

https://dspace.org/

Employee willingness to work with Robotics in retail pharmacies in South Africa

Khosa, Curtis Kulani

2022
University of the Witwatersrand, Johannesburg
https://hdl.handle.net/10539/43693

Khosa, Curtis Kulani. (2024). Employee willingness to work with Robotics in retail pharmacies in South Africa [Master's dissertation, University of the Witwatersrand, Johannesburg]. WireDSpace.https://hdl.handle.net/10539/43693

Downloaded from a DSpace repository. https://dspace.org/

Employee willingness to work with Robotics in retail pharmacies in South Africa.

Submitted by

Curtis K Khosa

2391569

Dissertation submitted in fulfilment of the requirements for the degree of Master of Business administration At Wits Business school.

Email: curtiskhosa@gmail.com

Supervisor: DR Nakuze Chalomba

Wits Business School

March 2022

Nominated Journal of Publication: African Journal of Health Profession education.

Abstract

The increase in competitiveness in the world of business in retail sector has pushed businesses to adopt advanced technology to have a competitive advantage over their competition. The support of employees through the transition process is crucial to facilitate a smooth process, buy in by employees is of paramount importance so that efficiency and adoption could be achieved easily by the company. This study looks specifically at retail pharmacy environment; therefore, it is important to examine the factors affecting employee willingness to work with robotics in retail pharmacy environment in South Africa. Although studies have been done to examine employee willingness to work with automation, but few have been done specifically looking at the factors influencing employee willingness to work with robotics in the retail pharmacy environment in South Africa.

The present study undertakes a quantitative approach in which pharmacy assistants and pharmacists are targeted and online surveys are distributed amongst them to explore the factors influencing employee willingness to work with robotics in retail pharmacies in South Africa. The findings support all eight proposed hypotheses, which are explained in detail in the following chapters below. The contribution of this paper is threefold, contextual, theoretical, and strategical knowledge which each is explained in detail towards the end of the paper.

ACKNOWLEDGEMENTS

My sincere gratitude and appreciation are extended to several people for the support I received during my MBA journey. Firstly, I would like to thank Doctor Nakuze Chalomba for the exceptional learning experience provided by her support, guidance, and supervision. My deepest gratitude to my wife who supported me throughout and understood that her sacrifice is also required through this journey so that I can achieve my goal. My warm and heartfelt thanks to my parents for their love, support, and motivation during the course of this journey; and lastly, the University of the Witwatersrand, Wits business school and division for providing me with the opportunity and resources to undertake and complete this degree.

The experience I have received through the learning journey has been phenomenal and will forever be grateful, relationships that I have created with amazing individuals through the journey will remain influential throughout my career.

Declaration

I Curtis Kulani Khosa, declare that this research report is my own unaided work. It is submitted in the fulfilment of the requirements for the degree of Master of Business Administration at the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination in this or any other university.

By Curtis Kulani Khosa

15 February 2022

Table of Contents

1 Chapter 1: Introduction and background to the study 11

1.1 Introduction ..... **Error! Bookmark not defined.**

1.2 The purpose and Justification of the study ..... **Error! Bookmark not defined.**

1.3 Problem statement 14

1.4 Research Objectives ..... **Error! Bookmark not defined.**

1.5 Research questions ..... **Error! Bookmark not defined.**

1.6 Definitions. ..... **Error! Bookmark not defined.**

1.6.1 Employee productivity. ..... **Error! Bookmark not defined.**

1.6.2 Trust in robotics. ..... **Error! Bookmark not defined.**

1.6.3 Job security. ..... **Error! Bookmark not defined.**

1.6.4 Ethical practices. ..... **Error! Bookmark not defined.**

1.6.5 Attitude towards Robotics. ..... **Error! Bookmark not defined.**

1.6.6 Employer investment in technology. ..... **Error! Bookmark not defined.**

1.6.7 Research Hypothesis Summary. ..... **Error! Bookmark not defined.**

1.7 Conclusion. 18

2 Chapter 2: Literature Review 20

2.1 Introduction ..... **Error! Bookmark not defined.**

2.2 Research overview ..... **Error! Bookmark not defined.**

2.3 Effects of Robotics and automation on job losses in a Pharmacy .... **Error! Bookmark not defined.**

2.4 Robotics and pharmacy ethical practices ..... **Error! Bookmark not defined.**

2.4.1 Introduction ..... **Error! Bookmark not defined.**

2.4.2 Research overview ..... **Error! Bookmark not defined.**

2.5 Management theories ..... **Error! Bookmark not defined.**

2.5.1 Expectation and confirmation theory ..... **Error! Bookmark not defined.**

2.5.2 Servqual theory ..... **Error! Bookmark not defined.**

2.6 Hypothesis summary ..... **Error! Bookmark not defined.**

2.7 Conclusion ..... **Error! Bookmark not defined.**

3 Chapter 3: Data collection and Analysis ..... **Error! Bookmark not defined.**

3.1 introduction ..... **Error! Bookmark not defined.**

3.2 Data Paradigm ..... **Error! Bookmark not defined.**

3.2.1 Data population ..... **Error! Bookmark not defined.**

3.3 Design of Questionnaire ..... **Error! Bookmark not defined.**

3.4 Data analyses technique ..... **Error! Bookmark not defined.**

3.5 Limitations ..... **Error! Bookmark not defined.**

3.6 Measurement instrument reliability and validity ..... **Error! Bookmark not defined.**

3.7 Validity of the study ..... **Error! Bookmark not defined.**

3.8 Reliability of the study..... **Error! Bookmark not defined.**

3.9 Ethical considerations. ..... **Error! Bookmark not defined.**

3.10 Conclusion. ..... **Error! Bookmark not defined.**

4 Chapter 4: Research strategy, design, Procedure, and methods. .... **Error! Bookmark not defined.**

4.1 Introduction..... **Error! Bookmark not defined.**

4.2 Research strategy. ..... **Error! Bookmark not defined.**

4.3 Research Philosophy ..... **Error! Bookmark not defined.**

4.4 Research design..... **Error! Bookmark not defined.**

4.5 Research methodology ..... **Error! Bookmark not defined.**

4.6 Limitations..... **Error! Bookmark not defined.**

4.7 Data collection..... **Error! Bookmark not defined.**

4.8 Data analysis technique. ..... **Error! Bookmark not defined.**

4.9 Measurements of constructs. ..... **Error! Bookmark not defined.**

5 Chapter 5: Presenting research results and interpretation of findings. 57

5.1 Introduction.....57

5.2 Descriptive statistics.....57

5.3 Measurement instrument assessment. 60

5.4 Testing for validity.....72

5.5 Structural Equation Modelling 93

5.6 Model Fit Assessment 93

5.7 Path Modelling and Hypotheses Testing 97

5.8 Summary of Hypothesis results. 101

5.9 Conclusion. 102

6 Chapter 6 Discussion of findings. 103

6.1 Introduction.....103

6.2 Main Findings 103

6.2.1 Employee productivity and attitude towards robotics. 104

6.2.2 Trust in robots and attitude towards robotics. .... **Error! Bookmark not defined.**

6.2.3 Job security and attitude towards robotics. ..... **Error! Bookmark not defined.**

6.2.4 Ethical practice and attitude towards robotics. ... **Error! Bookmark not defined.**

6.2.5 Employee attitude and willingness to work with robotics. .**Error! Bookmark not defined.**

6.2.6 Employer investment and attitude towards robotics. .....**Error! Bookmark not defined.**

6.3 Summary of findings. 106

6.4 Conclusion. 107

7 CHAPTER 7: CONCLUSION, RECOMMENDATIONS AND CONTRIBUTION. 108

7.1 Introduction.....108

7.2 Conclusion of the main findings. 108

7.3 Managerial implications. 109

7.4 Contributions.....109

7.5 Future research. 111

7.6 Limitations. 112

7.7 Conclusion. 112

List of tables.

Table 1: Differences between Quantitative and Qualitative Method. .....**Error! Bookmark not defined.**

Table 2: Descriptive Statistics 61

Table 3: Reliability statistics (Cronbach Alpha).....66

Table 4: Reliability statistics (Cronbach Alpha).....67

Table 5: Reliability statistics (Cronbach Alpha).....67

Table 6: Reliability statistics (Cronbach Alpha).....68

Table 7: Reliability statistics (Cronbach Alpha).....68

Table 8: Reliability statistics (Cronbach Alpha).....69

Table 9: Reliability statistics (Cronbach Alpha).....70

Table 10: Reliability statistics (Cronbach Alpha).....71

Table 11: Average Variance & Composite Reliability.....72

Table 12: Pattern Matrix.....73

Table 13: Structure Matrix.....76

Table 14: Factor Correlation Matrix.....**Error! Bookmark not defined.**

Table 15: Pattern Matrix.....79

Table 16: Structural Matrix.....83

Table 17: Factor Correlation Matrix.....86

Table 18: Pattern Matrix.....87

Table 19: Structure Matrix.....89

Table 20: Factor Correlation matrix.....91

Table 21: Total variance explained.....92

Table 22: Baseline comparison index.....94

Table 23: KMO and Bartlett's Test (chi square).....95

Table 24: Root mean Square.....96

Table 25: Goodness-of-Fit Index (GFI) 96

Table 26: Hypothesis results and Path coefficients. 98

Table 27: Summary of Hypothesis 107

Chapter 1: Introduction to the study

In this introductory chapter, the background and research problem are presented, along with the research objectives, research questions and significance of the study.

1.1 Background to the study

This research is inspired by the recent COVID-19 pandemic which caused an influx of patients to Doctors, Emergency rooms, Retail pharmacies and Hospitals. The research aims to find strategic ways to improve health care efficiency in retail pharmacies to reduce waiting time, long queues, and error reductions through the introduction of robotics. From experience, it has been noticed that when patients appear at the pharmacy, which is their last stop after waiting at their doctor or hospital, their patience has been eroded and are not willing to waste any more time. They are usually interested in receiving service quickly and leave (Pharmaceutical Technology,2021).

Across the world, the integration of robotics in retail pharmacies has gained traction in recent years, with the aim of improving efficiency and reducing errors in medication dispensing (Kraus, Schiavone, Pluzhnikova, & Invernizzi, 2021). However, the acceptance and willingness of employees to work with these technologies have not been extensively studied, especially in the South African context (Pharmaceutical Technology, 2021).

South Africa faces a unique set of challenges in its healthcare system, including shortages of healthcare professionals, a high burden of disease, and inadequate resources in many areas. The integration of robotics in retail pharmacies could potentially alleviate some of these

challenges. But it is unclear how employees perceive this technology and how it might affect their job satisfaction and job security (Robert, R., Kentish-Barnes, N., Boyer, A, 2020).

The processes in retail pharmacies are still manual and require several staff members to carry out these processes while a patient is waiting. Covid-19 has revealed that the way things are done needs to change and be automated to decrease time spent on long queues, cut costs, and safely deliver appropriate health care services to patients (Pharmaceutical Technology, 2021). Covid-19 has opened new ideas and opportunities which could be explored and turned into bigger business opportunities to enhance the way health care services in retail dispensaries are provided (Watrous, 2020).

When patients go to a health care facility they expect professional human interaction, someone that will show compassion, empathy, and the ability to enhance their quality of life through improving their health (Dekoulis, 2017). Disagreements on what is ethical or not, stem often from different beliefs on human nature and different expectations on what technology may achieve in the future (Lichocki, 2011). Several key topics like personal moral responsibility, accountability, and privacy are emerging in public sector using robotics to provide services that were traditionally rendered by humans who were always accountable for their own actions and have always been expected to work professionally and responsibly to assist patients (Kernaghan, 2014). The goal is to create a robot that follows an ideal ethical principle or set of principles that will guide the robot in decisions it makes about the possible actions it could take. If something goes wrong in the use of these robots in a retail pharmacy setting, who takes the responsibility if something goes wrong, the manufacturer, the programmer, the user, the owner of the pharmacy, or the seller (Kernaghan, 2014). These are some of the limitations in the use of robotics in a setting where ethics, morality and trust play a critical role. Robots cannot assess a situation and make reasonable judgement and take a decision based only on the various variables of that current situation, which humans do with ease all the time. Meaning that robots in this kind of settings can

only be used for autonomous activities like packing stock, rotating stock in terms of old and new, picking off from the shelf for an assistant to dispense to the patient cutting off patient interaction with the robot itself, or any actions that do not really require assessing the current circumstances and making a responsible decision based on those current variables of the situation. Another downside of robots and automation is that service robots are extremely expensive and often most business owners are not willing to invest so much money of the technology (Kernaghan, 2014).

On the other side, robots when deployed properly can work together with humans to enhance efficiency and improve the quality of health care. They are quick and can do an activity repeatedly without fail and provide the opportunity for personnel to concentrate on more clinical activities that require judgement and direct interaction with patients. The use of robots and automation should not be seen as replacing humans or personnel but to enhance the capabilities of personnel by working in unity (Kernaghan, 2014). The use of service robots has enormous potential to cut costs, improve service delivery and reduce workload on personnel.

The incorporation of robotic systems in retail pharmacies have proven to increase staff satisfaction and patient experience. Patients seem to prefer the direct interaction with pharmacy professionals but appear to welcome the new technology of incorporating robotics and automation to improve systems efficiencies within the dispensary and are aware that errors will be minimized throughout the whole process of getting scripts filled in a pharmacy (Gonzalez, 2018).

To investigate this topic, the research involved sending questionnaires to retail pharmacy employees in selected retail pharmacies in South Africa to assess their attitudes and perceptions towards robotics in the workplace. Factors such as training, job security, and perceived impact on job tasks and responsibilities were explored. Additionally, comparisons

were made between employees with different levels of experience and job roles to identify potential differences in willingness to work with robotics.

The findings of this research will have implications for the successful adoption and integration of robotics in retail pharmacies in South Africa, as well as for the broader understanding of employee attitudes towards automation and its impact on the workforce.

1.2 Problem statement

The research problem for this study focused on the lack of understanding about the attitudes and perceptions of employees towards the use of robotics, and how this technology affects their job satisfaction and job security ((Nasution, Rusnandi, Qodariah, Arnita, & Windasari, 2018).

The integration of robotics in retail pharmacies has the potential to improve efficiency, accuracy, and safety in medication dispensing. However, the acceptance and willingness of employees to work with these technologies are crucial for successful adoption and integration (Schwertner, 2017). In South Africa, where the healthcare system faces unique challenges, the integration of robotics in retail pharmacies could potentially alleviate some of these challenges. But it is unknown how employees perceive this technology and how it might affect their job tasks and responsibilities, and overall job satisfaction and security (Assefa, Rorissa & Alemneh, 2021)

Therefore, the research problem was to investigate the attitudes and perceptions of retail pharmacy employees in South Africa towards the integration of robotics in the workplace. This research will help to identify potential barriers and enablers to the adoption of this technology and provide insights into how to effectively manage the transition to a more automated workplace. It will also provide a better understanding of how employees perceive automation and its impact on the workforce, which could have implications beyond the retail pharmacy industry.

1.3 Purpose of study

The purpose of the study is to explore employee perceptions towards working with robotics in selected retail pharmacies in South Africa. This study was to explore how employees perceive the use of robots in the pharmacy industry and how it affects their job roles and work environment. It was also to examine the attitudes of employees towards the adoption of new technology in their workplace and identify any potential barriers or challenges that may arise from the introduction of robotics.

The study's aim was to provide valuable insights into the perceptions and attitudes of employees towards the use of robots in retail pharmacies. These insights are meant to help pharmacy managers and policymakers understand how to implement new technology in a way that is both effective and acceptable to employees. The findings of this study should also be useful in developing strategies to address any concerns or challenges that employees may have with working alongside robots. Overall, the aim of this study is to contribute to the advancement of the pharmacy industry in South Africa by promoting the adoption of new technology in a way that benefits both employees and customers.

1.4 Research Conceptualization

1.4.1 Research objections

The objectives of the study on employee willingness to work with robotics in retail pharmacies in South Africa are as follows:

1. To assess the current level of knowledge and understanding of robotics among retail pharmacy employees in South Africa.
2. To explore the attitudes and perceptions of retail pharmacy employees towards the integration of robotics in the workplace, including perceived benefits and challenges.
3. To investigate the factors that influence employees' willingness to work with robotics.

4. To compare the attitudes and perceptions of employees with different levels of experience and job roles to identify potential differences in willingness to work with robotics.

By achieving these objectives, the study will provide a comprehensive understanding of the attitudes and perceptions of retail pharmacy employees towards robotics in the workplace. This will inform strategies for successful adoption and integration of this technology, as well as identify potential barriers and enablers to its implementation. In addition, comparing the attitudes and perceptions of employees with different levels of experience and job roles should provide insights into how to effectively manage the transition to a more automated workplace.

1.4.2 Research questions

Based on the research objectives, the following research questions will be pursued:

1. What is the current level of knowledge and understanding of robotics among retail pharmacy employees in South Africa?
2. What are the attitudes and perceptions of retail pharmacy employees towards the integration of robotics in the workplace, including perceived benefits and challenges?
3. What factors influence employees' willingness to work with robotics in retail pharmacies?
4. Are there differences in the attitudes and perceptions of employees with different levels of experience and job roles towards the integration of robotics in retail pharmacies?

These research questions will guide the study in investigating the attitudes and perceptions of retail pharmacy employees towards robotics in the workplace, as well as the factors that influence their willingness to work with this technology. The findings will provide insights into how to effectively manage the transition to a more automated workplace and identify potential barriers and enablers to the successful adoption and integration of robotics in retail

pharmacies in South Africa. Also, the comparison of attitudes and perceptions of employees with different levels of experience and job roles will provide insights into how to tailor training and upskilling programs to the specific needs of different employee groups.

1.5 Significance of Study

The study has significant implications for both the healthcare industry and the broader workforce.

Firstly, the integration of robotics in retail pharmacies could potentially alleviate some of the challenges faced by the healthcare system in South Africa, including shortages of healthcare professionals, a high burden of disease, and inadequate resources in many areas. Therefore, understanding the attitudes and perceptions of employees towards this technology is crucial for successful adoption and integration, which could ultimately improve the quality and safety of healthcare delivery.

Secondly, this study can provide insights into how to effectively manage the transition to a more automated workplace, ensuring that employees' job satisfaction and job security are not compromised. This is particularly relevant in South Africa, where the workforce faces high levels of unemployment and job insecurity. By understanding the factors that influence employees' willingness to work with robotics, this study can help inform strategies for upskilling and retraining employees and ensuring that they remain relevant in an increasingly automated workplace.

Thirdly, this study can provide a broader understanding of employee attitudes towards automation and its impact on the workforce. With the increasing use of automation across various industries, it is essential to understand how employees perceive this technology and how it might affect their job tasks and responsibilities, and overall job satisfaction and security. The findings of this study will inform policies and strategies for managing the impact

of automation on the workforce and ensuring that it is deployed in a way that benefits both employers and employees.

Ultimately, the study will contribute to improving the quality and safety of healthcare delivery in South Africa, while also ensuring that employees' job satisfaction and job security are not compromised.

