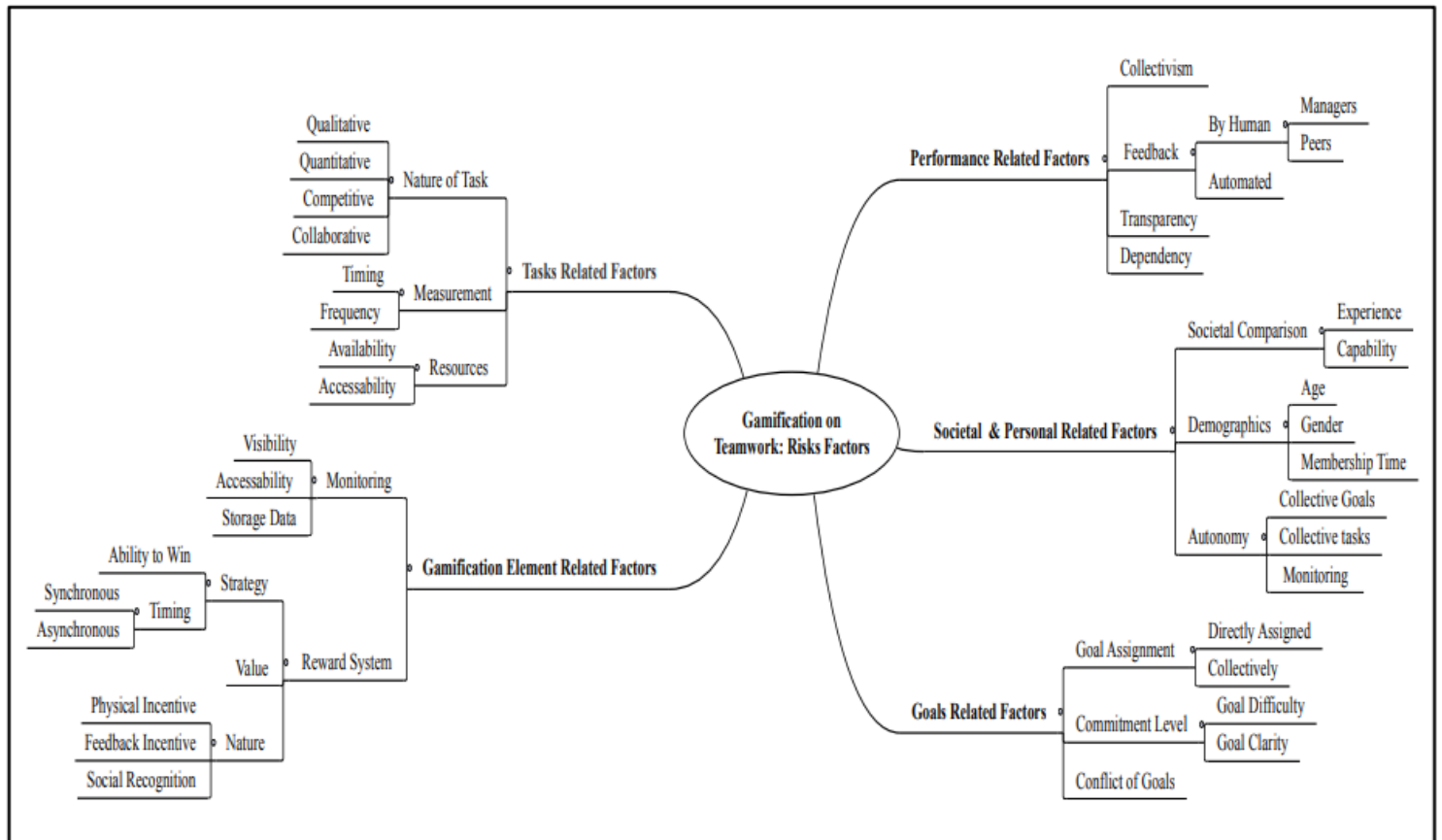


Figure 4 - Conceptualisation of Gamification Risk Factors to Teamwork (Algashami, et al., 2018)

2.6 Conclusion of Literature Review

The literature review and the theoretical framework were both discussed in Chapter 2. The literature examined the work of several authors who studied gamification and discovered that behavioural change, employee satisfaction, performance, and engagement were the themes that came up most frequently. With careful evaluation of the game features and the architecture of the gaming platform, gamification will increase or raise high-performing employees.

CHAPTER 3. RESEARCH METHODOLOGY

This chapter outlined the research methods used to examine the potential effects of gamification on South Africa's manufacturing sector. Firstly, it described the research approach which was adopted. Secondly, it included the research design that was used as well as the population and sample. Thirdly, it detailed the research instrument. Lastly, the research limitations were identified.

3.1 Research approach

Three different research approaches are commonly used. Qualitative research prioritizes in-depth investigation, interpretation, and comprehension of social processes and subjective meanings, while quantitative research concentrates on numerical data and statistical analysis (Creswell, 2013). The last approach is mixed methods, this approach is used to have a more thorough grasp of a research subject, a mixed methods approach is a research methodology that integrates both qualitative and quantitative research methodologies inside a single study (Creswell, 2013).

The qualitative method was selected as the research strategy for this study because it allows interviewees to freely answer in-depth, and honestly and convey their true feelings.

3.2 Research design

The research design is a case study on Abeco Tanks (Pty) Ltd, a manufacturer of steel tanks. The open-ended nature of the questions gives participants full freedom to respond, but the researcher can correct them if they stray from the subject at hand. This is one of the benefits of using a qualitative research design. The research questions that will be put to the participants can be answered in depth and with greater comprehension thanks to this design.

The design's drawback is that there were fewer participants because the case study focused on a company with employees who met the criteria, who had been with the company for a long time and had no experience with gamification.

The selection of participants was based on particular criteria, such as having ten years of experience in the manufacturing industry, to guarantee the validity of the data. To guarantee reliability, comprehensive data analysis techniques were used, including locating themes, patterns, and important insights in the data.

For this study, an interview research design was chosen as the desired method because it is best suited as a response to this study.

3.3 Population and sample

Data will be gathered staff from who meet the criteria at Abeco Tanks (Pty) Ltd which is based in Johannesburg. The documentation that will be required will be authorisation from the company allowing the researcher to conduct interviews during working hours as well as participation letters from each respondent allowing the researcher to conduct the interview.

3.3.1 Case site

The case site will be based at Abeco Tanks (Pty) Ltd at 10-12 John Street, Selby. This company was chosen for the research as it is a manufacturing company that knows about gamification and is considering implementing it within the company. Abeco Tanks (Pty) Ltd manufactures steel water tanks that are exported all over the world and they are very well known in Africa for their high-quality product. They are over 40 years old and are considered to be leaders in the locally manufactured steel water tanks in South Africa. Abeco Tanks (Pty) Ltd is proudly registered with all the quality certified bodies proving their product is of the highest quality.

3.3.2 Sample size and sampling method

The sampling method that will be used will be purposive sampling. Purposive sampling, also known as judgmental or selective sampling, is a non-random sampling technique where researchers deliberately select participants based on specific criteria (Kumar, 2014) this research is specifically looking at Abeco Tanks (Pty) Ltd therefore the sample will be coming directly from the company as well as through the selection criteria. Few employees fit the selection criteria and because the goal of the qualitative approach is to extract meaningful insights from a smaller group rather than oversaturate the data with a larger sample size, a total of four interviews were selected.

3.4 The research instrument

The research instrument that was chosen was interviews as it will be able to get in-depth insights on the topic. The main themes for the questions were to gauge a general understanding of the word gamification, what is the respondent's understanding of how it can impact the company, and what strengths and weaknesses can come from it specifically in the manufacturing industry.

The data collection method that will be used is interviews. The interviews will give insight if employees feel that gamification will increase employee production/engagement or reveal any other potential benefits or challenges to introducing gamification in the company.

Interviews were chosen as the desired instrument as they allow for more clarification and explanation of responses, freedom in questioning and probing, and in-depth exploration, Interviews gather rich qualitative data by encouraging participant interaction. This contextualizes participants' viewpoints, feelings, and situational elements.

3.5 Procedure for data collection

The respondents approached directly and asked to participate in an interview, and they will be requested to fill out a consent form (Appendix B) and further explained that they can exit the interview at any time if they wish to. The data will be collected using a voice recorder on a password-protected cell phone.

3.6 Data analysis strategies and interpretation

The data will be analysed by using thematic analysis to identify key phrases in the participant's responses.

3.7 Possible limitations and challenges of the study

Several limitations were identified in this study. Firstly, the research was confined to interviews conducted with employees from a single company, potentially limiting the generalizability of the findings to other organizational contexts. Additionally, the concept of gamification is still emerging and may not be widely understood, which could affect the depth of responses from participants. Moreover, the study utilized a small sample size, consisting of only four respondents, which may not fully capture the diverse range of perspectives within the workforce. These limitations suggest caution in extrapolating the results to broader populations and highlight areas for future research to address.

3.8 Quality Assurance

The ideas of transferability, credibility, and dependability will be addressed below and will be examined and applied to preserve the study's quality.

3.8.1 External validity OR transferability

To maintain transferability, the study's questions will only address the particular context and goals, making sure that the conclusions and interpretations are still pertinent and useful within the parameters of the investigation. The data gathered

will be more precisely matched with the research aims by keeping a limited focus on the study's particular environment and research questions.

3.8.2 Internal validity OR credibility

This study's validity and credibility will be maintained via a rigorous process of extended interaction with the data, guaranteeing careful analysis and interpretation.

3.8.3 Reliability OR dependability

In this study, the responses will be reliable as the data will be captured via a recording of the answers given to each question (University of Miami, 2020). To ensure reliability, researcher consistency was maintained to promote uniformity and minimize researcher bias.

3.9 Ethical considerations

To progress with this study, ethics approval has been applied for through the Wits Business School ethics form, only once approval was received did the study commence. The ethics application form is submitted along with this study. A formal letter was sent to Abeco Tanks (Pty) Ltd (Appendix C) requesting to conduct research at the company, approval was received – please see Appendix D. A letter of confirmation was issued by the managing director of the company giving authorization for the interviews to take place during working hours. The research will be conducted on a one-on-one basis with participants within the company in a closed-door interview during lunchtime. The interview will be recorded on a password-protected cell phone and then transferred to a password-protected computer. All participants will be asked to sign a consent form allowing the interview to take place, it will also be communicated that anonymity cannot be guaranteed.

CHAPTER 4. DATA ANALYSIS

4.1 Introduction

This chapter analyses the results that were collected from the data collection instrument. The purpose of this study was to address the research questions mentioned in the first chapter. A visualized cloud of understanding is utilized to express the participant's answers for each question, the data was inputted into www.monkeylearn.com which is a free word cloud generator to generate the images used in this Chapter. The bigger a term appears, the more often that particular word was used when responding to a particular question.

4.2 Understanding Gamification

Question 1 of the interview was based on research question 2, to gauge the extent of their understanding of the concept, participants were questioned about how well they understood the term "gamification." Utilizing a word cloud aims to summarize the ideas that emerged from the gathered data. Figure 5 is used to visualize the participant's understanding of the concept of gamification.