1.6 Delimitations

The study employed a deductive quantitative research methodology. Data was collected from South African retail pharmaceutical industry employees from the ages 18 years and older from different provinces to have a representative sample. The collection of data was done through an anonymous questionnaire with a 5-point Likert scale with measuring items from previous literature, and the survey was housed on Qualtrics. Structural Equation Modelling software, IBM SPSS Amos and SPSS were used for hypothesis testing and data analysis. The questionnaires were sent to participants through email, which were then submitted after completion. Time for data collection and analyses was limited.

1.7 Assumptions

There are five assumptions with regards to this research study. It is assumed that 1) knowledge and understanding of robotics is related to robotic integration in the workplace, 2) Employee attitude and perceptions towards robotics is directly related to robotic integration in the workplace, 3) Willingness to work with robotics is directly related to robotic integration within the workplace, 4) Understanding barriers and enablers to successfully implement robotics is directly related to robotic integration in the workplace, 5) Differences of attitude and perceptions of employees with different levels of experience and

job roles is directly related to robotic integration within the workplace. And finally, 6) All participants will respond truthfully to all the measurement items on the questionnaire.

1.8 Conclusion.

This chapter provided insight into the background of the study which informed the need to conduct the study. It also provided the justifications to conduct the study and different entities that will benefit from the research findings.

1.9 Structure of the report.

The study is subdivided into 6 chapters, and the details of each chapter are as follows:

Chapter1 → This chapter introduces the research and looks at the background of the study, providing useful information on the significance of the study and reasons why the study is necessary.

Chapter 2 → This chapter provides critical literature review of the current study by assessing what other research are saying in relation to the current study. Furthermore, it looks at the current situation in South Africa in terms of employee digital readiness.

Chapter 3 → This section details the project plan, the type of data that will be collected and the methodology that will be used to collect the data. The chapter also gives insight into the type of data analyses that will be used to analyse thet data collected.

Chapter 4 → This chapter details information that will assist in answering the research questions through analysing strategies and procedures used in the research.

Chapter 5 → This section provides the discussion chapter in which the researcher identifies whether the results have answered the research questions and also validate hypothesis questions.

Chapter 6 → This last chapter provides recommendations based on the findings of the study and these recommendations can be used by pharmaceutical companies or any other retail pharmaceutical company.

Chapter 2: Theory and Literature Review

2.1 Introduction

This chapter will provide an overview of the research topic and outline the objectives of the literature review. The review will explore published articles on the research topic and provide a theoretical foundation underpinning the current research topic. This review will articulate what is known and what has been done to solve the problem, and why this research is still necessary. This chapter will also provide an overview of robotics in healthcare in South Africa before highlighting different applicable management theories to the study. This will be followed by a conceptual model which indicates the predictor variables.

2.2 Review of relevant literature

This section provides a review of the literature that is relevant to the current study.

2.2.1 Overview of robotics In Healthcare.

This section will provide an overview of the use of robotics in healthcare, including the benefits and challenges. It will also discuss the current state of robotics adoption in retail pharmacies, both globally and in South Africa

Artificial intelligence and Robotics are a branch of computer science that deals with problem solving with the aid of symbolic programming and has greatly evolved into a science of problem solving with huge applications in business, health care and engineering (Vyas, 2018). Corporate life and the way we do business can no longer resist the technological changes that are happening around us. Every system and financial variables that are calculated need some sort of artificial intelligence to gather data and provide accurate results. To improve processes and efficiencies artificial intelligence provides the solution to enhance productivity and save costs (Dirican, 2015). Digital age, mechatronics, nano technology, and genetics change businesses directly or indirectly. These changes are called robotics and artificial intelligence (Dirican, 2015). Customer expectations evolve with time and businesses need to adapt to these changes and respond accordingly to stay in business. Large amounts of money are being invested to create a system that can function far more efficiently and within a much less time than a human being can (Vyas, 2018). For decades, the pharmacy profession was to ensure that the patient receives the right medication, at the correct dose and should not interact with other medications that the patient is taking. However, the scenario has changed over the past few years. Pharmacies are now employing Robots together with human supervision which has the effect of reducing errors, cutting costs, and drastically improving efficiency, therefore reducing the cost to the end user (Vyas, 2018). Robots can produce over 350 000 medical doses without a single error, this is something humans cannot do (Vyas).

Robotic dispensing leads to personnel savings, an increase in customer satisfaction and an increase in over-the-counter medication sales, even though an initial substantial investment is required to turn the dispensary into an automated robotic environment with some degree of human collaboration (Ruhle, 2009). The increase in sales of over the counter also depends on other factors like advertising and the ability of the personnel to sell the products effectively. In the pharmacy environment, Robotics can never replace the human touch, where emotions, empathy, and the ability to respond effectively to questions asked

by patients and to give them appropriate advice on health care matters and the proper use of drugs.

Change is inevitable for any organisation. Therefore, it is imperative that the full participation and commitment of all employees are essential for the success of the change initiatives. However, it is not easy to get the full support required from employees as they feel that any change in their work environment is a threat to their well-being as a result of they undergo tremendous stress (Dawson, 1994). Employees' reaction to organisational change depends on the extent to which employees cope with the radical change that has been introduced into their work lives. It is now widely accepted that major organisational changes are viewed as one of the critical stressors in the work environment (Dawson, 1994). Immediately employees hear about organisational automation and robotics, they think these changes are being implemented to replace them and take their jobs, which is far from the truth. Resistance to organisational change can result from a substantive change in jobs (skill requirement), reduction in economic security or job displacement, psychological threats (whether perceived or actual), disruption of social arrangements and lowering of status (the redefining of authority relationships) or combination of these factors (Dawson, 1994). The employees who undergo change will experience either one or a combination of these factors that lead to occupational stress.

2.2.2 Attitudes and Perceptions towards Robotics.

This section will review the literature on attitudes and perceptions towards robotics in the workplace, including factors that influence employees' willingness to work with this technology. It will also discuss the potential impact of robotics on job tasks and responsibilities, job satisfaction, and job security.

According to Sheridan (2016) one of the challenges of human-robot interaction is whether robots can generate jobs and enhance a sense of self-worth amongst employees instead of

taking jobs away or diminishing their sense of self-worth. Perceiving robots as a threat could lead to an increase in prejudice towards robotics amongst employees, therefore have negative attitude and perception towards the adoption of robotics. Employees' attitudes towards robotics is generally positive (Savela N, Turja T, Oksanen A, 2018). The negativity of employees' attitudes towards robotics has been argued to be related to the fear of losing one's income for the sake of improving efficiency in the workplace (Berg A, Buffie EF, Zanna LF, 2018).

Employees' general interest in technology and its development is connected to a positive attitude towards robotics and is possible that a positive perceived outcome of one technology could affect the attitude towards other technologies (Latikka R, Turja T, Oksanen A, 2019).

According to Vanman and, Kappas, (2019) employers should provide employees with all the necessary trainings and information on how robotics work so that employees could understand robotics better which has a direct positive effect on employees attitude and willingness to work with robotics. Latikka, Turja T and, Oksanen, (2019) have discovered that perceived positive attitude towards robotics increases productivity and employees execute their tasks effectively to yield maximum results.

2.2.3 Skills and training

This section will review the literature on the skills and training needed for employees to work effectively with robotics in retail pharmacies. It will also discuss the potential barriers and enablers to providing adequate training and upskilling programs.

Scholars and researchers are of the opinion that employees should be equipped with all the information they need to understand robotics, and how they work. The benefit of this is that employees will most likely be willing to work with robotics and will have a positive

attitude towards robotics (He W, Zhang ZJ, Li W, 2021). According to Hancock et al (2020), it is imperative that employees are consistently exposed to different skills and knowledge about the changing working environment and robotics in the workplace. These skills should be designed to be job specific and should bridge the gap that exist between employee attitude and robotics. Skills and programs designed to upskill employees on robotics are essential to allow continuity in the work environment, diminishing resistance from employees (Mishel, Schmitt, & Shierholz, 2013).

The reluctance of organisations to invest in programs and trainings that provide adequate skills to employees on how robotics work and to understand why they are part of their working environment is a major barrier which negatively affects the way employees perceive robotics in the work environment (Andreoni & Roberts, 2020).

2.2.4 Job satisfaction and Security.

This section will review the literature on the potential impact of robotics on employees' job satisfaction and job security. It will also discuss strategies for managing the transition to a more automated workplace and ensuring that employees' job satisfaction and security are not compromised.

Pharmacists are more accepting of new technologies to help with medicine management and allow them to concentrate on patient centred care (Law,2021). Robotics will never replace pharmacists and their knowledge, in a healthcare setting you always need a professional that will be able to show empathy and, emotions and be able to respond appropriately to the needs of the patients (Law, 2021). Most pharmacists expressed confidence in using new technologies and viewed technology as a tool to address current limitations in their practice (Law, 2021). Automation and Robotics are new technologies designed to enhance efficiencies and processes that are carried out in pharmacies and are meant to work together with staff members not to replace them. It is unfortunate that pharmacist assistants feel threatened by the introduction of these new technologies. These new technologies are meant to enhance

patient experience and business offerings to stay competitive and profitable (Law, 2021). Even Doctors have implemented the use of electronic scripts to enhance the process, provide better patient care and to reduce errors and duplication. Widespread job losses are not anticipated at all in pharmacies due to the adoption of 4IR but will only make the job of pharmacists and assistants easier and much more satisfying, some pharmacy support staff may be affected depending on experience and personal abilities. But Job roles and descriptions will change for both pharmacists and qualified pharmacy support staff. More training may be necessary to upskill all staff to ensure a smooth transition to the new normal (Ratanjee-Vanmali et al., 2020).

Pharmacists and assistants in the pharmacy were interviewed, and it was found that they were relieved to have robots in the pharmacy working together with other systems and the dispensary staff, most importantly the robots took over what they viewed as the mundane work of dispensing. Robots provided an opportunity for them to do more research or spend more time with patients (Barret, 2014).

Pharmacists have always been the ones advocating for the adoption of automation and robotics in their Pharmacies, but assistants were not included in the planning process and were less aware of the range of changes robots would introduce. They perceived robots as a novelty, and although they were mildly enthusiastic about their impending arrival, they did not expect that their use would provide significant work benefits to them (Barret, 2014).

The incorporation of robotic systems in retail pharmacies has proven to increase staff satisfaction and patient experience. Patients seem to prefer direct interaction with pharmacy professionals but appear to welcome the new technology of incorporating robotics and automation to improve systems efficiencies within the dispensary and are aware that errors will be minimized throughout the whole process of getting scripts filled in a pharmacy (Gonzalez, 2018).

Transitioning to a more automated environment in the Pharmacy retail space should be done gradually. Educating employees or assistants throughout the whole process is so important so that they could understand and be willing to provide the necessary support (Ratanjee-Vanmali et al., 2020).

2.2.5 Comparison of Attitude and perception.

This section provides a review of literature on the differences in attitudes and perceptions towards robotics among employees with different levels of experience and job roles. It will also discuss strategies for tailoring training and upskilling programs to the specific needs of different employee groups.

Employees with different levels of experience and job roles in an organisation had different attitude and perception towards robotics in the workplace (Henriette, Boughzala, & Feki (2015). Attitude and perception towards robotics amongst the older generation were found to be slightly negative compared to the younger and vibrant employees who are eager to embrace change, new technologies and are willing to experiment with different types of new technology (Henriette, Boughzala, & Feki (2015).

Different job roles in an organisation had a profound effect of influencing how employees perceive robotics therefore affecting their attitude towards new technology. Employees that were lower in rank and doing more autonomous tasks in the organisation had a more negative perception and attitude towards robotics than employees in more senior positions (Ashari et al., 2021).

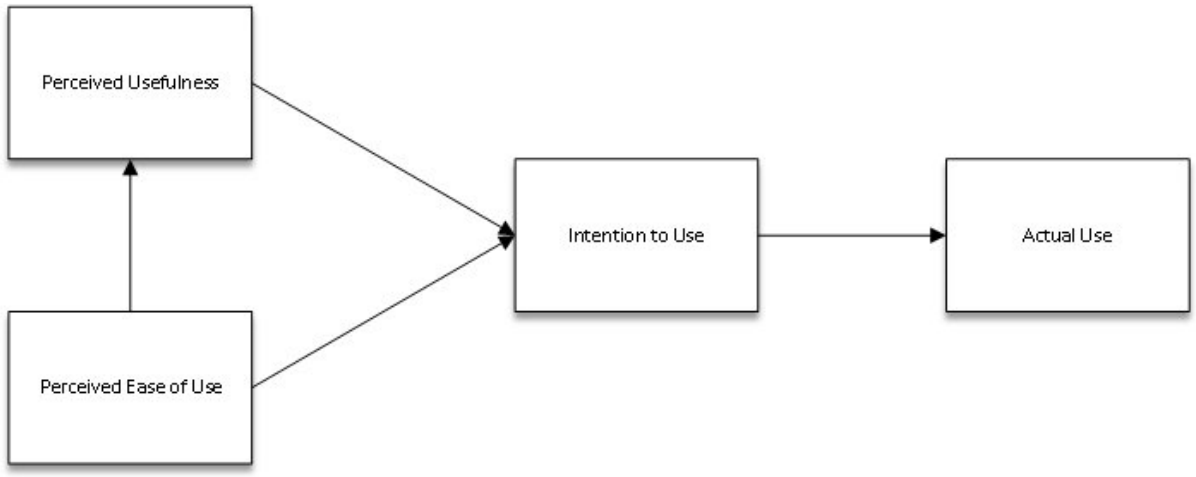
2.3 Management theories informing the study.

The study is informed by three existing management theories, the Theory of Technology Acceptance Model, the Theory of Job Demand Resources, and the Theory of Social Cognitive.

2.3.1 Theory of Technology Acceptance Model (TAM).

The TAM was originally developed by Davis (1989) (Figure 2.1 below) to address the limitations related to the lack of a theoretical model and scales to measure the acceptance of technology (Marikyan, & Papagiannidis, (2022). The goal of TAM was to become the framework for examining a wide range of behaviours of technology users while maintaining a parsimonious approach (Davis, 1989). The primary objective of the TAM was to provide insights onto the processes underpinning the acceptance of technology, in order to predict the behaviour of and provide a theoretical explanation for the successful implementation of technology (Marikyan, & Papagiannidis, (2022).

Figure 2:1 Theory of Technology Acceptance Model (TAM).



Source: Marikyan, D. & Papagiannidis, S (2022).

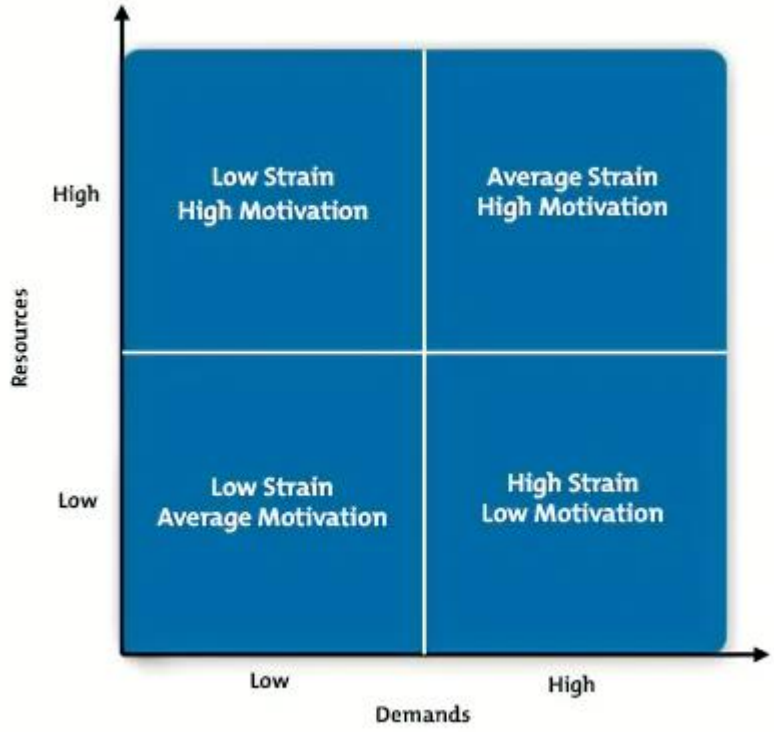
According to Davis, (1989) the model implies that if an application is expected to be easy to use or perceived as useful, the more likely it is that it will be considered useful for the user and the more likely it is that this will stimulate the acceptance of the technology. The Technology Acceptance Model (TAM) is highly relevant to the research study on employee perceptions towards robotics in retail pharmacies in South Africa. The TAM provides a useful theoretical framework for understanding employee perceptions towards robotics in retail pharmacies in South Africa and can help guide the implementation of technology in this context.

The TAM provides a framework for predicting technology adoption by individuals. In the case of retail pharmacies in South Africa, understanding employee perceptions towards robotics is crucial for predicting whether the technology will be adopted. The TAM also identifies two key factors that influence technology adoption - perceived usefulness and perceived ease of use. By using the TAM as a framework, the research study can explore how these factors affect employee perceptions of robotics in retail pharmacies. In addition, the TAM can also provide insights into how to implement technology effectively. By understanding the factors that influence adoption, the research study can make recommendations on how to promote the adoption of robotics in retail pharmacies, such as by emphasising the technology's usefulness or by providing training to improve ease of use.

2.3.2 The Job Demands-Resources Model (JD-R).

The JD-R model was introduced by Demerouti and Bakker**, (**2006) (Figure 2.2 below) as an alternative to existing models for employee well-being. The model states that when job demands are high and job positives are low, burnouts are more common (Bakker and Demerouti, 2007). This implies that when job resources are low and job demands are high, employees are more likely to experience high levels of stress. This model is widely used by managers to analyse and improve employees engagement (Bakker and Demerouti, 2007).

Figure 2:2 The Job Demand-Resource Model (JD-R).



Source: Bakker and Demerouti (2007).

The application of the JD-R model assists managers to identify Job demands, to address job demands, to identify possible job resources/positives and addressing job positives (Bakker and Demerouti, 2007).

In the context of a study on employee perceptions towards robotics in retail pharmacies in South Africa, the JD-R model is highly relevant. The model provides a relevant theoretical framework for understanding the impact of robotics implementation on employee well-being and job performance in retail pharmacies in South Africa. By using the model, the study can identify potential challenges and opportunities associated with the implementation of robotics and develop strategies to promote employee well-being and job performance.

The implementation of robotics in retail pharmacies can introduce new job demands, such as the need for employees to adapt to new technologies and workflows. The JD-R model can help identify these job demands and evaluate their potential impact on employee well-being and job performance. The JD-R model also considers the availability of job resources, such as support from supervisors, training opportunities, and adequate equipment. In the case of robotics in retail pharmacies, the model can help identify the resources that employees need to effectively utilize the technology and perform their jobs well. Additionally, the JD-R model explains how job demands and resources interact to affect employee well-being. By using the model in the study, researchers can identify the potential impact of robotics implementation on employee well-being and develop strategies to mitigate any negative effects.