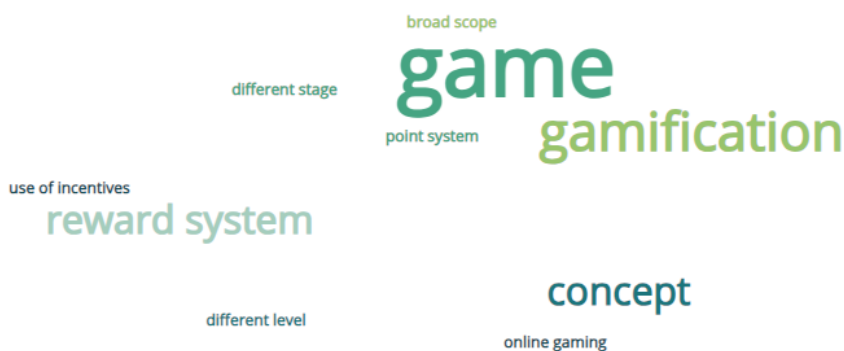


Figure 5 - Defining gamification

Extracts from the participants help to highlight the research's subsequent goal of understanding the context in which this text was used. All participants expressed

a general understanding of gamification, using words such as “point system”, “incentives”, “game” and “rewards system”. Participant 4 expressed that gamification is in everything, “I think everything now is based on gamification like your rewards system, trying to get to your different levels, trying to get to your different stages.” Participants 2 and 3 reflected that gamification is about incentives and a points system, whereas participant 1 and 4 based their answers on a game-like environment where you introduce game concepts.

4.3 Implementing Gamification

Question 2 considered the views of the participants and how they would go about introducing gamification to Abeco Tanks (Pty) Ltd, this further links with research question 2 to determine the participant's level of understanding of gamification.



Figure 6 - Implementing gamification

Participants 1 suggested that “ Via the ISO system, via procedures that is what I’d do ” and participant 3 affirmed this by saying “ there should be an electronic system to monitor this”, both participants discussed how gamification needs to be implemented through a systems and procedural approach, however, participants 2 and 4 reflected that gamification should be implemented in production through either a point system or a rewards system where output needs to be monitored. Participant 3 reflected a slightly different viewpoint suggesting double monitoring of the scoring system, the following was expressed, “there

should be an electronic system to monitor this so they can mark off the along with their superior how they met those objectives and then based on that they will get points and at the end of the day that is tallied on a scorecard. A participate answered this question as follows " approach it from a target point of view where each employee will have a specific target that it set up in such a way that it's for each position that is held in the company there should be an electronic system to monitor this", this highlighted that gamification is expected to monitored on an electronic system and for it to be job specific.

4.4 Employee Reaction

The next question explored the notion that if gamification was implemented at Abeco Tanks (Pty) Ltd, what response could be expected from the workforce? This question was aimed at answering question number 1 to gauge if there would be a negative or positive reaction to the change.



Figure 7 - Employee reaction

Participants 1 indicated that " They would not like it. People don't like change because they need to understand it first" and participant 2 affirmed this by saying " They will hate it, they not very keen on changes, they are very... they don't like changes", both believed that the workforce would react negatively towards the

potential implementation at the company due to individuals not liking change, but rather being happy in their comfort zones. However, participants 3 and 4 both expressed that the workforce would be “eager” and “excited” towards the change. Participant 4 highlighted that “if you make it exciting for them if there are constant changes and implications of the sort, change it every 3-6 months so it’s not the same and people doing it over and over again.” Therefore participant 4 believes that change needs to happen regularly to keep the workforce excited.

4.5 Employee Performance

The next question is related to research question 1 to determine how employee performance would be impacted by the introduction of gamification at the company.



Figure 8 - Employee performance

Participants 1 and 3 believed that there would be a positive impact on the employees’ performance, however, participant 4 expressed that half the employees will enjoy it and their performance will adapt with the change, and the other half of employees who will complain will be negatively impacted. The last participant (2) highlighted that the monitoring of performance was important to keep the employees productive. However a participant responded as follows “Everyone is different, some guys will see the excitement working towards something and other guys probably doesn’t phase them”, this points out that

employees should not be grouped together but treated as individuals as not everyone will react the same to the change.

4.6 Positives of Gamification on Employees

Question 5 aimed to answer research questions 1 and 2 – to determine what the participants are understanding of the positives of gamification and how can it positively influence the workforce.



Figure 9 - Positives of gamification

Participant 1 highlighted that " people working more efficiently cause they getting rewards, they work towards something they will get benefit from" and Participant 2 believed that "to pinpoint where there is a bottleneck as far as production is concerned". Participant 3 expressed that there would be an increase in encouragement, motivation as well as productivity. The last participant also stated that people would be more eager to come to work and their productivity levels would increase.

4.7 Negatives of Gamification on Employees

Similar to the previous question, this question seeks to shed light on the negatives of gamification and attempts to answer both research questions.



Figure 10 - Negatives of gamification

Participants 1,2 and 4 all believed that the negatives would be staff-related, that people would refuse to “accept” the change, that it would create “strict” rules that employees would be against and lastly, it could create discouragement, as Participant 4 states “if in their mind they have achieved it but they haven’t could have that sort of debate or argument over the discrepancies”. Participant 3 expressed that the negative impact will be systems-related and not employee-related related as there needs to be room for objectivity when monitoring of the scores is considered.

4.8 Gamification Elements

The next question was based on what gamification elements could be beneficial, especially to the manufacturing industry. This question was aimed at answering research question 2.

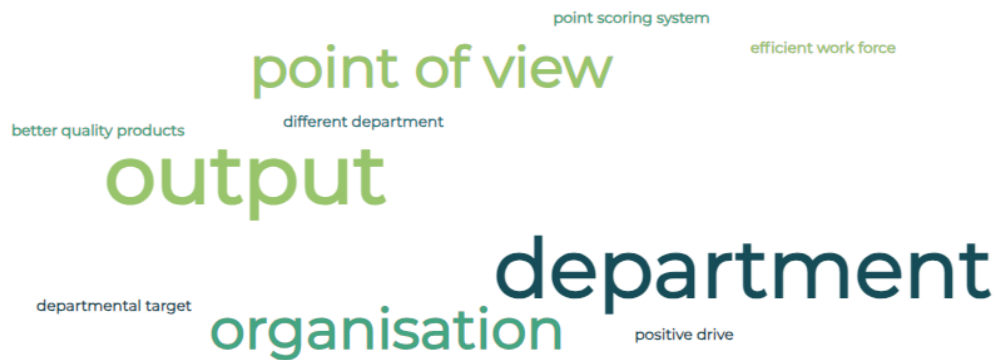


Figure 11 - Gamification elements

Participants were asked to mention gamification elements that they could see being beneficial to the manufacturing industry. Participants 1 and 2 both mentioned a rewards or points system, however, Participant 3 indicated that “definitely output, output related targets that are met and also from a the quality point of view having no quality defects or departmental targets with regards to quality and output could influence it in a positive way”. Lastly, participant 4 expressed that a monetary reward would benefit the sector as people would work for that. A participant brought up the following elements “ output related targets that are met and also from a quality point of view having no quality defects or departmental targets with regards to quality and output” this implies that output has a direct correlation to the quality of the product being manufactured, noting it as an important element to consider.