2.3.3 The Social Cognitive Theory (SCT).

This theory was introduced by Albert Bandura (1989) (figure 2.3 below), It provides a framework for understanding how people actively shape or are shaped by their environment, it details the processes of observational learning and modelling, and the

influence of self-efficacy on the production of behaviour (Schunk, 2012). The major component of the theory is observational learning, the process of learning desirable or undesirable behaviour by observing others, and then reproducing learned behaviours to maximize rewards (Bandura, 1986).

SCT is widely applied in different fields and sectors to influence people's behaviour to achieve and maximize a set of goals to produce results. Further development in social cognitive theory posits that learning will most likely occur if there is a close identification between the observer and the model and if the observer also has a good deal of self-efficacy. Self- efficacy beliefs function as an important set of proximal determinants of human motivation, affect, and action which operate on action through motivational, cognitive, and affective intervening processes (Schunk, 2012).

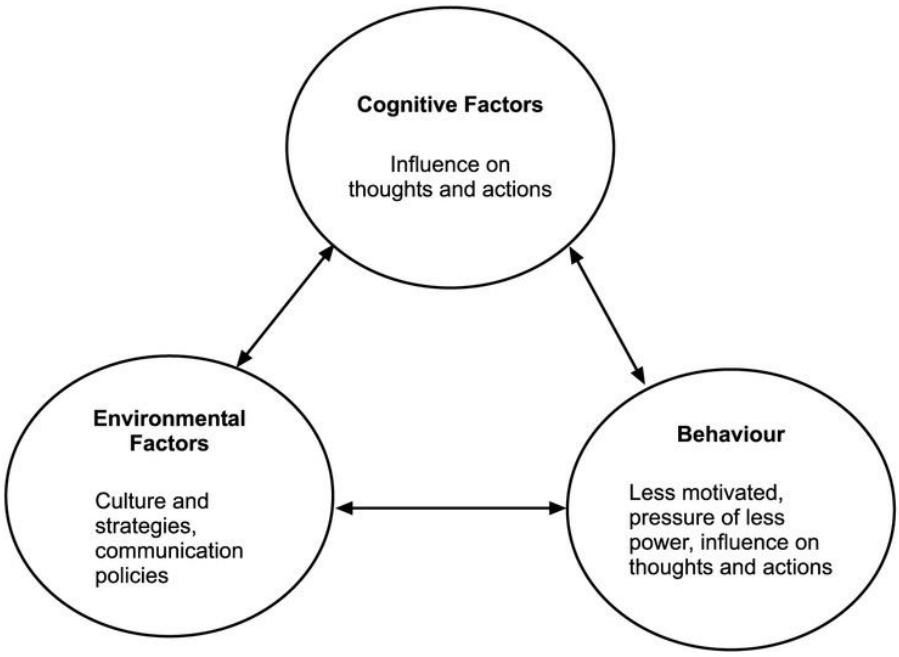
Identification allows the observer to feel a one-to-one connection with the individual being imitated and will be more likely to achieve those imitations if the observer feels that they can follow through with the imitated action (Bandura, 1986).

In the context of this study, the SCT is highly relevant. The SCT provides a relevant theoretical framework for understanding how employee perceptions towards robotics in retail pharmacies in South Africa are shaped by their learning experiences, beliefs and expectations, and self-regulation strategies. By using the SCT, the study can provide insights into how to promote the successful adoption and integration of robotics in this context.

The SCT emphasizes the importance of observational learning, where individuals learn by observing others. In the case of robotics in retail pharmacies, the study can explore how employees learn from observing others who are already using the technology, and how this influences their perceptions of the technology. The SCT also highlights the importance of self-efficacy, which refers to an individual's belief in their ability to perform a task successfully. By using the SCT, the study can examine how employee self-efficacy affects their perceptions

towards robotics in retail pharmacies, and how this in turn affects their willingness to adopt the technology. The SCT emphasizes the role of outcome expectations, which refers to an individual's belief about the consequences of their actions. By using the SCT, the study can explore how employee outcome expectations influence their perceptions of robotics in retail pharmacies, such as whether they believe the technology will lead to better job performance or greater job satisfaction. Finally, the SCT highlights the importance of self-regulation, which refers to an individual's ability to monitor and adjust their behaviour. By using the SCT, the study can examine how employees can self-regulate their use of robotics in retail pharmacies, and how this affects their perceptions of the technology over time.

Figure 2:3 The Social Cognitive Theory (SCT).

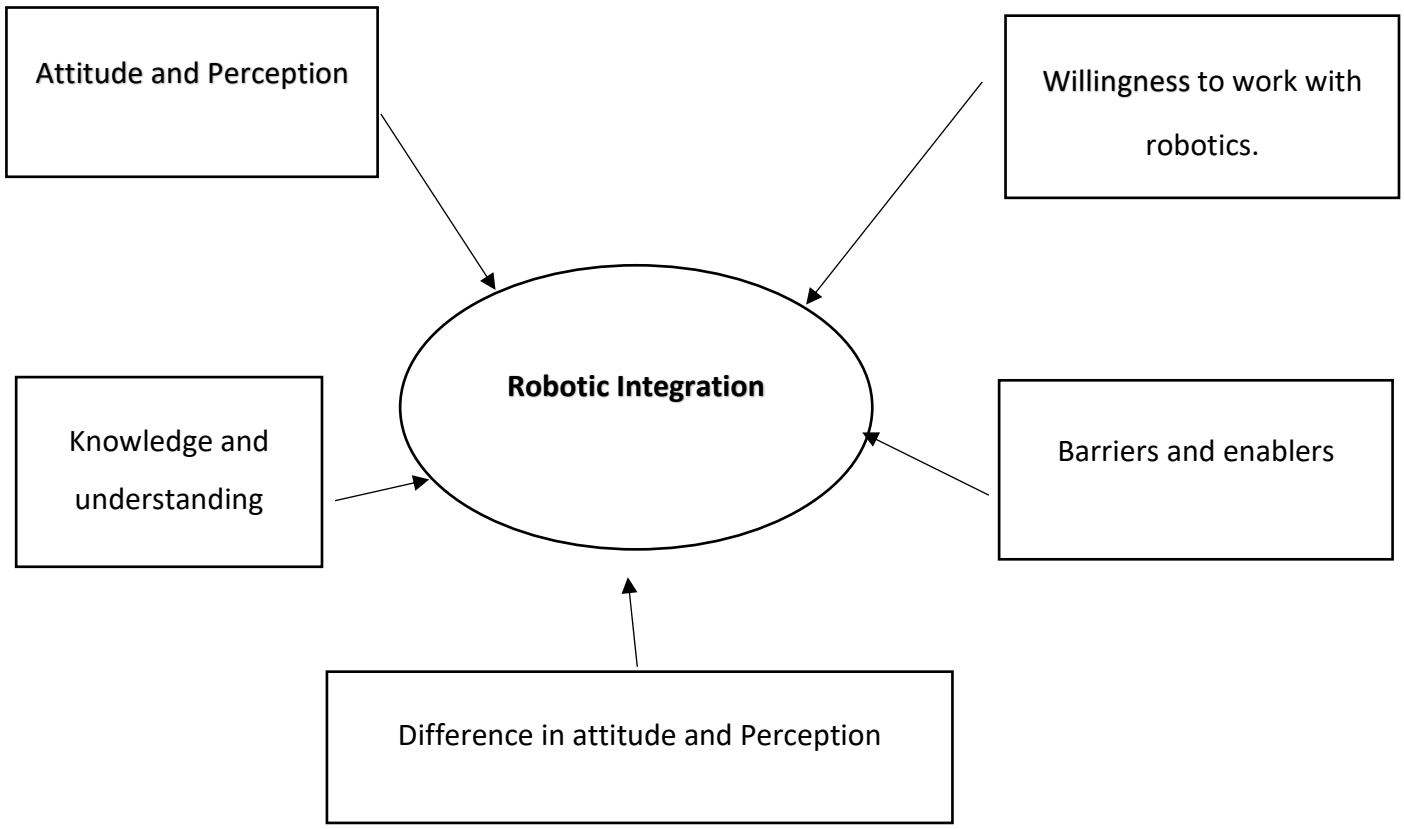


Source: Bandura (1986).

2.4 Conceptual Model.

The three theoretical frameworks, TAM, JD-R and the SCT Theory that inform this study have been used to identify the study variable that are used to develop the conceptual model (Figure 2.4). The study variables are the five predictor variables: 1) Knowledge and understanding of robotics, 2) Attitude and perceptions towards robotic integration, 3) Willingness to work with robotics, and 4) Difference in attitudes and perception amongst different employee groups towards robotic integration.

Figure 2: 4 The Conceptual model.



Source: Developed by researcher (2023).

The study aims to examine the relationship between the four predictor variables and the outcome variable. The researcher proposes that each of the predictor variables has a positive influence on the robotic integration success. This would suggest that when employees are provided with adequate knowledge and understanding of robotics, it would have a positive integration of robotics in retail pharmacies in South Africa. Employees that have a positive attitude and perception of robotics would easily allow for a smooth robotic integration, and therefore have a positive effect and those that are more willing to work with robotics would have a positive effect on robotic integration. Lastly when barriers and enablers are known this will have a positive effect on robotic integration in retail pharmacies in South Africa.

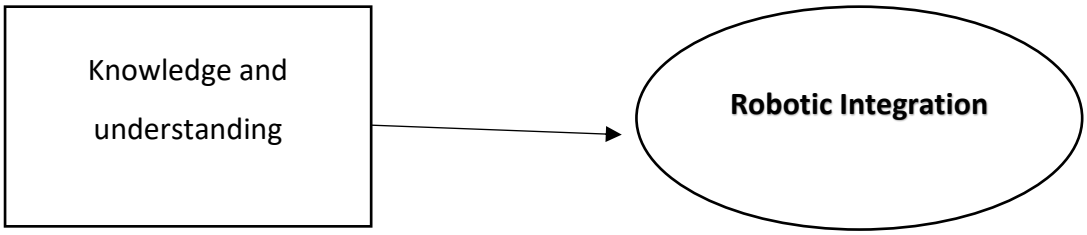
2.5 Hypothesis Development.

By using the literature and theoretical frameworks, this section aims to develop hypothesis of the current study.

2.5.1. Knowledge and understanding of robotics and robotic integration (Hypothesis 1).

Robotic integration uses robotic systems in strategic areas to perform automated tasks, this involves bringing together systems science aiming at developing and integrating the necessary capabilities for making systems work in real applications (Gazi, V. et al. 2001). Such technological systems require employees to work together with robotics to achieve the necessary goals, this has two elements to it which includes the knowledge and understanding of robotics towards interacting with technology ((Orebäck, A. & Christensen, H. I., 2003).

Figure 2: 5 Knowledge and understanding of robotics have a positive effect on robotic integration.



Source: Developed by researcher (2023).

Naimark (1990) examined the success of robotic integration and how this is influenced by employee understanding and their knowledge on robotics within different sectors. This study has concluded that when employees are provided with the knowledge and understanding of robotics, organisations are able to implement robotics effectively and successfully within the organisation (Naimark,1990). The framework that informs this hypothesis is the Theory of Social Cognitive which has shown a direct relationship between employee knowledge and understanding of robotics and the successful integration of robotics in an organisation (Bandura, 1986).

H1o: Employee knowledge and understanding of robotics has no positive impact on robotic integration.

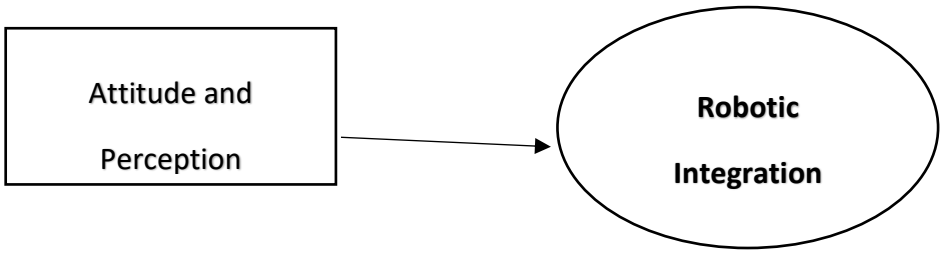
$H1_1$: Employee knowledge and understanding of robotics has a positive impact on robotic integration.

2.5.2. Attitudes of using robotics and robotic integration (Hypothesis 2).

Employees attitudes towards robotics is generally positive (Savela N, Turja T, Oksanen A, 2018). The negativity of employees attitude towards robotics has been argued to be related to the fear of losing one's income for the sake of improving efficiency in the workplace (Berg

A, Buffie EF, Zanna LF, 2018). Organisations gain insights into how employees typically view robotic changes to proactively react to employee concerns by gradually implementing innovative strategy (Van Looy, 2022).

Figure 2: 6 Attitudes and perception towards robotic integration (Hypothesis 2).



Source: Developed by the researcher (2023).

Based on the literature it is noted that attitudes and perceptions on robotics influences the integration of robotics in the workplace, this is supported by a study done by Sheridan, (2016) where it was found that employees that viewed robotics as a threat were likely not accept robotics as part of the working environment. The framework that informs this hypothesis is the Social Cognitive Theory, which shows a direct relationship between employee attitude towards robotics and robotic adoption in the workplace (Sheridan, 2016).

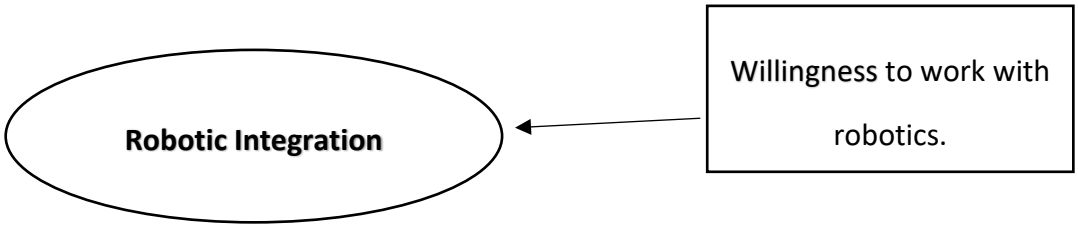
H1o: Attitude and perception towards using technology has no positive impact on robotic integration.

$H1_1$: Attitude and perception towards using technology has a positive impact on robotic integration.

2.5.3 Willingness to work with Robotics and robotic integration (Hypothesis 3).

Organizations now face a new challenge of encouraging their employees to work alongside robotics, a study done by Robert, (2018) results showed that human–robot similarity promoted trust in a robot, which led to willingness to work with robots and ultimately willingness to work with a robot over a human co-worker. According to Robert, (2018) similarity between humans and robots is an important facilitator of positive attitudes toward robots. The more an individual believes that a robot is like them, the more they like and prefer to interact with them.

Figure 2: 7 Willingness to work with robotics and robotic integration.



Source: Developed by researcher (2023).

Other studies that were done have found that employees that trusted robots more tend to be more willing to work with robotics and welcomed robotic integration in the workplace, and literature that is available supports the above statement (Robert,2018). The framework that informs this hypothesis is the Theory of Technology Acceptance Model which has shown a direct relationship between willingness to work with robotics and robotic integration in the workplace.

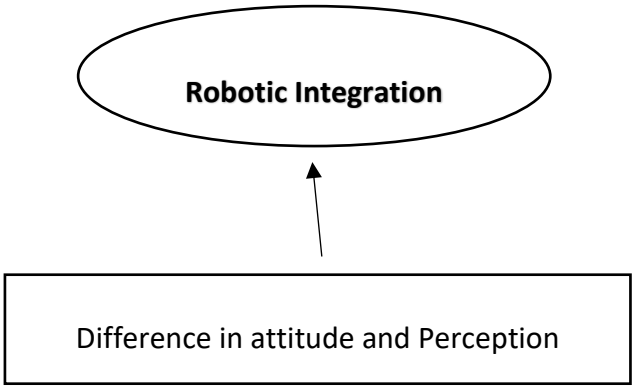
H1o: Willingness to work with robotics has no direct impact on robotic integration.

$H1_1$: Willingness to work with robotics has a positive impact on robotic integration.

2.5.4 Difference in attitude and perception.

Different job roles in an organisation had a profound effect of influencing how employees perceive robotics therefore affecting their attitude towards new technology. Employees that were lower down in ranking and doing more autonomous tasks in the organisation had a more negative perception and attitude towards robotics than employees on more senior positions (Ashari et al., 2021). It is worth noting that younger employees are more likely to have a positive attitude and perception on robotic adoption in an organization than the older employees (Kuhnert, 2017). An individuals presence and absence of technical background also plays a crucial role where an employee would be more open to work with technology and be willing to explore different changes that occur within the technology industry (Kuhnert, 2017).

Figure 2: 8 Differences between attitudes and perceptions in employees with different roles and experience.



Source: Developed by the researcher (2023).

A study done by Kuhnert, (2017) has found that employee's attitude and perception with different levels of experience, and roles differed towards the integration of robotics, and the framework that informs this Hypothesis is the Social Cognitive Theory which shows that differences in attitude and perception does exist in employees with different roles and experience towards the integration of robotics.

H1o: Differences in attitude and perception have no impact on robotic integration.

$H1_1$: Differences in attitude and perception have a direct impact on integration of robotics.

2.6 Conclusion.

This chapter discussed the literature available on robotic integration in retail pharmacies in south Africa, furthermore the chapter provided insight on factors influencing the integration of robotics. Management theories were further introduced to support the research questions of the study, integrating them with the research objectives to formulate Hypothesis. The following chapter discusses in detail the methodology adopted in the data collection and analysis of this current study.

Chapter 3: Research Design and Methodology.

3.1 Introduction.

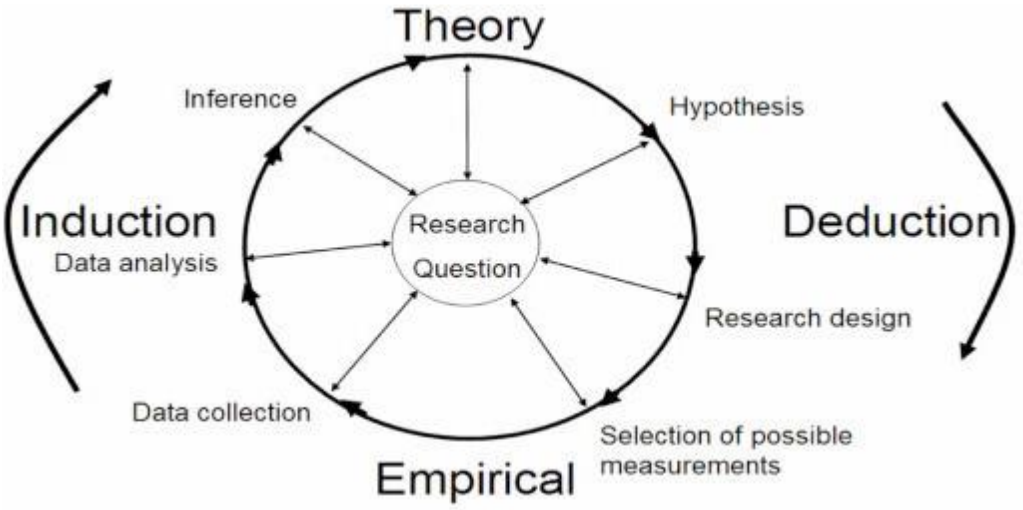
In the previous chapter literature relevant to the current study was reviewed. The method of data collection, the type of data analysis that was used, what data was collected, and the philosophy that was adopted for the study.

3.2 Research approach.

When conducting research, there are two approaches which could be adopted, a deductive or an inductive research approach (Malhotra & Birks, 2012). Deductive research refers to the empirical investigation of conceptual and theoretical structures. This form of research moves from the general to the particular, since it tests hypotheses derived from theory (Wellman, Kruger & Mitchell, 2005). On the contrary, inductive research develops theory through the observation of empirical reality. Thus, inductive research moves from the particular to the general, as general inferences are drawn from reality (Wellman et al., 2005). Furthermore, studies that take an inductive research approach follow little or no existing theoretical framework (Malhotra & Birks, 2012). The figure 2 below represents the difference in following a deductive versus inductive research process. An inductive research approach starts with empirical research, from which theoretical inductions are made. It

consists of the formulation of theory, based on the findings of the data collection. In contrast to an inductive approach, a deductive research approach focuses on testing existing theory through empirical research. The present study adopted a deductive approach in which hypotheses that have been drawn from previous literature, are tested.

Figure 3: 1 Deductive vs Inductive research



Source: Costa, Soares, and de Sousa (2017)

3.3 Research method

An approach used for discovering and understanding individuals or groups attributed to human or social problem is known as qualitative research (Creswell & Creswell, 2011). Data is collected within the participants setting where the data is analysed inductively building on

a particular information to the overall theme and the researcher interpreting the meaning of the data (Creswell & Creswell, 2018).

The approach used for testing the objective concepts by investigating the relationship among variables is known as quantitative research. This involves measuring variables on instruments for the numerical data to be analysed using statistical procedures (Creswell & Creswell, 2018).

This current study is quantitative in nature, previously published theory was used to support data collected from respondents that were surveyed. The numerical data was analysed using statistical methods. Furthermore, this study was aimed at testing relationships between the dependent and independent variables, to identify any causal relationships.

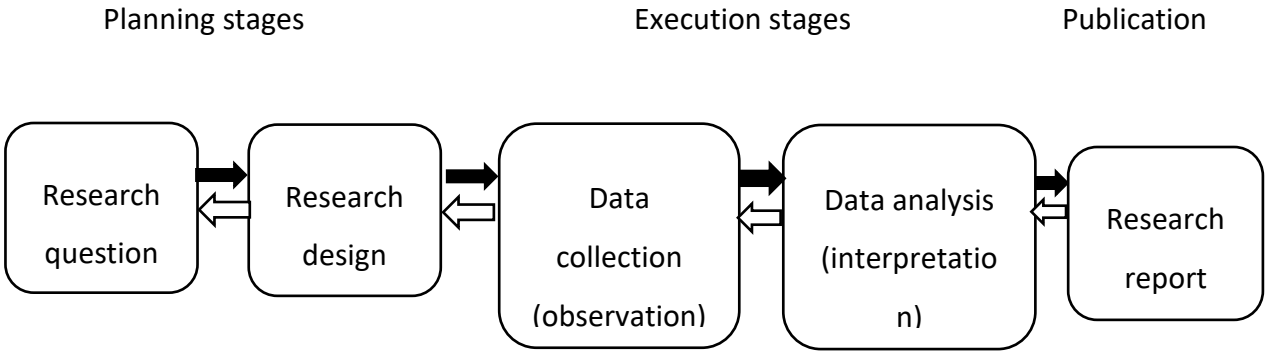
3.4 Research philosophy.

Research philosophy refers to the source, development, and nature of knowledge (Žukauskas). Žukauskas, Vveinhardt and Andriukaitienė (2017) assert that data used in research needs to be reliable and authentic through having several credible reference points and being accurate. There are several research philosophies, such as the Phenomenological paradigm which utilises the feelings, views, and experiences of the respondents. The personal accounts of the respondents are considered, making this qualitative in nature (Saunders et al., 2015). The Positivist Paradigm is the second research philosophy unpacked in this narrative. It is quantitative in nature and uses numerical data to create a view during research and displays this information by using mathematical charts and graphs (Saunders et al., 2015). Next, the Interpretivist Paradigm utilises the subjective accounts and experiences of the participants to gauge their reactions to an event or experience (Saunders et al., 2015). The Positivist paradigm was chosen for the current study, as the retention strategies were tested under a questionnaire designed to numerically describe the highlights and lowlights in their experience of the organisation (Saunders et al., 2015).

3.5 Research design.

The research design is a blueprint that details how the research study will be executed to address the research questions (Durrheim, 2006), Figure 3:2. The research process is a sequential process that includes the planning stage, execution stage and the publication stage (Durrheim, 2006).

Figure 3: 2 The research process



Source (Durrheim, 2006).

The research process starts with formulating the research questions followed by the research design which is the bridge between the research question and the execution and publication stage (Durrheim, 2006) (Figure 3: 2). Once the research design has been developed, the researcher is ready for data collection followed by the data analysis and finally publication (Durrheim, 2006). However, Durrheim (2006) also argues that the research process does not only mover from the research question to publication, but rather that there are instances

where during the research process it is necessary to go backwards in the research process ultimately leading to an amended research design and research questions (Durrheim, 2006).

Social research often asks the following research questions, “1) What is going on (descriptive research)? and 2) Why is it going on (explanatory research)?” (de Vaus, 2001, p. 1). Muaz (2013) classifies research design into five categories, 1) Descriptive (e.g., case-studies and surveys/questionnaires), 2) Experimental (e.g., field experiments and controlled experiments), 3) Correlational (e.g., observational studies), 4) Review (e.g., systematic reviews and 5) Meta-analysis.

This present study was descriptive because of the “What is going on” type of research questions and the use of questionnaires to answer these research questions.

3.6 Rationale for Quantitative study.

The use of a quantitative research method is generally acknowledged to be the most used in the business and social sciences research methodology (Pandey, 2015).

3.7 Sampling Design.

The sampling strategy provides the framework for the research in terms of the data collection, that is who the data will be harvested from and what type of data will be harvested (Pandey, 2015).

3.7.1 Target population.

Data population refers to the universe of units from which the sample is selected (Bryman & Bell, 2007). The unit of measure does not necessarily refer to a sample of human beings, but could also refer to a sample of cities, nations, region, firms and so on. It is generally agreed

that sampling is a central element of research. It refers to a subset of the population (Malhotra & Birks, 2012). For purposes of this study, the population of interest is Basic and Post basic qualified pharmacist assistants that are registered under the Pharmacy Act of South Africa, qualified Pharmacists who hold a bachelor's degree in pharmacy and are registered as such under the Pharmacy Act of South Africa. This population group gave accurate objective professional feedback regarding the current study since it is a study that deals with their daily activities, and they understand what the study entails. 300 of these professionals were targeted through online surveys to get a well-represented sample.

3.7.2 Sample size.

It is common knowledge that a large sample is more likely to yield more reliable data, which can then be analysed to produce more accurate findings. For this study 300 professionals will be surveyed across different pharmacy business units to decrease sampling errors (Bryman & Bell, 2003). According to Bujang and Adnan (2016), sample size determination is crucial and challenging in planning a statistical study. Grotzinger et al., (2019) maintain that in Structural Equation Modelling, a sample size of less than 100 would be considered small, between 100 and 200 is considered medium and over 200 is considered large. Having the right sample size is crucial in finding a statistically significant result. The larger the sample size, the more reliable the results. Sample size refers to the number of respondents that will be surveyed and participate in generating the data required for the study (Lamb, Hair, McDaniel, Boshoff, Terblanche, Elliott & Klopper, 2013). Having over 15 000 pharmacy support personnel in South Africa, the sample size will yield more accurate result. It was determined using a number of factors, such as, time, costs, accessibility, confidence level and confidence interval, and the most important factor that determines the sample size is cost and time (Bryman & Bell, 2003).

A 97% confidence level was allowed using 3% confidence interval to minimise sampling errors and unreliable data leading to misleading conclusions.

3.7.3 Sampling strategy.

There are two approaches to selecting a sample, namely: probability and non-probability sampling methods. Probability sampling refers to methods where a sample has been selected using random selection for each unit to have an equal chance of being selected (Bryman & Bell, 2007). The goal of probability sampling is to minimise the possible sampling errors and strengthen the validity of the results more than non-probability sampling, however this method is often more costly and time-consuming (Bryman & Bell, 2007). Sampling error refers to any type of bias that is attributed to mistakes made, in either the selection process, or in determining the sample size to ensure a representative sample (Lamb et al., 2000). It also refers to any bias that may come from the researcher during the process of sampling.

For this study, a nonprobability, random sampling method was used (Malhotra & Birks, 2012). The results are representative of the population, and were obtained using a random sampling method, which allows the researcher to utilise a process or system in the selection of subjects. Another advantage of this sampling method is the assurance that the population will be evenly sampled. (Hair et al, 2009). The subject sampling of this study took the approach of targeting major retail South African dispensary staff that have been mentioned earlier on, which represents a reliable sampling of over 1000 subjects, which is a good representation of the population of the current study, and the representativeness of the sample is guaranteed. The database was carefully filtered prior to survey distribution to confirm that the respondents' profile matched those of the identified subjects mentioned earlier on and links to online surveys were emailed to the selected subjects.

There are five sampling methods encompassed in probability sampling; these are:

• Simple Random Sampling: The sample is chosen at random with no prior input or bias from the researcher.

• Systematic Random Sampling: This method uses a specific, pre-determined method for randomising the sample. For example, the respondents will be numbered, and a number will be chosen to choose that corresponding respondent. A number will be chosen again, and this may represent the age group of the next respondent.

• Cluster Random Sampling: The populous is divided into clusters which are usually geographic to determine a view of feedback from that specified group or cluster of respondents

. • Stratified Random Sampling: This sampling technique dictates that the population is categorised using specified criterion such as gender, race. The final sample of respondents are then chosen from this layered and diverse group.

• Mixed/Multi-Stage Random Sampling: This technique uses two or more of the methods mentioned above to gauge an unbiased result. It ensures that there are no open ends to discredit the authenticity of the randomness in the sampling (Etikan and Bala, 2017).

For the purpose of this study, a simple random sampling method was used where there was no prior or input from the researcher therefore no bias is observed during the sampling procedure.

3.8 Data Collection.

3.8.1. Data Paradigm

The expected pattern of data should reflect that both Pharmacist and assistants will embrace the adoption of robotics and automation in the dispensary and will be willing to work together with this new technology that will enhance the efficiencies in the dispensary

and allow both pharmacists and assistants to concentrate on duties that require more human interaction, judgement, and sound ethical decision-making process.

3.8.2 Method of data Collection.

The method of data collection that will be adopted is going to be online survey questionnaires that will be sent to the participants through online connectivity. This type of data collection in research has gained popularity in recent years since it saves time, it is flexible, reduces costs and allows the researcher to access many participants in a very short time (Duffy, Smith, Terhanian and Brener,2005). This method also allows the data to be collected without the researcher being present eliminating biasness by the interviewer time (Duffy, Smith, Terhanian and Brener,2005). On the other side, online surveys have limitations, the researcher will only be able to reach participants that are online or have access to the internet. And another disadvantage is the low response rate of participants that will be identified to participate in the survey. The third disadvantage of online surveys is that participant respond differently in that they are more likely to choose mid-points or 'I don't know' answers which will then segue the data which then affects the overall results (Terhanian, 2003). Due to costs and time saving this study will use the online surveys to collect data from participants, and everything will be done to maximise participants response and participation throughout the survey.

3.8.3 Questionnaire Design.

The questionnaire was designed using an online software tool to make it easier to access the targeted participants, and to save time and costs. The questionnaire consists of 40 statements that are easy and quick to respond to and grouped into three sections. This encourages participation from the participants, and questionnaire will be sent to the participants electronically for ease of facilitation and record keeping, and lastly a covering letter will also be sent to motivate participants to fully participate and provide feedback

according to the questionnaire. The first section of the questionnaire requires few personal information to analyse trends and behaviour of different participants in relation to their characteristics. The second section comprises of statements that addresses perceptions of technology and innovation within a professional working environment. The final section looks at how participants feel about working with new technology and automation within the same space, and the future of the pharmacy profession in relation to technology and automation. The questionnaire was designed to suit the current study and unpack issues that poses a threat to job security of employees in most professions. An example of the kind of statements that will be addressed are included in Appendix A.

3.8.4. Measurement scales.

As explained above, the measurement instrument that will be used for this study is questionnaires that have been designed to suit the current study. In terms of scales the 7-point Likert scale will be used, and these are the most common scales used to test perception, behaviour, and attitudes, another reason these scales are most common because they allow wide range of answers that allow the participants to respond accurately providing more data to be analysed (Miller & Brewer, 2003). The limitations of the Likert scale in relation to the current study is that it is difficult to treat neutral opinions as either agree or disagree, and participants tend to agree with the statements showed, and this is called acquiescence bias and lastly two people can get the same value on the Likert scale but having chosen different options. Relationship Quality scale was adapted from Fernandes and Pinto (2019). The first part of the questionnaire focused on demographic variables and the second part employed the Likert 48 (agreement) scale for questions based on the

research model. A cover letter, detailed instructions to the participants for completing the questionnaire.

3.8.5. Data analyses technique

The technique that is used for this study is structural equation modelling (SEM), multivariate statistical tool which determines priori specified hypothesis between observed and latent variables (Mueller & Hancock, 2016). This technique mainly uses multiple regression and factor analyses which is used to determine the relationship between measured variable and tested hypothesis. The collected data is coded on a Microsoft excel sheet and then SPSS (Statistical packages for Social Sciences) is then used to generate different descriptive statistical variables like the mean, standard deviation, fit, etc which are analysed and a conclusion in relation to the hypothesis is then established.

3.8.6. Measurement instrument reliability and validity

The following section provides a summary overview of instrument for validity and reliability in the context of this study, these variables are important because the results must be accurate, dependable, and realistic.

According to Heale & Twycross, (2015) is classified into three, content, construct, and criterion validities. Content validity investigates whether the study tool has all the content necessary to measure the study variables. The construct validity investigates whether there are any inferences that can be made from the study results (Heale & Twycross, 2015). To verify that a research tool has construct validity, it needs to be homogenous (it must measure one construct), there should be convergence (the tool is able to measure the same variables as other similar tools) and there must be theory of evidence (meaning that the observation aligns with the theoretical proposition of the study tool (Heale & Twycross, 2015).

The last category is the criterion validity which compares the research tool to other tools published in literature (Heale & Twycross, 2015), and it can be measured through convergent, Divergent and Predictive validity. When criterion validity is measured through convergent validity it means the tool is aligned with other tools that measure the same constructs, Divergent validity means the tool is not aligned with tools that measure opposing constructs, and lastly Predictive validity means that the tool has high correlation to future respondent behaviour (Heale & Twycross, 2015).

3.8.6.1. Convergent validity

This indicates the validity of the measurement instrument by using the results to indicate high correspondence between scores from two or more different measures of the same construct (Schwab, 2006). The item loadings should be greater than 0.5 to indicate acceptable validity (Schwab, 2006).

3.8.6.2. Confirmatory factor analyses

This test is critical in that it measures the validity of the research instrument, which is the degree at which the research instrument measures what it intends to measure, and this is the validity of the research instrument (Hair et al., 2000). For each of the scales, a confirmatory analysis was conducted, which is a technique used to confirm a priori hypotheses of the relationship between measurement items and their respective factors (Netemeyer, Bearden & Sharma, 2003). This variable is measured to ensure that the relationships between the observed variables and the latent variables met the

one-dimensionality assumption, and secondly, to check the standardised factor loadings. The standardised factor loading values should be more than 0.6 to show strong association.

3.8.6.3. Discriminant validity

This measure indicates the heterogeneity between different constructs, which provides clarity on whether the measurement scores of a construct are unique (Schwab, 2006). To

achieve high discriminant validity, values of less than 0.8 are ideal, thus the constructs will be distinct (O'Rourke & Hatcher, 2013).

3.8.7. Validity of the study

In this section we will discuss the validity of the study in more detail and look at what extent to which the results and conclusion of the study can be applied.

3.8.7.1. External validity of the study

The study revolves around a specific targeted population, and the sample size represents the target population very well, so it is expected that the conclusion can be generalised but only to the targeted population and to specifically the Pharmacy profession (Onwuegbuzie, 2000). And the expected outcome will indicate a cause-effect relationship between two variables in question. For this study, I can conclude that it is externally valid and furthermore the independent variable (explained in detail below) applied is within the Dispensary and results or data is collected within the dispensary case setting (Onwuegbuzie, 2000).

3.8.7.2. Internal validity of the study.

In preparing for the study, everything was done in great length to get the results or outcomes that are meaningful and trustworthy. The results of the study are due to the independent variable in the study, nothing was manipulated or introduced that was not part of the study (Onwuegbuzie, 2000). The sample taken from the targeted population was randomly selected so that causes to effects can be assigned unambiguously (Onwuegbuzie, 2000).

Heale & Twycross, 2015 concluded that reliability means that the tool should give approximately the same responses every time the respondent uses it, and this is measured through homogeneity, stability (meaning that the responses will be approximately the same

every time the respondent uses the tool) and equivalence meaning consistency amongst the responses from multiple responders.

The measuring items in the questionnaire were validated during the pilot study by the Pearson product moment correlation technique in SPSS program and the research tool will be declared valid because it had a significance of < 0.05 (Santoso & Latihan, 2010). The reliability was performed on SPSS using Cronbach's alpha and the research tool was 47 declared reliable because it had a Cronbach alpha value above 0.6 (Santoso & Latihan, 2010).

3.8.8. Reliability of the study

Reliability refers to the extent in which the scale produces consistent results when it is used several times. (Hair et al., 2009). The sample that is used is randomly selected from the targeted population and the sample sufficiently represent the population well (Lamb, Hair, McDaniel, Boshoff, Terblanche, Elliott & Klopper, 2013). Simple random sampling is used where the sample is chosen randomly with no prior input or bias from the researcher to maximise credibility, integrity, and authenticity (Etikan and Bala, 2017).

3.8.8.1. Cronbach alpha coefficient

Cronbach alpha coefficient is used to test reliability of the measurement instrument in the questionnaire so that we can know that the results are dependable and realistic. Nunnally (1978) has stated that a Cronbach's Alpha Coefficient is accepted when it lies between 0.5 and 0.6.

3.8.8.2. Chi-square

This is a statistical test used to compare observed results with expected results, the main purpose of this test is to determine if the difference between the expected results and the observed results is due to the relationship between the two variables in the study. Therefore, Chi-square is used to evaluate the overall model fit and to assess the magnitude

of discrepancy between the sample and fitted covariances matrices (Hu & Bentley, 1999) For this study a Chi-square of < 3 indicates a good model fit and the Chi-square for this study will work well since the sample size is not very big, and one of the limitations of this test is that it is sensitive to a large sample and will often reject the model with large sample size (Bentler & Bonnet, 1980; Joreskog & Sorbon, 1993).