4.9 Non-Monetary Motivating Factors

This question explored different ideas of motivating the workforce besides monetary.



Figure 12 - Non-monetary motivation factors

All participant's answers were similar, employees could be rewarded with "education" for them personally or their family members, "time off", "vouchers", and "grocery hampers". Participant 4 highlighted that a boost in morale can be seen as a non-monetary motivating factor, " You see it often if a workforce is happy and driving well, they will do anything, when I mean anything, you want to do it as opposed to need to do it."

4.10 Scoring System Impact on the Factory

The second last question addressed the notion of a scoring system that was implemented at Abeco Tanks (Pty) Ltd and how it could potentially impact production (linking up to research question 1).



Figure 13 - Scoring system

3 of the participants stated that it would be a useful tool to reach targets, it would increase production and it would foster healthy competition amongst the workers. The last participant showed concern as the design of the scoring system would have to be quite complex to monitor the points for 4 different departments in the factory and the scoring system would be unique to each department. The following was mentioned " From an incentive point of view it can push production but by pushing production we must keep in mind that we want to up production and not sacrifice quality" that gamification can be used as an incentive however this can impact the quality of the item as workers will be focusing on output and not necessarily their quality of work.

4.11 Long-Term Effects

The last question looked at how the participants perceived the long-term impacts of gamification in the company.



Figure 14 - Long-term effects

Participant 1 stated “ I think we will manufacture more, put out more production”, another participant expressed the importance of introducing the concept properly then only the long-term impact would foster big benefits. Participant 4 believes that gamification could be the next big drive towards motivating staff, however, concern was also raised about where gamification gets capped.

4.12 Conclusion

In conclusion, the analysis highlights participants' perceptions, strategies, and anticipated outcomes regarding gamification at Abeco Tanks (Pty) Ltd. Gamification is seen as a means to integrate game-like elements into work processes, with proposed approaches focusing on system integration and goal setting. While some anticipate resistance to gamification, others foresee potential benefits in productivity and motivation. Identified benefits include increased efficiency, while potential drawbacks revolve around resistance to change. Non-monetary motivators and scoring systems are suggested to enhance employee engagement and performance. Overall, participants anticipate long-term improvements in productivity and workforce morale, underscoring the potential of gamification as a strategy for enhancing organizational performance at Abeco Tanks (Pty) Ltd.

CHAPTER 5. DISCUSSION OF RESULTS

5.1 Introduction

This chapter explores the discussions around the analysis and literature review, further discusses the results of the research study objectives, and lastly gives feedback on the research questions.

5.2 Review of the study's objectives

The original questions that were posed at the beginning of the study are below. These questions created the base for the questions that were asked in the interviews and are the aim of the study.

1. Does gamification have the potential to increase/decrease a worker's productivity level in the manufacturing industry?
2. Understanding Gamification in the Manufacturing Industry.

5.3 Review research questions

To gain an understanding of the data, every interview question will be examined and connected to the literature.

5.3.1 Research Question 1: What is your understanding of the term gamification?

The definition of gamification was given by Groh (2019) and was explained as "the use of game design elements in non-game contexts". The themes that were drawn from the data showed that the participants had similarly viewed the conceptualization of gamification to that of Groh's explanation. All participants could define gamification and showed a general understanding of the concept. The success of adopting the system is determined by each person's unique definition of the notion, according to authors Staller & Koerner (2021), who further claimed that gamification is only beneficial for educational purposes, contradicting further explanations.

5.3.2 Research Question 2: If you were able to, how would you implement gamification at Abeco Tanks?

When it came to the implementation of gamification the research methodology identified that authors Stewart (2022) and Gupta (2022) both identify that the challenge with gamification is that it is very costly to develop, implement, and maintain and that the system will lose value over time, suggesting that updates need to be made regularly. It was also identified that gamification needs to be implemented in stages to gain the buy-in from the staff. The participants suggested that integrating an existing system with gamification can be considered, as well as electronic monitoring and linking the system up to performance criteria. To address the cost of implementing gamification, linking it up to an existing system will reduce the cost. The participant's answers showed their concern towards existing systems, monitoring, and the performance of the staff. According to Staller & Koerner (2021), however, the absence of a precise definition of gamification may have an effect on its use since there won't be any guidance or understanding of the intended outcome.

5.3.3 Research Question 3: How do you think the employees would react to the introduction of gamification?

According to the literature, staff would show a positive reaction towards the introduction of gamification, as suggested by Engineering (2019) there will be employee engagement and productivity. It will boost healthy competition (Keepers, Nedbit, Romero, & Wuest, 2022). Employees will be more engaged and go the extra mile while competing with their colleagues (Stewart K. , 2022). The data showed that there was a clear 50/50 split between the employees reacting negatively towards the introduction of gamification and/or positively towards the introduction of gamification. This highlights the importance of how gamification is introduced in the workplace, if it is done abruptly and involves too many elements it will scare the staff away however a slow, simple approach might foster a more exciting learning environment towards accepting the change.