3.8.8.3. Composite reliability

The reliability of the measurement instrument is evaluated by taking the results and determining the composite reliability index. For this index to be reliable, the result should be greater than 0.7, and it is calculated using a complicated formula (Hair et al., 2009). And is calculated by the following formula, $CR\eta = (\Sigma\gamma yi)2 / [(\Sigma\gamma yi)2 + \Sigma\varepsilon i]$.

3.8.8.4. Average value extracted.

Average value extracted also test the reliability of the measurement instrument and it reflects the total variance in the indicators, as accounted for by the latent variable. For the purposes of this study an Average value extracted greater than 0.4 of the constructs is considered reliable (Fraering & Minor, 2006). The formula below is used to calculate the Average value extracted. $V\eta=\Sigma\lambda yi2/(\Sigma\lambda yi2+\Sigma\varepsilon i)$.

3.8.9. Pilot Study.

Literature and scholars encourage pilot testing of the questionnaire that would be used for the study to ensure its efficiency (Bryman & Bell, 2007; Adam, Khan, & Raeside, 2014). Ten respondents were used on the pilot study who provided valuable insights about the questionnaire, which is sufficient sample size for pilot studies s (Hill, 1998; Isaac & Michael, 1995). The valuable insights resulted in some amendments of the measurement items, and thereafter the study was conducted.

3.9. Data analysis technique.

The analysis method suitable for this study was Structural Equation Modelling (SEM). This represents a theory-driven data analytical approach for the evaluation of a priori specified hypotheses about causal relations among measured and/or latent variables (Mueller & Hancock, 2016). This technique uses the combination of factor analysis and multiple regression analysis and was used to analyse the structural relationship between measured variables and tested hypotheses. Firstly, the collected data was coded in a Microsoft Excel spread sheet before analysis. To gain comprehension of the attributes of each variable, descriptive statistics analysis was utilized which is depicted by the mean and standard deviation of each factor. Statistical Packages for the Social Sciences (SPSS) was used to analyse the data. This also allows for the assessment of fit between (typically) correlational data, obtained from experimental or non-experimental research. In addition, a Confirmatory Factor Analysis (CFA) and Path Modelling was performed for structural equation model (SEM). The alternative analysis method for this study was multiple regression analysis using SPSS.

3.10. Limitations.

This study has done everything to its outmost limits to establish the effects robotics and automation will have on dispensary personnel and other factors within the dispensary business unit. The first obvious limitation is that the study was only done within only the dispensary business unit and the findings may not be applicable to other sectors, Secondly the study was done in South Africa meaning that generalizing may be tricky since the findings may not be true in other countries abroad or even in Africa.

3.11. Ethical consideration.

The new POPI law requires the protection of any personal information of an individual and should be used, stored, and destroyed appropriately. All the personal information of all participants will be treated with confidentiality and will not be distributed to anyone and will only be used for the purposes of this study. This information will be communicated to the participant so that they know what their personal information will be handled to prevent any demotivation from any participant. Due to the nature of the research which involves research within a professional environment and also involves human professionals, therefore ethical clearance had to be obtained before commencement with data collection. Participation by all participants is voluntary and no one is forced to do or say anything, and participants may withdraw from the study at any time they wish. The research data as indicated above is for this research study only and will not be sold or given to any third parties. All participants names are not necessary and the questions on the questionnaire are anonymous, no harm will be subjected to the participants in any way and no feedback can be traced back to any specific individual. The researcher followed the University of the Witwatersrand ethics policy and obtained ethical clearance prior to starting with the data collection.

3.12. Conclusion.

This chapter explained in detail how the data will be collected and who the participants are, the chapter also explained the variables that will be statistically calculated and what these variables mean. The management theories and data analysis will be done using SEM and SPSS respectively in the following chapter.

Chapter 4: Data presentation and analyses.

4.1 Introduction

This chapter offers excessive insight on the data analysis and what different data results mean. This includes explanation on key investigative metrices and demographic spread of participants. This is then followed by SEM descriptive; hypothesis testing and concludes with hypothesis results. The above variables will give us more insight on how dispensary staff perceive automation or robotics or how automation affects dispensary staff and willingness to work with robotics.

4.2 Descriptive statistics

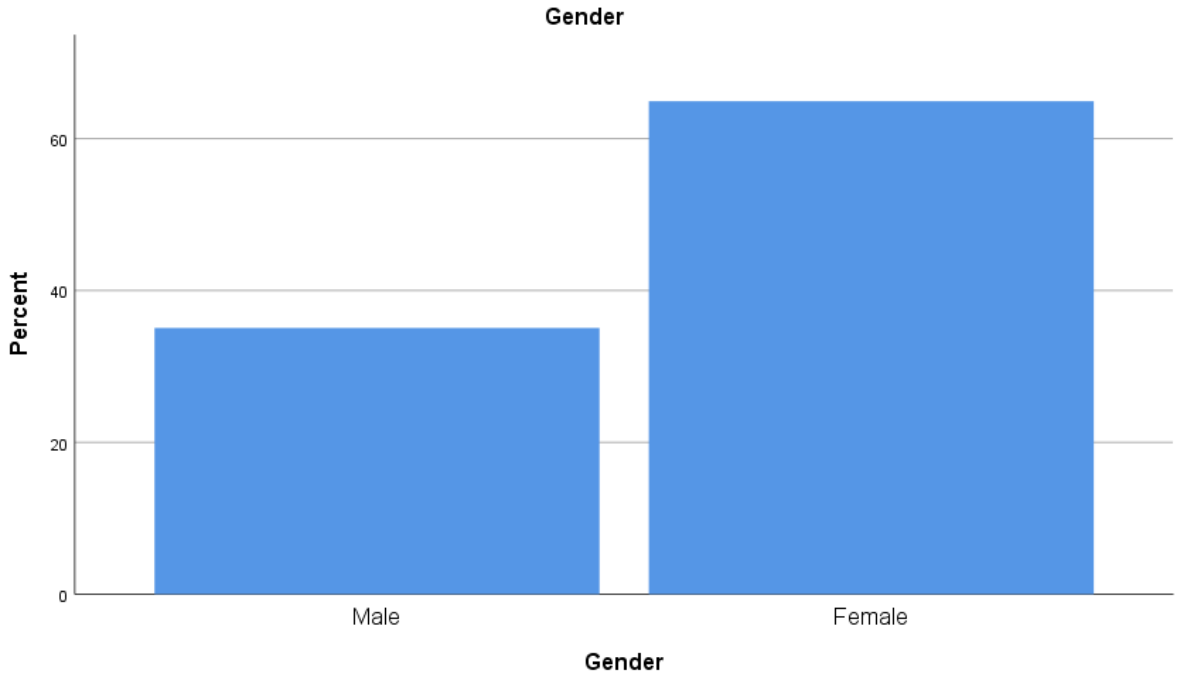
This section provides an overview of the demographic profile of participants, firstly their gender, age and qualifications which will give a clear pattern when analysing statistical

variables. Their perception and attitudes towards robotics will follow where different statistical tests will be used to determine different variables.

4.3 Demographic profile of participants.

In terms of demographic profiling of participants, gender, age, qualifications, and occupation are considered. Gender is indicated by the figure below, followed by the figure that will indicate the age spread of the participants. Under demographic profiling again a figure is presented that will indicate the occupation of various respondents.

Figure 4: 1 Gender



An analysis on the data was done to determine the percentage of males to females, figure 4: 1 show that there were more female (64.94%) than males (35.06) participants.

Figure 4: 2 Age

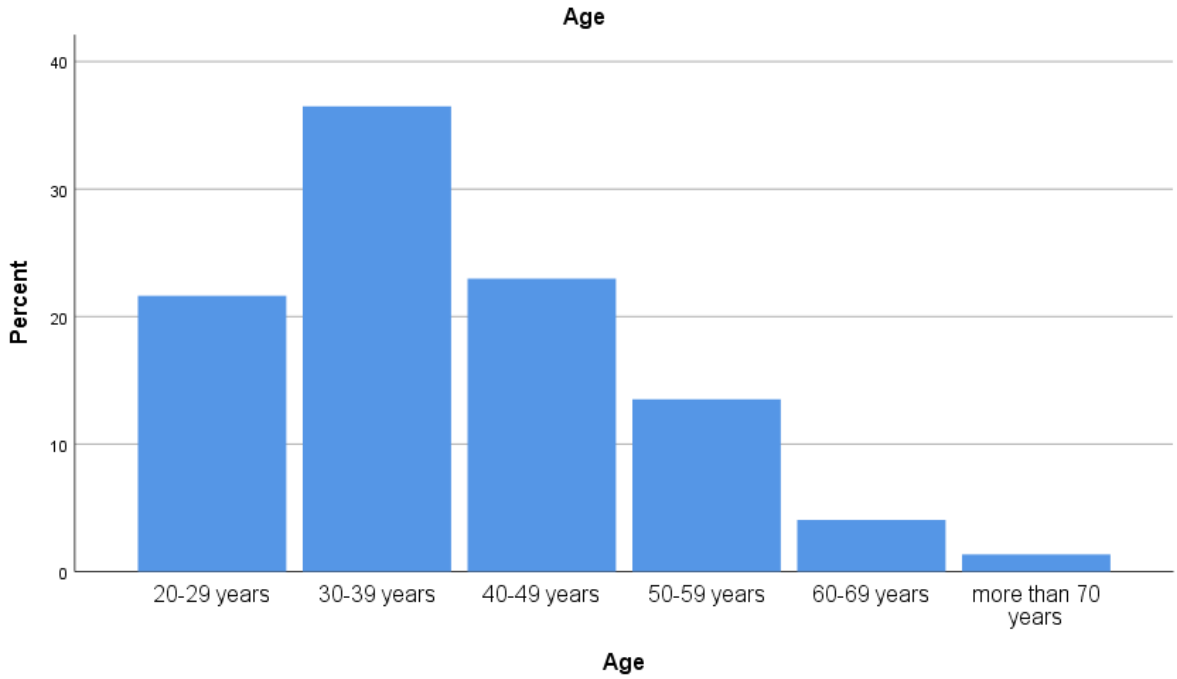
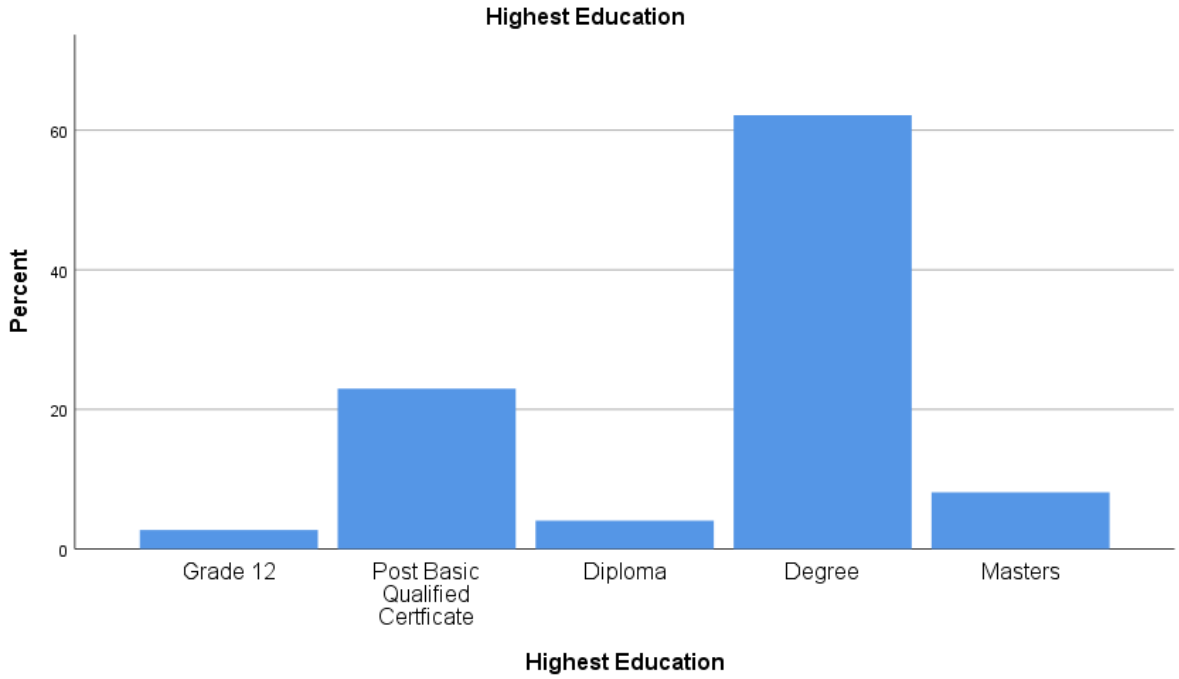


Figure 4 :2 above, that most of the respondents were between the age of 30 and 39 and the least proportion were above 60 years of age and more. There was almost the same number of participants in the 20-29 and 40-49 age groups.

The descriptive graph below (Figure 4: 3) further reveals that the majority (62.162%) of the participants held a bachelor's degree and the least percentage (4.054%) held diploma. None (0%) held a PhD or Qualified Basic Certificate.

.

Figure 4: 3 Highest Education



4.4 Measurement instrument assessment.

The constructs under study in this research are personnel attitudes and perceptions towards robotics, effects of robotics on productivity, employer investment on robotics and robotics and ethics in the dispensary. For detailed descriptive statistics, Table 4:1 below was produced. It shows that the mean responses were between level 2 ("disagree") and level 5 ("slightly agree"). There was satisfactory variance among all responses. None were close to zero. The skewness shows that mostly, the responses were in the negative, slightly skewed i.e., "strongly disagree", "disagree" and "slightly disagree", and broad flat. This is indicative of variation of responses across the scale levels.

Table 4: 1 Descriptive Statistics

Research Construct	N	Minimum	Maximum	Mean		Std. Deviation	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
KU	74	1	7	5.19	.189	1.627	2.649	-1.020	.279	.550	.552
KU	74	1	7	5.38	.189	1.628	2.649	-.991	.279	.466	.552
KU	74	1	7	2.95	.205	1.766	3.120	.590	.279	-.638	.552
AP1	74	1	7	5.93	.139	1.197	1.434	-2.032	.279	5.462	.552
AP2	73	1	7	5.59	.163	1.393	1.940	-1.061	.281	1.357	.555

AP3	73	1	7	3.29	.200	1.712	2.930	.322	.281	-1.094	.555
AP4	73	1	7	3.37	.175	1.495	2.236	.310	.281	-.660	.555
AP5	74	1	7	4.46	.185	1.589	2.526	-.271	.279	-.840	.552
AP6	74	1	7	4.24	.219	1.886	3.556	-.287	.279	-1.020	.552
AP7	72	1	7	4.15	.209	1.774	3.145	-.191	.283	-.921	.559
WWR1	72	1	7	5.00	.187	1.583	2.507	-.854	.283	.376	.559
WWR2	72	1	7	3.93	.191	1.621	2.629	-.109	.283	-.699	.559
WWR3	72	1	7	3.75	.190	1.616	2.613	.090	.283	-.701	.559

WWR4	72	1	7	5.15	.169	1.431	2.047	-1.048	.283	1.055	.559
WWR5	72	1	7	4.22	.187	1.585	2.513	-.399	.283	-.864	.559
BE1	72	1	7	5.18	.184	1.559	2.432	-1.020	.283	.565	.559
BE2	72	1	7	4.67	.144	1.222	1.493	.196	.283	.027	.559
BE3	72	1	7	3.24	.182	1.543	2.380	.420	.283	-.523	.559
BE4	72	1	7	4.65	.174	1.474	2.174	-.593	.283	.295	.559
APE1	72	1	7	3.24	.179	1.515	2.296	.536	.283	-.156	.559
APE2	72	1	6	4.17	.147	1.245	1.549	-.461	.283	-.357	.559

APE3	72	1	7	4.81	.149	1.263	1.595	-.441	.283	.087	.559
	Minimum	Maximum	Mean	Std. Deviation	Variance	Skewness	Kurtosis	N	Minimum	Maximum	Mean
APE4	72	1	7	3.17	.161	1.364	1.859	.204	.283	-.346	.559
APE5	71	1	7	4.85	.156	1.316	1.733	-.518	.285	.204	.563
APE6	72	1	7	5.49	.163	1.384	1.915	-.938	.283	.587	.559
APE7	72	1	7	5.00	.167	1.414	2.000	-.768	.283	.586	.559
Valid N (listwise)	66										

Key: KU = Knowledge and Understanding of Robotics; AP = Attitude and Perception towards integration of robotics; WWR = Willingness to work with robotics; BE = Barriers and Enablers; and APE = Attitude and perception of employees with different experience.

4.5 Reliability testing.

To measure the reliability of the scale the Cronbach Alpha Coefficient, and the Composite Reliability (CR) was used. The section below provides the overview of the results.

4.5.1 Cronbach Alpha Coefficient

To confirm the reliability of each of the variables in the measurement instrument, the standardised Cronbach Alpha Coefficient was used. When the Cronbach is bigger than 0.7 is regarded as reliable (Hair et al., 2009).

Table 4: 2 Reliability statistics (Cronbach Alpha)

Reliability Statistics		
Cronbach's Alpha Before Deletion of items	Cronbach's Alpha After Deletion of items	Cronbach's Alpha After Deletion and Modification of items
.865	.879	.922
N = 26	N = 24	17

To determine whether the items in the scale are suitable for factor analysis, a global Cronbach's reliability test is run on them all and on individual conceptual constructs. The value of the statistics has to be 0.70 or above, a value of 0.6 is deemed acceptable with other values below it being considered poor. Table 4:2 above shows that alpha ranges between 0.865 (excellent) and 0.879 (excellent), implying that there is evident intercorrelation between the items, therefore validating the reliability of the measurement items.

Table 1: 3 Reliability statistics (Cronbach Alpha)

AP on Robotics Reliability Statistics	
Cronbach's Alpha Before Deletion of items	Cronbach's Alpha After Modification of items
.701	.922
6	9

Table 4: 4 Reliability statistics (Cronbach Alpha)

WWR Reliability Statistics.	
Cronbach's Alpha Before Deletion of items	Cronbach's Alpha After no Deletion of items
.903	.863
N = 5	N = 8

Table 4: 5 Reliability statistics (Cronbach Alpha)

BE Reliability Statistics	
Cronbach's Alpha Before Deletion of items	Cronbach's Alpha After Deletion of items
.565	.896
N= 4	N = 3

Table 4: 6 Reliability statistics (Cronbach Alpha)

APE Reliability Statistics	
Cronbach's Alpha Before Deletion of items	Cronbach's Alpha After Deletion of items
-2.155	.754.
N = 7	N = 3

Table 4: 7 Reliability statistics (Cronbach Alpha).

KU Reliability Statistics	
Cronbach's Alpha Before Deletion of items	Cronbach's Alpha After Deletion of items
.520	n/a (singular item)
N = 3	N = 1

Table 4:3 through to Table 4:7 above presents the reliability of the individual conceptual constructs before and after deletion items. Deletion of some items showed marked increase in the values of the individual Cronbach's alphas. To note is the alpha in Table 4:5 for" Barriers and enablers" where the alpha value increased from a questionable 0.565 to an acceptable 0.896. Also, Table 4:6 shows that after recoding the items of the "Attitude and perception of employees with different level of experience" the alpha value significantly changed from -2.155 to 0.754. A negative alpha value may be due to a negative average covariance among the individual items and therefore recoding is necessary by reversing the responses. The alpha value of the "Knowledge and understanding of robotics "construct, shown in Table 4:7 has also changed from 0.52 (questionably poor) to a null alpha value as only one item loads into this construct.

Factor 6 in Table 4:8 not in the conceptual model had a null alpha value to 0.539. Table 4: 9 below showed that a factor not in the initial conceptual model has an alpha value equal to an unacceptable 0.360.

Table 4: 8 Reliability statistics (Cronbach Alpha)

Factor 6 Reliability Statistics	
Cronbach's Alpha Before Deletion of items	Cronbach's Alpha After Deletion of items
n/a	0.539
n/a	N = 4

Table 4: 9 Reliability statistics (Cronbach Alpha)

Factor 7 Reliability Statistics	
Cronbach's Alpha Before Deletion of items	Cronbach's Alpha After Deletion of items
n/a	0.360
n/a	N = 2

4.5.2 Average variance and Composite reliability.

Furthermore, average variance and composite reliability tests were done to confirm reliability of the constructs.

Table 4: 10 Average Variance & Composite Reliability

	Factor 1	Factor 2	Factor 3
AVE	0.291066	0.291925	0.355151
CR	0.768143	0.749056	0.754787

We determined the average variance explained by the construct and its composite reliability, these are calculated using the item loadings on the specific factors. An ideal AVE value should be 0.5 or more. The results above in Table 4:10 show that these values are all below the 0.5 cut-off. This implies that the items are not measuring the variance in the constructs but the errors. The threshold for the composite reliability sits at 0.7 or more but values greater than 0.5 indicate that the internal construct validity is good.

4.6 Testing for validity

The following was used to test the validity of the instrument, correlation matrix and factor loading.

4.6.1 Convergent validity

Convergent validity refers to the extent to which two different measures capture the same construct (Lekwa et al., 2018). Weaker convergent validity is signalled by values deviating

from 1, therefore highlighting possible problems in the correspondence of the two measurement constructs (Meissner, 2019). It is recommended for this value to be greater than 0.5 (Lekwa et al., 2018). Table 4:11 below, presents the results for the factor loading estimates.

Table 4: 11 Pattern Matrix

Items	Factor						
	1	2	3	4	5	6	7
AP7	0.832						
APE2	-0.600						
APE5	0.562						
AP5	0.512						
APE4	0.506			**-0.332**			
APE3	0.495	**-0.306**					

AP2	0.333	**-0.301**	**-0.306**				
KU		**-0.791**					
KU1		**-0.74**					
AP		**-0.598**					
WWR		**-0.581**					
WWR2		**-0.476**			0.313		
APE1			**-0.908**				
APE			**0.681**				
BE			**-0.372**				
BE1				0.498			
KU2				0.481			

BE2	0.36			0.441			
BE					0.896		
APE						**-0.596**	
AP3						0.594	
WWR1							**-0.948**
WWR							**-0.943**
AP6		**-0.311**					**-0.48**
WWR3							**-0.463**

We obtained Table 4:11 above (pattern matrix) because of the rotation. The structure appears to be clear with items loading into different factors. Note how some loadings are negative (bold) and loading into a single factor. This suggest that the items are candidates for recoding or reversal. Table 4:12 show an interesting feature that items are mostly negatively correlated with three of the seven factors: factor 2, 3 and 7. This present a problem in confirming the

structure in Table 13. The factor correlation matrix in Table 14 is a matrix that shows the correlation between the factors. It shows that factors extracted after direct obliging before any deletion of any items(s) are negatively correlated to each other.

Table 4: 12 Structure Matrix.

Structure Matrix							
Items	Factor						
	1	2	3	4	5	6	7
AP7	.890	-.334	-.402				-.623
APE2	-.789	.516	.337				.599
AP5	.723	-.470	-.320				-.625
APE5	.683	-.452			.334		-.470
APE3	.683	-.586	-.412				-.539

AP2	.584	-.523	-.529		.350		-.458
APE4	.519						
KU1	.552	-.876	-.480		.322		-.589
KU	.370	-.849	-.380				-.487
WWR	.584	-.783	-.406		.377		-.693
WWR2	.575	-.669	-.377		.443		-.587
AP		-.553					
AP4		.331					
APE1			-.849				
APE	-.335	.374	.777		-.306		.438
KU2				.502		.302	

BE1				.494			
BE					.875		
AP3				.360		.628	-.302
APE0						-.602	
WWR1	.558	-.393	-.417				-.955
WWR0	.546	-.358	-.409				-.945
AP6	.663	-.627	-.403				-.786
BE2	.608	-.500	-.391	.506			-.684
WWR3	.435	-.534	-.490				-.682
BE0	.394		-.537	.382	.433		-.560

Table 4: 13 Factor correlation Matrix.							
Factor	1	2	3	4	5	6	7
1	1.000	-.406	-.320	.005	.247	.143	-.564
2	-.406	1.000	.293	-.058	-.058	-.026	.438
3	-.320	.293	1.000	-.077	-.178	-.199	.397
4	.005	-.058	-.077	1.000	.118	.112	-.212
5	.247	-.058	-.178	.118	1.000	.059	-.236
6	.143	-.026	-.199	.112	.059	1.000	-.078
7	-.564	.438	.397	-.212	-.236	-.078	1.000

Table 4:14 Pattern Matrix

Pattern Matrix							
Items	Factor						
	1	2	3	4	5	6	7
KU	.842						
KU1	.808						
WWR	.663						
AP	.624						
WWR2	.557						
AP2	.374	.325					
AP7		.782					

APE2		**-.620**					
APE4		.536				-.338	
APE5		.524					
AP5		.500					
APE3	.408	.476					
WWR1			.867				
WWR0			.866				
AP6	.404		.430				
WWR3	.337		.423				
APE1				.860			

APE				**-.642**			
BE0				.335			
APE					.908		
KU2						.539	
BE1						.506	
BE2		.312				.408	
AP3						.317	.588

In an attempt not to modify or delete the items prematurely, another rotation method (promax) was employed in extracting the model. To note, only three factor loadings are negative here in Table 4:14. Also, the structure matrix in Table 4:13, suggest that virtually all items are positively correlated with more than one factor. This may be due to collinearity of the items, with exception of a few. Item “AP4” is the only item not loading to any factor in the

matrix. Table 4:15, which shows the factor correlation matrix reveals positively correlation amongst the factors.

Table 4: 15 Structural Matrix

The Structural matrix							
Items	Factor						
	1	2	3	4	5	6	7
KU1	.925	.474	.498	.376			
KU	.864		.407				
WWR	.844	.513	.615		.356		
WWR2	.740	.516	.509		.425		
AP2	.591	.550	.388	.459	.327		
AP	.497						

AP4	-.326						
AP7	.408	.898	.561	.319		.424	
APE2	-.522	-.759	-.523				
AP5	.526	.699	.564			.321	
APE5	.511	.657	.396		.314		
APE3	.605	.653	.458	.339			
APE4		.512					
WWR1	.463	.532	.949	.327			
WWR0	.435	.522	.940	.322			
AP6	.688	.614	.729			.301	
WWR3	.586	.400	.650	.414		.329	

BE2	.574	.594	.632			.606	
BE0	.319	.396	.548	.479	.414	.483	
APE1				.864			
APE	-.455	-.315	-.407	-.743			
BE					.879		
KU2						.508	
BE1						.471	
APE0							-.603
AP3	.326					.392	.599

Table 4: 16 Factor Correlation Matrix.

Factor Correlation Matrix							
Factor	1	2	3	4	5	6	7
1	1.000	.359	.407	.269	.205	.245	.071
2	.359	1.000	.451	.253	.186	.183	.085
3	.407	.451	1.000	.287	.205	.295	.087
4	.269	.253	.287	1.000	.087	.124	.150
5	.205	.186	.205	.087	1.000	.229	.009
6	.245	.183	.295	.124	.229	1.000	-.002
7	.071	.085	.087	.150	.009	-.002	1.000

4.6.2 Discriminant Validity correlation matrix.

Correlation matrix demonstrates the lack of similarity between the constructs, which subsequently indicates discriminant validity (Engellant, Holland & Piper 2019). Discriminant

validity is achieved by indication that values have deviated from 1. The pattern matrix, Table 4:17, shows a clear simple structure, with just four cross-loadings. The structure matrix, in Table 4:18, reveals that items are very much correlated with virtual all the three factors. This is confirmed by the factor correlation matrix in Table 4:19 below. The relationship of the constructs lacks orthogonality, and this may pose as serious challenge as all factors may predict the same item. The issue of linear combination between items is once again shown here.

Table 4:17 Pattern Matrix

	Factor		
	1	2	3
WWR0	.891		
WWR1	.882		
WWR3	.551		
BE0	.471		
AP6	.454	.359	

APE	.345		
AP7		.899	
AP5		.583	
APE5		.525	
BE2	.311	.501	
AP2		.486	
APE3		.441	.339
KU			.796
KU1			.740
AP			.579
WWR	.317		.534

WWR2		.318	.463

Table 4:18 Structure Matrix

	Factor		
	1	2	3
WWR1	.935	.533	.366
WWR0	.933	.542	.319
AP6	.735	.677	.585
WWR3	.706	.458	.535
BE0	.596	.485	
APE	.504	.372	.453
AP7	.524	.922	

AP5	.567	.742	.419
BE2	.585	.682	.381
APE5	.432	.650	.447
APE3	.488	.630	.548
AP2	.433	.628	.479
KU1	.576	.588	.892
KU	.480	.381	.868
WWR	.658	.630	.755
WWR2	.568	.594	.663
AP			.528

Table 4:19 Factor Correlation matrix

Factor	1	2	3
1	1.000	.479	.374
2	.479	1.000	.346
3	.374	.346	1.000

4.6.3 Average Value Extracted (AVE) and Shared Value (SV)

Average Value Extracted (AVE) and Shared Value (SV) Post the analysis of the inter-correlation values, discriminant validity was then examined by ascertaining whether the Average Value Extracted (AVE) was greater than the Highest Shared Variance (HSV) value. According to Voorhees et al., (2016), it is ideal for the Average Variance Extracted (AVE) to be greater than 0.4 to allow for the construct to be considered reliable. After running a confirmatory factor analysis and using Kaiser's eigenvalue criterion, the results in Table 4:20 show that seven (7) factors were extracted accounting for a cumulative 73.727% which presents the Total Variance Explained. This is well above the 0.4 acceptability threshold.

Table 4:20 Total variance explained.

Total Variance Explained						
	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Factor	Total	% Of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	10.625	40.865	40.865	10.358	39.837	39.837
2	1.862	7.161	48.026	1.400	5.385	45.222
3	1.596	6.140	54.166	1.227	4.719	49.941
4	1.499	5.764	59.930	1.093	4.203	54.144
5	1.329	5.110	65.040	1.033	3.972	58.116
6	1.241	4.772	69.813	.839	3.227	61.343
7	1.018	3.915	73.727	.616	2.368	63.711

8	.946	3.639	77.366			
. .	. .	. .	. .	. .	. .	. .
.	.	.	.	.	.	.
26	.040	.153	100.000		.	.

4.7 Structural Equation Modelling

This study applied structural equation modelling (SEM) for data analysis. Ringle et al., (2017), describe SEM as a multivariate statistical framework that is used for modelling multifaceted associations between variables which are directly and/or indirectly observed.

4.8 Model Fit Assessment

The determination of whether the model is appropriately fit to the data, is done through rigorous model fit assessments. This study incorporated Confirmatory Factor Analysis (CFA) and was chosen in favour of a less fit-for-purpose Exploratory Factor Analysis (EFA). Testing of the model was done using adequate appropriate indices such as Goodness of Fit Index (GFI), Chi-square (CMIN) and Root Mean Square Error of Approximation (RMSEA). SEM and CFA were performed using SPSS and AMOS (software used to perform Structural Equation Modelling). CFA consents specification among indicator uniqueness which may have substantial importance. The table below,

4.8.1 Baseline comparison index.

Table 4:21 shows the results of the baseline comparison index.

Table 4:21 Baseline comparison index

Model	**NFI**	**RFI**	**IFI**	**TLI**	**CFI**
	Delta1	rho1	Delta2	rho2	
Default model	0.918	0.931	0.945	0.921	0.956
Saturated model	1		1		1
Independence model	0	0	0	0	0

Upon examining the baseline comparison indices, the following was found, the NFI (0.918) is accepted at a level bigger than 0.9, therefore confirming a good model fit. The second index, RFI indicated a good model fit as it portrays a value of 0.931. The NFI (0.918) and the RFI (0.931) had values greater than 0.9. Furthermore, the IFI (0.945), TLI (0.921) and CFI (0.956) are well within the suggested limits of being above 0.9 (Tabachnick and Fidell, 2007), therefore it is taken as a good model fit.

4.8.2 Chi-square Index.

The next index to be examined is the Chi-square index which produced the below findings.

Table 4:22: KMO and Bartlett's Test (chi square)

Model	NPAR	CMN	DF	P	CMN/DF
Default model	141	1194.724	325	0	3.67
Saturated model	596	0	0		
Independence model	72	931.34	136	0	6.84

Table 4:22 indicates a value of 3.67. The criterion for acceptable model fit varies across researchers, ranging from less than 2 (Ullman, 2001) to less than 5 (Barrett, 2007; Schumacher & Lomax, 2004). Therefore, it is evident that the Chi-square indicates a good model fit.

4.8.3 Root Mean Square Error of Approximation

Table 4:23 presents the root mean square error approximation (RMSEA). For the RMSEA to be accepted, the value should be below 0.06 (McDonald & Ho, 2002; Hooper, Coughlan & Mullen, 2008). As evident in the results below, it can be confirmed that with a value of 0.01, the RMSEA is accepted, indicating good model fit.

Table 4:23 Root mean Square

Model	RMSEA	LO 90	HI90	PCLOSE
Default model	0.018	0.026	0.041	1
Independence model	0.23	0.21	0.26	0

4.8.4 Goodness-of-Fit Index (GFI).

The Goodness fit index was examined, and the results below were observed.

Table 4:24: Goodness-of-Fit Index (GFI)

Model	RMR	GFI	AGFI	PGFI
Default model	0.128	0.918	0.631	0.762
Saturated model	0	1		
Independence model	0.431	0.642	0.472	0.814

Ong and Puteh (2017) describe Goodness-of-fit (GFI) as the variance that is accounted for by the estimated population covariance. For the purpose of this study, a value greater than 0.9 was accepted to indicate a good model fit, and this was achieved with a value of 0.918.

4.9 Path Modelling and Hypotheses Testing

The following section presents the results of the hypotheses and the correlating path coefficients. The main advantage of using path modelling (over regression analysis), is that the indirect and total effects are analysed, as opposed to only analysing direct effects which are prevalent when using regression analysis (Keith, 2015). Furthermore, path analysis provides a clearer understanding of the cause and effect between variables and is often a better choice for the explanatory analysis of non-experimental data (Keith, 2015). In Table 4:25, the path coefficients reflect the nature of the strength between the variables: the higher the value, the stronger the relationship. To detect whether the hypotheses are supported or not, the p-values are analysed. At a 95% level of significance, the supported hypotheses are indicated with three asterisks (***).

A structural equation model, Table 4: 25 below, was estimated to determine the significance of the model and relationships between the items and the factors they ought to measure. The p-values are all between 0.000 and 0.53, this means that all path coefficients are statistically significant.

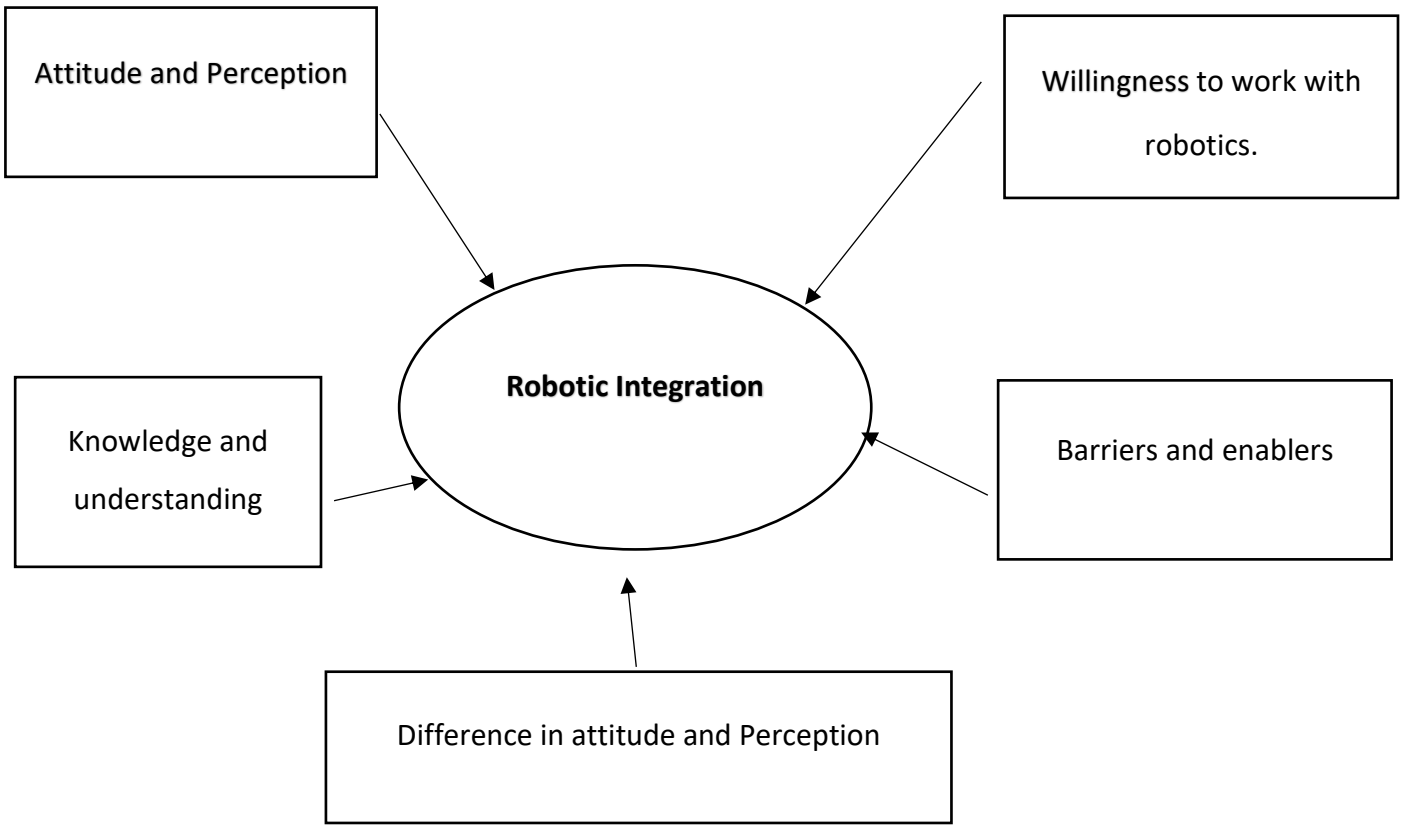
Table 4:25 Hypothesis results and Path coefficients.