5.3.4 Research Question 4: What impact would you expect gamification to have on the employee's performance?

The research methodology showed that a positive and negative impact can be expected on the employee's performance. Engineering (2019) expects a positive impact on performance and employee engagement, yet Tado, Valle & Isotani (2018) expect a reduction in performance due to risk factors. Gupta (2022) expects an increase in performance as employees will find the concept fun and motivating, however, authors such as Jankelova, Joniakova, & Prochazkova (2022) said that diversity is generally overlooked in the manufacturing industry resulting in a decline in performance. The data showed that 75% of the participants believed that there would be an increase in performance and 25% believed that the reactions would vary according to individual preference and adaptability. This identifies that the team implementing the change must take diversity into account.

5.3.5 Research Question 5: What positives do you see gamification having on employees?

The literature identified the following as positives: Increased engagement and productivity (Engineering, 2019), increased loyalty to the company, inspires employees to work harder and enjoyment (Engineering, 2019), and increased teamwork (Ilgen, Hollenbeck, Johnson, & Jundt, 2005). The data showed that similar positives were identified by the participants such as increased productivity, drive, motivation, and happiness. This shows that the positives were not hard to visualize for the gamification concept.

5.3.6 Research Question 6: What negatives do you see gamification having on employees?

The negatives that were pointed out were that gamification can become a costly exercise to develop the software to monitor scores, and to keep updated and there is the potential of losing value over time or for it to become outdated and ultimately reduce production (Gupta, 2022). The participants highlighted factors

that were more centralized towards individual participation suggesting resistance, favouritism, and unachievable targets.

5.3.7 Research Question 7: What gamification elements do you think can benefit the manufacturing industry?

The literature spoke to different types of elements that could be implemented such as a single-player approach or a multiplayer approach, whereby a team works towards a common goal/score/level (Keepers, Nedbit, Romero, & Wuest, 2022). The participants had similar answers to the literature, they spoke about rewards, point scoring, quality targets, and that each department needs need to be taken into consideration. According to authors Leite, Alves, Cardoso, and Neto (2023), gamification consists of three primary components that are centred around the system's output: knowledge sharing, enhanced production, and motivation.

5.3.8 Research Question 8: What motivating factors besides monetary do you think will increase an employee's performance?

Keepers, etc.(2022) found enjoyment to increase an employee's performance, whereas authors Ulmer, etc. (2020) suggested that competition can spark an intrinsic motivator that will cause an employee to try to outdo another employee. Other factors such as self-regulation and self-empowerment were also identified (Ryan & Deci, 2000). When it came to motivating factors at Abeco Tanks (Pty) Ltd individual-focused suggestions were put forward such as educational opportunities, time off, recognition, and incentives. This points out the importance of self-improvement in the manufacturing industry.

5.3.9 Research question 9: How do you perceive a scoring system to impact the factory?

Ulmer, etc. (2020) suggested that a scoring system be used in their UI which displays high scores to create a competitive environment. 75% of the participants

found that a scoring system would benefit the company and expect an increase in production and competitive nature however 25% highlighted the importance of creating a bespoke program for each department.

5.3.10 Research question 10: What do you perceive the long-term effects of gamification to be if introduced to Abeco Tanks?

Gamification is a new system to be introduced to companies, specifically in the manufacturing industry, therefore the long-term effects of gamification are unknown. However, according to the participants who have been in the industry for a prolonged period, they suggested that they ultimately see gamification changing the workforce's mind enhancing productivity and increasing manufacturing output. One participant pointed out that there will be a need for ongoing testing and keeping an eye on individual responses to the new system.

5.4 Conclusion

The concept of gamification is widely understood, but the depth of this understanding has not been precisely determined due to a lack of discussion on game design and features. The best course of action for implementing gamification is to take a deliberate, methodical approach; a systems approach is advised. The workforce is likely to approach the concept with caution, however, excitement is likely to grow with updates on the system. Gamification is likely to have a positive impact on the workforce, predicted outcomes are an increase in productivity and morale. Employees who are accustomed to staying the same will be reluctant to make changes.

Research question 1: Does gamification have the potential to increase/decrease a worker's productivity level in the manufacturing industry – according to the data analysis as well as the literature, gamification does have the potential to increase a worker's productivity level and to maintain this there should be changes to the system every few months to eliminate boredom. The organization will address the issue of feeling stuck in one position by introducing modifications that will

make the job feel fresh and varied, even though the monitoring system has changed rather than the actual job itself.

Research question 2:

Understanding Gamification in the Manufacturing Industry.

After a thorough investigation of this topic, it was discovered that while gamification as a concept is still being developed in the manufacturing sector, there is a fundamental comprehension of what gamification is and aims to accomplish. gamification is a technique used to increase the enjoyment and intentionality of employee interactions at work. The system's purpose is to keep an eye on employee performance and boost output while upholding standards of quality.

CHAPTER 6. RECOMMENDATIONS

6.1 Recommendations to introduce gamification in a manufacturing firm in South Africa

In order to successfully introduce gamification in a manufacturing firm it is imperative that a motivational theory needs to be fostered as a supporting base to the gamification system. This is required as people naturally fear change, and by having a motivational theory attached to the system it will allow for the workforce to comfortably accept the change.

It is recommended that once the system is set up, that management fully explains the purpose of the new system and why it is being introduced. It is very important that the workforce understands the system and what benefits can from it. A step-by-step process is recommended in order for employees to ease into it.

A further recommendation is that the system needs to be updated at least twice a year to eliminate boredom and a sense of comfort in the employee's workspace. By introducing the concept boredom is already decreased by 29% (Carstarphen, 2022), by eliminating the repetitive nature of tasks will decrease human errors (Salientprocess, 2023).