Path coefficient	Hypothesis	Estimate	P-value	Result
Knowledge and Understanding → Robotic integration.	H1	0.887	***	Significant and supported
Attitude and perception→ Robotic integration.	H2	0.555	***	Significant and supported
Willingness to work with robotics→ Robotic integration.	H3	0.072	***	Significant and supported
Attitude and perception of employees with different level of experience → Robotic integration.	H4	0.122	***	Significant and supported

Analysing the results above in Table 4:25, it was found that all six hypotheses are significant and supported. More specifically, the strongest relationship was found to be hypothesis 1, which tested the relationship between employee's knowledge and understanding towards robotic adoption/integration (0.887). This indicates the more employees understand and have knowledge on robotics the more they are willing to work with robotic technology.

Furthermore, hypotheses two, also indicated strong relationships between attitude and perception in robots and willingness to work together with robotics (0.555), . The weakest relationships were found to be hypothesis three, four and five. This indicate that there is a weak positive relationship between willingness to work with robotics, barriers and enablers, attitude, and perception of employees with different level of experience towards robotic adoption or integration in the workplace, although all three hypotheses are significant. To conclude, the results support all five proposed hypotheses with employee attitude and perception towards robotic integration having the strongest relationship, while willingness to work with robotics towards robotic integration having the weakest positive influence. Derived from the findings presented above, Figure 4:4 below presents the conceptual model.

Figure 4:4 The Conceptual model.



4.10 Summary of Hypothesis results.

H1: There is a positive relationship between employee knowledge and understanding of robotics and integration of robotics. From the findings, the first hypothesis (H1) is supported. This indicates that a positive relationship exists between these two variables. In other words, the more knowledge and understanding employees are provided with, they are more likely to embrace robotic integration within the workplace. Upon closer examination, the path coefficient (0.887) reflected a positive and strong relationship between these variables.

H2: There is a positive relationship between employees attitude and perception on robotics towards robotic integration. Likewise, hypothesis 2 (H2) is supported. The findings indicate that there is a positive relationship between the two variables. This means that the more positive employees attitude and perception towards robotics are, the more likely they are to support robotic integration or adoption. The strength of the relationship (0.555) is similar to that of H1, therefore confirmed to be strong.

H3: There is a positive relationship between willingness to work with robotics and robotic integration. Hypothesis 3 (H3) also reflects a positive relationship and therefore the hypothesis is supported. In other words, a positive relationship exists between willingness to work with robotics and robotic integration. This means that the more willing employees are to work with robotics, the more likely they will support robotic integration in the workplace. Upon examining the path coefficient (0.072), indicates a weak relationship between these two variables.

H4: There is a positive relationship between understanding barriers and enablers of robotics and robotic integration. Like the previous three hypotheses, hypothesis four is supported, indicating a positive relationship between understanding barriers and enablers of robotics and robotic integration. In other words when employees fully understand robotic

barriers and enablers, they are more likely to support robotic adoption or integration within the work environment. The strength of the relationship was indicated by a path coefficient of 0,278 thus indicating a strong relationship between the two variables.

H5: There is a positive relationship between employees attitude and perception with different level of experience and robotic integration. The fifth hypothesis was also found to be significant. The proposed hypothesis was therefore supported. In other words, employees that were more experienced would be more likely to support robotic integration. However, the strength of this relationship is explained by the path coefficient of 0,122, indicating a slightly weak positive relationship.

4.11 Conclusion.

To conclude, this chapter provided the statistical analysis and results obtained from the data collected on Factors influencing employee willingness to work with robotics in retail pharmacies in South Africa. The following was discussed: an overview of the descriptive statistics, an analysis of the reliability and validity of the measurement instruments, an overview of the model fit and lastly, where a path modelling with the results from the hypothesis were conducted and presented.

Chapter 5: Discussion of findings.

5.1 Introduction

This chapter presents a critical discussion of the research findings considering previous literature. Firstly, the results of each hypothesis are presented, followed by a comparison of the results to previous literature and lastly, a discussion of what implications these results have on retail Pharmacies.

5.2 Main Findings

This section discusses the findings of the factors influencing employee willingness to work with robotics in retail Pharmacies in South Africa.

5.2.1 Knowledge and understanding of robotics and robotic integration.

H1o**:** Employee knowledge and understanding of robotics has no positive impact on robotic integration.

$H1_1$: Employee knowledge and understanding of robotics has a positive impact on robotics integration or willingness to work with robotics.

The findings of Hypothesis 1 indicate a positive relationship between knowledge and understanding of robotics with willingness to work with robotics or robotic integration in the workplace. This means that when employees are provided with more knowledge and information about robotics, they will understand robotics better and will be more willing to work with robotics in the workplace. And the strength of the relationship between the two variables is indicated by a path coefficient of (0.887) which is strong and suggest that knowledge and understanding of robotics is regarded as a predictor of employee willingness to work with robotics. The findings from this study supports previous studies that have used the Social Cognitive Theory to examine the association between employee knowledge and understanding towards willingness to work with robotics (Yuanjian & Fawad, 2017). According to Bandura (2004), The theory provides a framework for understanding how people actively shape and are shaped by their environment. The theory views people as active agents who both influence and are influenced by the environment. In this case, this

will imply that when employees are exposed to robotics and be provided with sufficient knowledge and training to enhance their understanding of robotics, they will more likely be willing to work with robotics.

5.2.2 Employee perception and attitude towards robotics.

H2o There is no positive relationship between employee attitude towards robotics and willingness to work with robotics.

$H2_1$ There is a positive relationship between employee attitude towards robotics and willingness to work with robotics.

The findings of Hypothesis 2 indicated a positive relationship between employee attitude towards robotics and willingness to work with robotics. Upon a closer examination of the relationship between the two variables it was noted that the relationship was strong (0.555), in other words employee attitude is a predictor of employee willingness to work with robotics. The findings were supported by the study done where it was found that robotics were accepted better as a team member than a face-to-face human colleague (Vanni & Korpela, 2015).

Again, in a study conducted by Van Looy (2017), employees seem highly positive about robots in the workplace and feel comfortable leaving simple repetitive tasks to be automated.

Findings from this study confirms that the Technology Acceptance Theory plays an important role in the relationship between employee attitude and willingness to work with robotics. This means that if employees perceive robotics to be easy to use and considered useful, they will have a positive attitude and will more likely be willing to work with robotics. It can thus be concluded that attitude towards robotics is a predictor of willingness to work with robotics in the workplace.

5.2.3 Willingness to work with robotics.

H3o There is no relationship between employee willingness to work with robotics and robotic integration.

H3a There is a positive relationship between employee willingness to work with robotics and robotic integration.

The findings of Hypothesis 3 indicated a positive relationship between employee willingness to work with robotics and robotic integration within the workplace. This means that when employees accept and perceive robotics in a positive way, their willingness to work with robotics is enhanced. Therefore, it is imperative for employers to educate and provide employees with all information regarding robotics, so that they can understand why robotics are being used and for what purpose, this will then enhance their attitude towards robotics and improve their willingness to work with robotics.

The strength of the two variables was indicated by a value of 0.072, which is positive but weak. The findings are supported by a study done by You & Lionel (2017), Organizations are adopting and integrating robots to work with and alongside their human employees. However, their human employees are not necessarily happy about this new work arrangement. This may be in part due to the increasing fears that robots will eventually take their jobs (You & Lionel, 2017). The study further elaborated that when employees are aware that they are not at risk of losing their jobs they are more willing to accept and work with robotics, which is influenced by the increased attitude towards robotics triggered by the knowledge of no threat to their job positions.

Another study done by Scholl & Sasseberg (2020), where they discovered that employees that were not communicated clearly about the adoption of robotics in the workplace were more likely to be more resistant and would have a negative attitude towards robotics and would not be willing to work with this new technology. But employees that knew what robotics there are for and how they work were more willing to work with robotics and their attitude was more positive.

In summary it appears that it is up to employers to facilitate the huge change where robotics can be easily integrated into the work place and be accepted by all employees, this is easily achieved by educating employees and assuring them that robotics are simply there to make their work easier and to improve efficiency not to replace anyone, this will lead to improved attitude towards robotics and employee willingness to work with robotics will be enhanced. The above therefore supports the Theory of Technology Acceptance model as the framework that informs this hypothesis.

5.2.4 Attitudes and perceptions of employees with different levels of experience.

$H5_0$ There is no relationship between attitudes, perception of employees with different levels of experience and robotic integration.

$H5_1$ There is a positive relationship between attitudes, perception of employees with different levels of experience and robotic integration.

The findings of the current research indicate that there is a positive relationship between attitudes and perceptions of employees with different levels of experience and robotic integration. A study done by (Kuhnert, 2017) has established that younger employees are more likely to have a positive attitude and perception towards robotic integration than the older more experienced employees. Younger employees are more eager to experiment with new technology and to learn and understand more about newer technologies (Ashari et, 2021). Kuhnert, (2021) has further established that lack of technical background and knowledge plays a role in the willingness of the employee to accept robotic integration and be willing to work with new technology. The framework that informs the above findings and the current Hypothesis is the Social Cognitive Theory which shows that differences in attitude and perception does exist in employees with different roles and experience towards the integration of robotics.

5.3 Summary of findings.

In summary the research has shown that all five Hypothesis are supported. This means that H1 has shown that the is positive relationship between Knowledge. Understanding and

robotic integration. H2 was also supported meaning there is a positive relationship between attitudes, perception, and robotic integration. H3 was also supported indicating a positive relationship between willingness to work with robotics and robotic integration. Lastly H4 was also supported meaning that there is a positive relationship between attitude, perception of employees with different levels of experience and robotic integration.

Table 5:1 Summary of Hypothesis

	Hypothesis	**Result**
H1	Knowledge and understanding has a positive impact on robotic integration.	Supported
H2	Attitude and perception have a positive impact on robotic integration.	Supported
H3	Willingness to work with robotics has a positive impact on robotic integration.	Supported
H4	Attitude and perception of employees with different level of experience has a positive impact on robotic integration.	Supported

Conclusion.

All four Hypothesis are supported which showed similar findings to existing literature and confirmed that there is a significant positive relationship between the variables. The table above illustrates the summary of results from the hypotheses. The present chapter provided a critical discussion on the research results. Derived from the data analysis, the outcomes of the proposed hypotheses were discussed. Further, the findings were compared to previous literature and lastly, the application of the results to real workplace environment is presented. In the following and final chapter, the conclusion, contributions, limitations, and future research are discussed.

CHAPTER 6: CONCLUSION, RECOMMENDATIONS AND CONTRIBUTION.

6.1 Introduction.

This chapter presents an overview of the main findings of the study. Furthermore, it discusses the managerial implications of the study, the contributions, and limitations, and lastly, areas recommended for future research.

6.2 Conclusion of main findings.

In conclusion, all five hypotheses were found to be significant. Therefore, employee knowledge and understanding, attitude and perception, willingness to work with robotics, understanding barriers and enablers and lastly attitude and perception of employees with different level of experience all positively influences robotic integration within the workplace. From the findings of the study, it was visible that the strongest relationship was between Knowledge, understanding of robotics and robotic integration, and the weakest relationship is between willingness to work with robotics and robotic integration.

The findings indicate that employers should make the adoption of robotics a transparent process where employees are also involved and understand clearly what robotics are for. It is crucial for employers to make all employees understand that robotics is not there to replace them but to make their job easier and increase efficiency and reduce costs. Employee job description should adopt accordingly and redesigned to align the fast-developing trend of the use of technology and automation in the workplace. Trainings should be adequately provided to all employees so that they can understand how the new technology works and how they are operated.

It is also of paramount importance for employees to understand that we live in an evolving business environment, open mindedness and flexibility is crucial to ensure a smooth transition from the old to the new. Robotics and automation are here to stay, and both employees and employers can benefit in what these technologies can offer and what they are capable of.

6.3 Managerial implications.

The days of management deciding and implementing major changes regarding company operations and infrastructure behind closed doors are over, employees are no longer expecting just a pay cheque, they expect inclusion and open consultations through appropriate channels to ensure transparency and eradication of confusion (Masana & Muriithi, 2019; Venter, Craffert, Van Greunen, Veldsman, Candi & Sigurdarson, 2019; Marutha, 2019; Andreoni & Roberts, 2020; Kohrt, Rai, Vilakazi, Thapa, Bhardwaj & van Heerden, 2019). Employees expect to feel part of the company and want to be involved in matters that affects the way they work in the company. This means that management should implement proper channels of communication and consultations with all employees. They should invest in training and providing information to all employees regarding any major changes within the business (Masana & Muriithi, 2019; Venter, Craffert, Van Greunen, Veldsman, Candi & Sigurdarson, 2019; Marutha, 2019; Andreoni & Roberts, 2020; Kohrt, Rai, Vilakazi, Thapa, Bhardwaj & van Heerden, 2019). Employees have no problem with robotics but expect to be consulted and properly consulted regarding issues that may lead to confusion and unnecessary panic. Employers should also understand that no one is saying technology should not be adopted, the changing business environment dictates fast efficient operations that require the use of both human touch and automation. The current study has demonstrated that humans can work together with robotics to facilitate operations and improve efficiency without any job losses. Any business manager should encourage investment in new technology and allocate adequate financial resources for the training of staff at all levels (Ho, 2018). The more employees understand robotics and new technology, the more they will welcome new technological changes, therefore allowing a smooth transition from manual operations to fast more improved automation of processes.

6.4 Contributions.

The contributions of this study are threefold: conceptual, theoretical, and practical, as discussed below.

6.4.1 Conceptual contribution.

Conceptually, the present study makes a significant contribution to research in a South African context, the study was conducted amongst registered pharmacist and pharmacist assistants in South Africa. The study looked at factors influencing employee willingness to work with robotics in retail pharmacies in South Africa. By exploring the importance of factors influencing employee willingness to work with robotics, this study adds to contextual knowledge on retail pharmacies in South Africa on factors used to influence employee willingness to work with robotics.

6.4.2 Theoretical contribution.

The research contributes to healthcare literature, employee management, retail management and other related fields in several ways. The first evident contribution of this research is the examination of the employee and robotics construct within retail pharmacies in South African setting. This research contributes to the theory of experiential emotions by providing a validated theoretical framework, which explains the relationship between the constructs of employee emotions and robotics. Although similar research has been conducted across an array of industries, few have factors influencing employee willingness to work with robotics in retail pharmacies in a South African context. Secondly, the present research contributes to academic literature as it demonstrates evidence of employee variables as a predictor of attitude towards robotics. Moreover, the research also points out that employee productivity is the strongest predicter of employee attitudes towards robotics, and also ethics and employer investment play a crucial role in influencing employee willingness to work with robotics. Furthermore, due to a lack of research on factors influencing employee willingness to work with robotics in retail pharmacies, this study provides a validated conceptual framework, which identifies constructs that have a relationship with robotics retail pharmacies in South Africa. This research present descriptive findings from factors influencing employee willingness to work with robotics in retail pharmacies in South Africa. From the findings, the present study provides support that ethics and employer investment influence employee willingness to work with robotics. This

study also provides researchers with an in-depth understanding of employee responses to sensory cues in retail settings. Within the field of retail pharmacy and healthcare, researchers will have access to current literature on factors influencing employee willingness to work with robotics in retail pharmacies in South Africa.

6.4.3 Strategic contribution.

The investigation of factors influencing employee willingness to work with robotics can provide employers with more information that will help develop strategies which can be implemented to reduce resistance from employees to work with robotics. Once these factors are identified, employees will be able to work on communicating more information on how robotics work and why they are adopted, and training can also be implemented if necessary. This will enhance attitudes towards the use of robotics and employees will be more willing to work together with robotics. Fear of losing jobs will be eliminated, and it will be easier for employers to implement the new technology and allow for a smooth transition.

Implementing robotics in retail pharmacies will provide a competitive advantage over the competition, it will improve efficiency, reduce costs, decrease errors, and reduce patient waiting time. It will also provide an excellent working environment for employees since it will reduce autonomous procedures that provides no value to the employee but wastes time.

6.5 Future research.

The result of this study contributes to the literature on factors influencing employee willingness to work with robotics, this information could be used by other researchers who might expand the study further and apply the study in other professions not in the health sector only. Furthermore, the results could be used to compare with studies that can be done outside the borders of South Africa. Other business owners can use the results of this study to explore avenues to improve operations within their business units. Retail pharmacy owners could use the results of this study to do similar investigations within their

pharmacies on the practicality of adopting robotic technology to work with their current employees.

6.6 Limitations.

Although this study has provided more insight on factors influencing employee willingness to work with robotics in retail pharmacies. The study has few limitations, it was done only within the context of South African borders, the results may not be applicable in countries outside South Africa. Furthermore, the study only looked at pharmacist and registered pharmacist assistants and specifically in retail pharmacies, the findings may not be applicable in other professions or other business sectors involving different individuals with different qualifications and experiences. Due to time and lack of financial resources, the study was done using a small sample size, which in future could be increased to obtain more accurate results.

The study used an online survey methodology to gather data, respondents might have rushed through the questions, as there was no researcher present to control and monitor this aspect of the research. With the nature of the research having been online, there is the possibility of the respondent not having completed the survey personally. It could be due to time constraints, as most of the respondents are employed full-time, they could have asked peers, colleagues, or a friend to complete the survey. Alternatively, their environment may have distracted them. The third limitation is that the survey was designed in English, which is not their first language majority of the respondents, where English is a second or third language of preference. This may have resulted in the possibility of misunderstanding, despite care taken to ensure otherwise.

6.7 Conclusion.

Five hypotheses were tested against vigorous set of questions to extract value for pharmacy owners and other business leaders, the results yielded useful information that could be applied in the real world to create strategies that will improve the implementation of robotics in the workplace. Variables were identified that are more likely to influence

employees when it comes to willingness to work with robotics, management can use this information to address the issues highlighted in this study which are most likely to cause issues. Businesses are forced to adapt to market changes and technology is driving modern ways to reach out and service clients, to create an excellent customer experience and to provide businesses with a competitive advantage to stay relevant.

References.

Abutabenjeh S, Jaradat R. 2018. Clarification of research design, research methods, and research methodology: A guide for public administration researchers and practitioners teaching Public Administration.

Adam, J., Khan, H., & Raeside, R. (2014). *Research Methods for Business and Social Sciences Students.* New Delhi: Sage Publications Pvt. Ltd.

Alaan, Y. 2016. Pengaruh Service Quality (Tangible, Empathy, Reliability, Responsiveness dan Assurance) terhadap Client Satisfaction: Penelitian pada Hotel Serela Bandung. Jurnal Manajemen Maranatha.