If Abeco Tanks (Pty) Ltd wishes to adopt gamification in their firm, the next step will be to introduce the self-determination motivation theory, which aids the manufacturing industry through base learning. Management and HR should then get involved to explain why this change is being done and to address any concerns. It is also essential that the organization provide ongoing support to its staff to resolve any questions that may emerge. The organisation can then implement gamification. Gamification is underrepresented and understudied in the manufacturing industry; the research objective was to determine whether it would be a feasible choice to employ in the manufacturing industry. Although the long-term effects of gamification are unknown, there will be a risk associated with its implementation. The investigation found promise in introducing the concept

because change is uncommon in this sphere of work and can potentially be the disturbance that the industry needs.

6.2 Limitations of the research

The limitations of the study were that the study was done on one manufacturing company in South Africa, and a border scope of understanding will give a clearer picture if gamification will be beneficial to implement within the industry. An additional limitation is that only office staff was interviewed, interviewing across all levels as well as on the floor will give a more accurate understanding if the floor staff would be interested in such a system in their workplace.

6.3 Suggestions for future research

If future research was done on gamification in the manufacturing industry, it would be beneficial to increase the scope of companies in the industry as well as the participants on various levels throughout the company. To try to incorporate manual labour into the scope of gamification, more scholarly research on the subject and the factors that drive people to perform it should be conducted.

REFERENCES

- Abun, D. (2021). Employees' self-efficacy and work performance of employees as mediated by work environment. *SSRN Electronic Journal*, 1 - 15.
- Algashami, A., Cham, S., Vuillier, L., Stefanidis, A., Phalp, K., & Ali, R. (2018). *Conceptualising Gamification Risks to Teamwork within Enterprise*. United Kingdom: Bournemouth University.
- Bandura, A. (1977). Self-efficacy: Toward a Unifying Theory of Behavioral Change. *Psychological Review*, 190–215.
- Bank, S. A. (2020). Occasional Bulletin of Economic Notes. *Chris Loewald* , (pp. 1 - 13).
- Bassanelli, S., Vasta, N., Bucchiarone, A., & Marconi, A. (2022). Gamification for behavior change: A scientometric review. *Acta Psychologica*, 228.
- Benitez, J., Ruiz, L., & Popovic, A. (2022). Impact of mobile technology-enabled HR gamification on employee performance: An empirical investigation. *Information & Management*, 1 - 15.
- Biasutti, M. (2017). *Flow and Optimal Experience*. Retrieved from Science Direct: <https://www.sciencedirect.com/topics/psychology/flow-theory>
- Bizzi, L. (2023). Why to gamify performance management? Consequences of user engagement in gamification. *Elsevier*, 1 - 12.
- Carstarphen, N. (2022, September 12). *Why your organization might roll the dice on gamification*. Retrieved from Deloitte-logo: <https://action.deloitte.com/insight/2467/why-your-organization-might-roll-the-dice-on-gamification>
- Chitroda, H. (2015, June 4). *Knolskape*. Retrieved from A Brief History on Gamification: <https://knolskape.com/blog/brief-history-gamification/>

- Creswell, J. W. (2013). *Qualitative inquiry and research design: Choosing among five approaches*. California: Sage Publications.
- Devar, T., & Hattingh, M. (2020). Gamification in Healthcare: Motivating South Africans to Exercise. *IFIP International Federation for Information Processing* (pp. 108 - 119). Switzerland: Springer Nature Switzerland.
- Engineering, G. (2019, August 29). *THE HISTORY OF GAMIFICATION (FROM THE VERY BEGINNING TO NOW)*. Retrieved from Growth Engineering: <https://www.growthengineering.co.uk/history-of-gamification/>
- Fulton, J. (2019, August 1). Theory of Gamification - Motivation.
- Griffin, M., Patterson, M., & West, M. (2001). Job satisfaction and teamwork: the role of supervisor support. *Journal of organizational behavior*, 537-550.
- Groh, F. (2019). Gamification: State of the Art Definition and Utilization. *Institute of Media Informatics*, 39 - 46 .
- Group, T. F. (2023). *How to achieve trustworthiness in qualitative research*. Retrieved from The Farnsworth Group: <https://www.thefarnsworthgroup.com/blog/trustworthiness-qualitative-research#:~:text=Credibility%20in%20Qualitative%20Research,well%20as%20their%20research%20methods.>
- Group, T. F. (2023). *How to achieve trustworthiness in qualitative research*. Retrieved from The Farnsworth Group: <https://www.thefarnsworthgroup.com/blog/trustworthiness-qualitative-research#:~:text=Credibility%20in%20Qualitative%20Research,well%20as%20their%20research%20methods.>
- Gupta, G. (2022, March 05). *Pros And Cons Of Gamification*. Retrieved from eLearning Industry : <https://elearningindustry.com/pros-and-cons-of-gamification>

- Ilgen, D., Hollenbeck, J., Johnson, M., & Jundt, D. (2005). Team in organizations: from input-process-output models to IMOI models. *Annual Review of Psychology*, 517-543.
- Jaca, C., Viles, E., Tanco, M., Mateo, R., & Santos, J. (2013). Teamwork effectiveness factors in healthcare and manufacturing industries. *Team Performance Management*, 222 - 236.
- Jankelova, N., Joniakova, Z., & Prochazkova, K. (2022). The way to business competitiveness: The importance of diversity management and teamwork climate in stabilizing of employees. *Journal of Business Economics and Management*, 606 - 625.
- Keepers, M., Nedbit, I., Romero, D., & Wuest, T. (2022). Current state of research & outlook of gamification for manufacturing. *Journal of Manufacturing Systems*, 303-315.
- Khan, A. (2022, August 26). *The Top Five Gamification Trends for 2022*. Retrieved from my Cred: <https://mycred.me/blog/top-five-gamification-trends/>
- Krath, J., Morschheuser, B., & von Korflesch, H. (2022). Designing gamification for sustainable employee behaviour: Insights on employee motivation, design features and gamification elements. *Proceedings of the 55th Hawaii international conference on system sciences*, 1594 - 1603.
- Kumar, R. (2014). *Research Methodology: A Step-by-Step Guide for Beginners*. SAGE Publications.
- Leite, R., Alves, L., Cardoso, L., & Neto, H. (2023, July 12). *How Has Gamification in the Production Sector Been Developed in the Manufacturing and Construction Workplaces?* Retrieved from MDPI: <https://www.mdpi.com/2075-5309/13/10/2614>
- Lindner, J. (2013, December 16). *Must-Know Gamification Statistics [Recent Analysis]*. Retrieved from GITNEX: <https://gitnux.org/gamification-statistics/#:~:text=Gamification%20increases%20employee%20engagem>

ent%20levels%20by%2048%25.,-

This%20is%20a&text=It%20demonstrates%20that%20gamification%20is
,looking%20to%20increase%20engagement%20levels.