Alvesson, M., & Skoldberg, K. (2000). *Reflexive Methodology: New Vistas for Qualitative Research.* London, Thousand Oaks, CA, and New Delhi: Sage.

Ana Olavarría-Jaraba, Jesús J. Cambra-Fierro, Edgar Centeno, Rosario Vázquez-Carrasco.

2018. Relationship quality as an antecedent of client relationship proneness: A cross-cultural study between Spain and Mexico. Journal of Retailing and Consumer Services, Volume 42, Pages 78-87.

Antony, Gnana Sunny. 2016. Automation to Handle Client Complaints in Banks Using BPM Tool. Culminating Projects in Mechanical and Manufacturing Engineering. 48. https://repository.stcloudstate.edu/mme_etds/48. Date of access, 15 Aug. 2020.

Asanad, K., Zheng, J., Chan-Golston, A., Tam, E., Bhetraratana, M., Lan, C.W., Zhao, M., Abdi, R., Abdi, F., Vasti, E. and Prelip, M.L. 2018. Assessing quality of care through client satisfaction at an interprofessional student-run free clinic. Journal of interprofessional care, 32(2), pp.203- 210.

Ascarza, E., Neslin, S.A., Netzer, O., Anderson, Z., Fader, P.S., Gupta, S., Hardie, B.G.,

Lemmens, A., Libai, B., Neal, D. and Provost, F. 2018. In pursuit of enhanced customer retention management: Review, key issues, and future directions. Customer Needs and Solutions, 5(1), pp.65-81. 92 Tayal, Vishal K., Anwesh R. 2018.

Ashari Nasution, R., Arnita, D., & Fatimah Azzahra, D. (2021). Digital Readiness and Acceptance of Mobile Advertising. *Australasian Marketing Journal*, *29*(1), 95-103.

Azis, I.J., and H.S. Shin. 2015. Global Shock, Risks, and Asian Financial Reform. Cheltenham: EdwardElgar.http://UCT.eblib.com/patron/FullRecord.aspx?p=1890461. Date of access: 12 Aug 2020.

Bariet, M. Oborn, E. Orlikawaski, W.J. Yates, J. (2012). Reconfiguring boundary relations of robotic innovations in pharmacy work. Orginization science, 23(5):1448-1466.

Bentler, P.M. (1990), Comparative fit indexes in structural models. Psychological bulletin, *107*(2): 238-46.

Bentler, P.M. & Bonnet, D.C. (1980), Significance tests and goodness of fit in the analysis of covariance structures. Psychological bulletin, *88*(3): 588-606.

Bryman, A., & Bell, E. (2007). Business research methods, Oxford: Oxford University Press.

Bujang, M., & Adnan, T. (2016). Requirements for Minimum Sample Size for Sensitivity and Specificity Analysis. *Journal of Clinical & Diagnostic Research*, YE01-YE06.

Byrne, B. (2012). Structural equation modeling with Mplus: Basic concepts, New York: Taylor & Francis.

Byrne, B. M. (2001). Structural equation modeling with AMOS, EQS, and LISREL: Comparative approaches to testing for the factorial validity of a measuring instrument. *International journal of testing*, 55-86.

Cilliers, L., Viljoen, K. L. A., & Chinyamurindi, W. T. (2018). A study on students' acceptance of mobile phone use to seek health information in South Africa. *Health Information Management Journal*, *47*(2), 59-69.

Cohen, J. (1988). *Statistical Power Analysis for the Behavioral Sciences.* Hillsdale: Lawrence Earlbaum Associates.

Costa, E., Soares, A., & de Sousa, J. (2017). Institutional networks for supporting the internationalisation of SMEs: the case of industrial business associations. *Journal of Business & Industrial Marketing*, 1182-1202.

Creswell, J.W. & Creswell, J.D. (2018). Research design qualitative, quantitative, and mixed methods approach, 5th edition. Los Angeles: Sage.

Creswell, J.W. & Poth, C.N. (2018). Qualitative inquiry & research design among amongst five approaches, 4th edition. Singapore: Sage.

Cuneyt, D. (2015). The impacts of robotics, artificial intelligence on business and economics. Volume 195, 564-573.

Dawson, P.M. (1994). Organizational quantitative change: A processual approach. London Paul Chapman Publishing.

Dekoulis, G. (2017). Robotics-legal, ethical, and socioeconomic impacts, ethical reflections

about services robotics, from human protection to enhancement. Case study on cultural heritage.

Duffy, B., Smith, K., Terhanian, G. & Bremer, J. (2005). Comparing data from online and face-to-face surveys. International market research journal, *47*(6): 615-639.

Duncan, A. (2020). Why Is Digital Transformation So Hard in China? Retrieved from https://www.campaignasia.com/article/why-is-digital-transformation-so-hard-inchina/465877

Durrheim, K. (2006). Research design. In Research in Action: Applied methods for the social sciences (pp. 33-59).

Fraering, M., & M.S. Minor, (2006). Sense of community: An exploratory study of US consumers of financial services. International journal of Bank marketing, *24*(5): 284-306.

Gonzalez, C. (2018). Robotic dispensing improves patients' safety, inventory management, and staff satisfaction in an outpatient hospital pharmacy.

Hair, J.F., Bush, R.P. & Ortinau, D.J. (2009). Market research: Within a changing information environment. Cape Town*:* Juta and Company*.*

Hassen, E. (2017, December 8). The Pharmaceutical Industry in South Africa. Retrieved from African Business Information:

https://www.whoownswhom.co.za/store/info/4557

Heale, R., & Twycross, A. (2015). Validity and reliability in quantitative studies. Evidence Based Nursing Online.

Henriette, E., Boughzala, I., & Feki, M. (2015). The shape of digital transformation: A systematic literature review. In Information Systems in a Changing Economy and Society: MCIS2015 proceedings. The Association for Information Systems, 431-443. Retrieved from https://aisel.aisnet.org/mcis2015/10

Hill, R. (1998). What sample size is "enough" in internet survey research? *Interpersonal* Computing and Technology: An Electronic Journal for the 21st Century, 3-4.

Ho, B. (2018, June 13). Change Readiness in a World of Digital Transformation. Retrieved from AON Human Capital: https://www.asia.aonhumancapital.com/home/insights-at-work/change-readinessin-digital-transformation

Hoyng, M., & Lau, A. (2020). Challenges for Leadership in the Digital Era: How to Enhance Employees' Digital Readiness. Academy of Management.

Iyawa, G. E., Hamunyela, S., Peters, A., Akinsola, S., Shaanika, I., Akinmoyeje, B., & Mutelo, S. (2020). Digital Transformation and Global Health in Africa. Handbook of Global Health, 1-32.

Keith, T. (2015). *Multiple regression and beyond: An introduction to multiple regression and structural equation modeling, 2nd edition.* New York: Routledge Publishers.

Kerraghan, K. (2014). The rights and wrongs of robotics: Ethics and robots in public organizations.

Khubone, T., Tlou, B., & Mashamba-Thompson, T. P. (2020). Electronic health information systems to improve disease diagnosis and management at point-of care in low- and middle-income countries: a narrative review. Diagnostics, *10*(5), 327.

Kline, R. (2016). Principles and practice of structural equation modeling. New York: The Guilford Press.

Koh, A., Swanepoel, D. W., Ling, A., Ho, B. L., Tan, S. Y., & Lim, J. (2021). Digital health promotion: promise and peril. *Health Promotion International*, *36*(Supplement_1), i70-i80.

Kohrt, B. A., Rai, S., Vilakazi, K., Thapa, K., Bhardwaj, A., & van Heerden, A. (2019). Procedures to select digital sensing technologies for passive data collection with children and their caregivers: qualitative cultural assessment in South Africa and Nepal. JMIR paediatrics and parenting, *2*(1), e12366.

Korstanje, J. (2021, June 27). Structural Equation Modeling. Retrieved from Towards data science: https://towardsdatascience.com/structural-equation-modelingdca298798f4d

Kraus, S., Schiavone, F., Pluzhnikova, A., & Invernizzi, A. C. (2021). Digital transformation in healthcare: Analyzing the current state-of-research. *Journal of*

Law, M. Zeng, S. Koo, J. (2021). Perceptions of community pharmacist to implementing Technologies in the workplace.

Lichocki, P. Kahn, P.H. Billard, A. (2011) The ethical landscape of robotics. Journal: IEEE Robotics and Automation magazine.

Malhorta, N.K. (2009). Marketing research: An applied orientation, 6th edition. New Jersey: Prentice Hall.

Malhorta, N. K. (1996). Marketing research: An applied orientation, 2nd edition, New Jersey: Simon & Schuster.

Manyazewal, T., Woldeamanuel, Y., Blumberg, H. M., Fekadu, A., & Marconi, V. C. (2021). The potential use of digital health technologies in the African context: a systematic review of evidence from Ethiopia. *NPJ digital medicine*, *4*(1), 1-13.

Masana, N., & Muriithi, G. M. (2019, March). Adoption of an integrated cloud-based electronic medical record system at public healthcare facilities in Free-State, South Africa. In *2019* Conference on Information Communications Technology and Society *(ICTAS)* (pp. 1-6). IEEE.

Maskew, M., Brennan, A. T., Fox, M. P., Vezi, L., Venter, W. D., Ehrenkranz, P., & Rosen, S. (2020). A clinical algorithm for same-day HIV treatment initiation in settings with high TB symptom prevalence in South Africa: The SLATE II individually randomized clinical trial. *PLoS medicine*, *17*(8), e1003226.

Masterson, S. S., Lewis, K., Goldman, B. M., & Taylor, M. S. (2000). Integrating justice and social exchange: The differing effects of fair procedures and treatment on work relationships. Academy of Management Journal, 738-748.

Mazibuko-Makena, Z., & Kraemer-Mbula, E. (2021). Final reflections: Towards an inclusive and sustainable Fourth Industrial Revolution in Africa. Leap 4.0. African Perspectives

on the Fourth Industrial Revolution: African Perspectives on the Fourth Industrial Revolution, 417.

Mbunge, E., Batani, J., Gaobotse, G., & Muchemwa, B. (2022). Virtual healthcare services and digital health technologies deployed during coronavirus disease 2019 (COVID-19) pandemic in South Africa: a systematic review. *Global Health Journal*.

Mbunge, E., Muchemwa, B., & Batani, J. (2022). Are we there yet? Unbundling the potential adoption and integration of telemedicine to improve virtual healthcare services in African health systems. *Sensors International*, *3*, 100152.

McCombes. (2019, September 2021). *An introduction to sampling methods*. Retrieved from Scribbr: https://www.scribbr.com/methodology/sampling-methods/

McLeod, S. (2019). *What's the difference between qualitative and quantitative research?* Retrieved from Simply Psychology: https://www.simplypsychology.org/qualitativequantitative.html

McDaniel, C. & Gates, R. (2006). Marketing research: With SPSS, 7th Edition. John Wiley & Sons.

Memon, M., Ting, H., Cheah, J., Thurasamy, R., Chuah, F., & Cham, T. (2020). Sample Size for Survey Research: Review And Recommendations. *Journal of Applied Structural Equation Modeling*.

Merriam, S. (2009). *A guide to design and implementation: Qualitative research science and education.* New York: Jossey-Bass.

Miller, B. (2020, January 27). *Advantage and Disadvantages of Quantitative Research*. Retrieved from Green Garage: https://greengarageblog.org/15-advantages-anddisadvantages-of-quantitative-research

Miller, R. L. & Brewer, J. D. (2003). The A-Z of social research. Sage: London.

Minichiello, V., Aroni, R., Timewell, E., & Alexander, L. (1990). *In-depth interviewing: Researching people.* Melbourne: Longman Cheshire.

Moonasar, D., Pillay, A., Leonard, E., Naidoo, R., Mngemane, S., Ramkrishna, W., ... & Pillay, Y. (2021). COVID-19: lessons and experiences from South Africa's first surge. *BMJ Global Health*, *6*(2), e004393.

Moore, A., & Hawarden, V. (2020). Discovery Digital Health strategy: COVID-19 accelerates online health care in South Africa. *Emerald Emerging Markets Case Studies*.

Muaz, J. M. (2013). Practical Guidelines for conducting research. In *Summarizing good research practice in line with the DCED Standard.*

Mueller, R. O., & Hancock, G. R. (2019). Structural equation modeling. In G. Hancock, L. Stapleton, & R. Mueller, *The reviewer's guide to quantitative methods in the social sciences* (pp. 445-456). Routledge/Taylor & Francis Group.

Nasution, R. A., Rusnandi, L. S., Qodariah, E., Arnita, D., & Windasari, N. A. (2018). The Evaluation of Digital Readiness Concept: Existing Models and Future Directions.

The Asian Journal of Technology Management, 94-117.

Nemoto, T., & Beglar, D. (2014). Likert-scale questionnaires. *JALT 2013 conference proceedings*, (pp. 1-8). Japan.

Netemeyer, R., Bearden, W., & Sharma, S. (2003). *Scaling Procedures: Issues and Applications.* SAGE.

Ngusie, H. S., Kassie, S. Y., Chereka, A. A., & Enyew, E. B. (2022). Healthcare providers' readiness for electronic health record adoption: a cross-sectional study during preimplementation phase. *BMC health services research*, *22*(1), 1-12.

Nunally, J.C. (1978). Psychometric theory. 2nd edition. New York: McGraw-Hill.

O'Rourke, N. & Hatcher, L. (2013). A step-by-step approach to using SAS for factor analysis, and structural equation modelling. 2nd edition. North Carolina: SAS Institute Inc.

Ong, M., & Puteh, F. (2017). Quantitative data analysis: Choosing between SPSS, PLS, and AMOS in social science research. *International Interdisciplinary Journal of Scientific Research*, 14-25.

Otieno, O. C., Liyala, S., Odongo, B. C., & Abeka, S. (2016). Theort of Reasoned Action as an Underpinning to Technological Innovation Adoption Studies. *World Journal of Computer Application and Technology*, 1-7.

Pallant, J. (2001). *SPSS survival manual - a step by step guide to data analysis using SPSS for windows (version 10).* Buckingham Open University Press.

Parekh, D., Kapupara, P., & Shah, K. (2016). Digital Pharmaceutical Marketing: A Review. *Research J. Pharm. and Tech*, 108-112.

Pharmaceutical Technology. (2021, July 23). COVID-19 accelerated digital transformation of the pharma industry by five years: Poll. Retrieved from Pharmeutical Technology:

https://www.pharmaceutical-technology.com/news/covid-19-accelerated-digital-transformation-of-the-pharmaindustry-by-five-years-poll/

Ratanjee-Vanmali, H., Swanepoel, D. W., & Laplante-Levesque, A. (2019). Characteristics, behaviours, and readiness of persons seeking hearing healthcare online. International Journal of Audiology, *58*(2), 107-115.

Ratanjee-Vanmali, H., Swanepoel, D. W., & Laplante-Lévesque, A. (2020). Strengthening the Role of the Audiologist in the Digital Age. The Hearing Journal, *73*(6), 38-39.

Ratanjee-Vanmali, H., Swanepoel, D. W., & Laplante-Lévesque, A. (2020). Digital proficiency and teleaudiology: key implications in hearing care. The Hearing Journal, *73*(9),18-20.

Research Methods in the Social Sciences: Deductive, inductive, and abductive approaches. (n.d.). Retrieved from Elearning.net:

http://elearning.net.marjon.ac.uk/researchskills/researchmethods/researchsocscimo_251110/html/course files/deductive_4_2.html

Rhoades, L., & Eisenberger, R. (2002). Perceived organizational support: A review of the literature. *Journal of Applied Psychology*, 698-714.

Rhoades, L., Eisenberger, R., & Armeli, S. (2001). Affective commitment to the organization: The contribution of perceived organizational support. *Journal of Applied Psychology*, 825-836.

Ronkko, M., & Cho, E. (2020). An Updated Guideline for Assessing Discriminant Validity. *SAGE*, 6-14.

Ruhle, F. Braun, R. Ostermann, F. (2009). Impact of robotics dispensing machines in German

pharmacies on Business performance. Journal: Libyan journal of medicine.

Schumacker, R., & Lomax, R. (2004). *A beginner's guide to structural equation modeling, 2nd edition.* New Jersey: Lawrence Erlbaum Associates.

Schwab, D.P. (2006). Research methods for organisational studies. 2nd edition. New York: Psychology Press. pp. 32-34.

Schwertner, K. (2017). Digital Transformation of Business. *Trakia Journal of Sciences*, 388-393.

Self, D. (2007). Organizational change-overcoming resistance by creating readiness. Development and Learning in Organizations, 11-13.

Shore, T., Sy, T., & Strauss, J. (2006). Leader responsiveness, equity sensitivity and employee attitudes and behaviour. *Journal of Business and Psychology*, 227-241.

Soper, D. (2021). *A-priori Sample Size Calculator for Structural Equation Models [Software]*. Retrieved from https://www.danielsoper.com/statcalc

Stein, C. M., Morris, N. J., & Nock, N. L. (2012). Structural equation modeling. Statistical. *Methods in Molecular Biology*, 495-496.

Stein, C. M., Morris, N. J., & Nock, N. L. (2012). Structural equation modeling. Statistical Human Genetics: Methods and Protocols. *Methods in Molecular Biology*, 495-496.

Stein, C., Morris, N., & Nock, N. (2012). Structural equation modeling. Statistical Human Genetics: Methods and Protocols. *Methods in Molecular Biology*, 495-496.

Tabachnick, B., & Fidell, L. (2007). *Using multivariate statistics, 5th edition.* New York: Allyn and Bacon.

Triandis, H. (1980). Values, Attitudes, and Interpersonal Behaviour. *Nebraska Symposium on Motivation* (pp. 195-259). Lincoln: University of Nebraska.

Types of Sampling: Sampling Methods with Examples. (n.d.). Retrieved from QuestionPro: https://www.questionpro.com/blog/types-of-sampling-for-socialresearch/

Ubaidillah, E., Gunawan, I., Adha, M., Ariyanti, N., & Erviana, Y. (2020). Students Perception of Technology-Assisted Services and Readiness of Employee Digital Competencies in Covid-19 Pandemic Era. Proceedings of the 6th International Conference on Education and Technology *(ICET 2020)* (pp. 151-156). Atlantis Press.

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003, September). User Acceptance of Information Technology: Toward a Unified View. *MIS Quartely, 27*(3), 425-478. Retrieved August 2021, from https://www.jstor.org/stable/30036540

Venter, M., Craffert, L., Van Greunen, D., Veldsman, A., Candi, M., & Sigurdarson, H. T. (2019). Diagnosis of the digital landscape in south Africa-skills, infrastructure, and available technologies. *European Union Erasmus Plus*.

Verina, N., & Titko, J. (2019). Digital transformation: conceptual framework. contemporary issues in business, management, and economics engineering'2019. Vilnius.

Vial, G. (2019). Understanding digital transformation: A review and a research agenda. Journal of Strategic Information Systems, 118-144.

Vyas, M. Thakur, B. Riyaz, B. Bansal, K.K. Tomal, B. (2018). Artificial intelligence: The beginning of a new era in Pharmacy profession.