Lopez, C., & Tucker, C. (2018). The effects of player type on performance: A gamification case study. *Computers in Human Behavior*, 333 - 345.

Mitchell, R., Schuster, L., & Seung Jin, H. (2018). Gamification and the impact of extrinsic motivation on needs satisfaction: Making work fun? *Journal of Business Research*, 323 - 330.

Nonaka, & Takeuchi. (1995). *The Knowledge-Creating Company*. New York: Oxford University Press.

Oliveira, A. (2023, February 6). *How to Use Self-Determination Theory to Increase Employee Motivation?* Retrieved from Pro Action International: <https://blog.proactioninternational.com/en/how-self-determination-theory-enhance-employee-motivation#:~:text=In%20summary%2C%20self%2Ddetermination%20and,innovation%2C%20productivity%2C%20and%20resilience.>

Oliver, E. (2017, August 22). Gamification as transformative assessment in higher education. Pretoria, Gauteng, South Africa.

Prasad, K., & Mangipudi, M. (2021). Gamification for Employee Engagement: An Empirical Study with E-Commerce Industry. *Montenegrin Journal of Economics*, 145 - 156.

Rayapeddi, V. (2016, January 16). *Lean Thinking Series: 7 Steps for Successful Lean Implementation*. Retrieved from LinkedIn: <https://www.linkedin.com/pulse/7-steps-successful-lean-implementation-vishnu-rayapeddi/>

Ryan, R., & Deci, E. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, 68-78.

Salientprocess. (2023, August 9). *Salient Process*. Retrieved from How Reducing Repetitive Tasks Can Save Time and Money: <https://salientprocess.com/blog/how-reducing-repetitive-tasks-saves-time-and-money/#:~:text=For%20example%2C%20repetitive%20tasks%20can,might%20complete%20tasks%20more%20slowly.>

SARB. (2020, November). *Resbank*. Retrieved from South African Reserve Bank Occasional Bulletin of Economic Notes: [https://www.resbank.co.za/content/dam/sarb/publications/occasional-bulletin-of-economic-notes/2020/10410/OBEN%202002%20\(South%20African%20Manufacturing%20A%20situational%20analysis\)%20-%20November%202020.pdf](https://www.resbank.co.za/content/dam/sarb/publications/occasional-bulletin-of-economic-notes/2020/10410/OBEN%202002%20(South%20African%20Manufacturing%20A%20situational%20analysis)%20-%20November%202020.pdf)

Shannon, J. (2022). *The History of Gamification - Journey from 1896 to the 21st Century*. Retrieved from Gamify: <https://www.gamify.com/gamification-blog/the-history-of-gamification>

Shannon, J. (2022). *The History of Gamification - Journey from 1896 to the 21st Century*. Retrieved from Gamify: <https://www.gamify.com/gamification-blog/the-history-of-gamification>

Signé, L. (2023). *Africa's Fourth Industrial Revolution*. Cambridge: Cmabridge University Press.

solutions, C. d. (2023). *Three Aspects of Validity in Qualitative Research*. Retrieved from Complete disseration by stastics solutions: <https://www.statisticssolutions.com/three-aspects-of-validity-in-qualitative-research/>

Spinify. (2024). *Spinify*. Retrieved from Who started gamification?: <https://spinify.com/blog/gamification-history/#:~:text=Wondering%20who%20coined%20gamification%3F,for%20vending%20machines%20and%20ATMs.>

- Stadnicka, D. &. (2019, December). A GAMIFICATION APPROACH APPLICATION TO FACILITATE LEAN MANUFACTURING KNOWLEDGE ACQUISITION. *Management and Production Engineering Review*, 108–122.
- Staller, M., & Koerner, S. (2021, February 10). *Beyond Classical Definition: The Non-definition of Gamification*. Retrieved from SpringerLink: <https://link.springer.com/article/10.1007/s42979-021-00472-4>
- Stewart, K. (2022, April 8). *What are the Advantages and Disadvantages of Gamification?* Retrieved from Echo360: <https://echo360.com/what-are-the-advantages-and-disadvantages-of-gamification/>
- Stewart, K. (2022, April 08). *What are the Advantages and Disadvantages of Gamification?* Retrieved from echo360: <https://echo360.com/what-are-the-advantages-and-disadvantages-of-gamification/>
- Tado, A., Valle, P., & Isotani, S. (2018). The dark side of gamification: An overview of negative effects of gamification in education. *Higher Education for All. From Challenges to Novel Technology-Enhanced Solutions* (pp. 143–156). Sao Carlos: Institute of Mathematics and Computer Science (ICMC) - University of Sao Paulo.
- Teacher, U. (2023). *Dependability in Qualitative Research*. Retrieved from Universal Teacher: <https://universalteacher.com/1/dependability-in-qualitative-research/>
- Tripp, S., Grueber, M., Simkins, J., & Yetter, D. (2020). *Video games in the 21st century: The 2020 economic impact report*. TEconomy Partners LLC.
- Ulmer, J., Braun, S., Cheng, C., Dowey, S., & Wollert, J. (2020). Human-centered gamification framework for manufacturing systems. *53rd CIRP Conference on manufacturing systems* (pp. 670 - 675). Melnourne: Elsevier B.V.
- University of Miami, S. o. (2020, 09 22). *How is reliability and validity realized in qualitative research?* Retrieved from University of Miami, School of

Education and Human Development:
<https://sites.education.miami.edu/statsu/2020/09/22/how-is-reliability-and-validity-realized-in-qualitative-research/#:~:text=Reliability%20in%20qualitative%20research%20refers,by%20transcribing%20the%20digital%20files.>

Vasudevan, K., & Keung Chan, N. (2022). Gamification and work games: Examining consent games: Examining consent Uber drivers. *Special Issue Article*, 866–886.

Zainol, M. N., & Mohd, N. Z. (2015). *The relationship between knowledge conversion abilities and academic performance*. Shah Alam: Elsevier LTD.

APPENDIX (A) Instrument

Interview Guide		Research Question
1	What is your understanding of the term gamification?	Research Question 2
2	If you were able to, how would you implement gamification at Abeco Tanks?	Research Question 2
3	How do you think the employees would react to the introduction of gamification?	Research Question 1
4	What impact would you expect gamification to have on the employee's performance?	Research Question 1
5	What positives do you see gamification having on employees?	Research Question 1
6	What negatives do you see gamification having on employees?	Research Question 1
7	What gamification elements do you think can benefit the manufacturing industry?	Research Question 2
8	What motivating factors besides monetary do you think will increase an employee's performance?	Research Question 2
9	How do you perceive a scoring system to impact the factory?	Research Question 2
10	What do you perceive the long-term effects of gamification to be if introduced to Abeco Tanks?	Research Question 1

APPENDIX B – Consent Form



University of the Witwatersrand,
Wits Business School 011 717 3544

(Participants name)
Abeco Tanks (Pty) Ltd
10-12 John Street, Selby, Johannesburg

26 May 2023

Dear Sir/Madam,

Re: Consent letter for interview

Title of Project: The potential impact of gamification in the manufacturing industry in South Africa.

Name of researcher: Stephanie Jooste

I, _____ agree to participate in this research project.

I agree to the following:
(Please circle the relevant options below)

The research study being conducted was explained to me. I understand what this study is about.	YES NO
I understand that I can volunteer to take part in the study.	YES NO
I agree that the interview may be audio recorded.	YES NO
I agree that direct quotations from my interview/ may be used by the researcher in their research report.	YES NO

I agree that my participation will remain anonymous (my name or other identifying data will not be used by the researcher in their research)	YES NO
acknowledge that my anonymity cannot be guaranteed.	YES NO
I agree that other researchers may use the information I provide in my interview, but my name and any personal information will not be used or passed on.	YES NO

..... (signature)
..... (name of participant)
..... (date)

..... (signature)
..... (name of researcher)
..... (date)

APPENDIX C - Permission Letter



University of the Witwatersrand,
Wits Business School 011 717 3544

Duane Ramos
Abeco Tanks (Pty) Ltd
10-12 John Street, Selby, Johannesburg

26 May 2023

Dear Sir,

Re: Permission to conduct research at Abeco Tanks (Pty) Ltd.

My name is Stephanie Jooste.

I have had the privilege of working at Abeco Tanks (Pty) Ltd for over 10 years, in various positions within the company.

I am studying for a Master of Business Administration qualification at the Wits Business School at the University of the Witwatersrand. I am seeking permission to do research at Abeco Tanks (Pty) Ltd.

I am conducting research on the potential impact gamification can have on a company operating in the manufacturing industry in South Africa. Abeco Tanks (Pty) Ltd is a leader in the tank manufacturing industry, I have chosen this company to conduct research to determine the potential impacts of implementing a gamified environment within a manufacturing industry.

I will invite individuals from your organization to participate in this study. The individuals will be in management positions who are key members of the organisation. If they agree, they will be asked to be interviewed. The interview will be conducted during lunchtime at Abeco Tanks (Pty) Ltd premises in Selby, the duration of the interview will be approximately 30min to 1 hour. The participants' responses will be recorded for data analysis.

Participants will be asked to give their written or verbal consent before the research begins. Their responses will be treated confidentially, and identities (their names and the name of the organisation) will be anonymous unless otherwise expressly indicated.

Individual privacy will be maintained in all published and written data resulting from the study.

The results will be communicated by means of a dissertation.

The research participants will not be advantaged or disadvantaged in any way. They will be reassured that they can withdraw their permission at any time during this project without any penalty. There are no foreseeable risks in participating in this study. The participants will not be paid for this study.

All research data will be preserved anonymously for reuse by other researchers.

I therefore request permission in writing to conduct my research at your organization. The permission letter should be on your organization's headed paper, signed and dated, and specifically referring to myself by name and the title of my study.

Please let me know if you require any further information. I look forward to your response as soon as is convenient.

Yours sincerely,

Stephanie Jooste

Stephanie
073 206 0204
752871@students.wits.ac.za

Sylvester Horvey
011 717 3544
sylvester.horvey1@students.wits.ac.za

APPENDIX D – Permission Received



WORLD'S FIRST WATER BANK
SAVE • INVEST • MITIGATE RISK • CRISIS MANAGEMENT

26 May 2023

Dear Stephanie Jooste

Re: Permission to conduct research at Abeco Tanks (Pty) Ltd.

Please accept this letter as permission to conduct your research on the potential impact of gamification in the manufacturing industry in South Africa at Abeco Tanks (Pty) Ltd.

If you require any additional information, please contact me on 011 493 1197.

Yours sincerely,

Duane Ramos
MD

ABECO TANKS (PTY) LTD

P.O. BOX 38092, BOOYSENS 2016

TEL: (011) 493 1197

FAX: (011) 493 7884

CO REG NO: 2016/319069/07

VAT NO: 4550274809



Directors: MF Ramos, DA Ramos, B Neale, LM Koyana Alternative Director: O Shushan
Reg No: 2016/319069/07 Vat No: 4550274809

Factory Address
12 John Street
Selby, Johannesburg

Office Address
ABECO House,
6A Bradford Road,
Bedfordview

www.abecotanks.co.za