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Evaluating the Interconnectivity Between Different Security Solutions and Their Effectiveness in Preventing Crime: A Case Study of Retail Supermarkets in the United Kingdom



Christopher Ikenna Onumonu

1811291

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ABSTRACT

Despite many retail supermarkets having invested in security systems, the rate of crime is on the increase. According to the British Retail Crime Report (2023) there has been a steady and significant increase in retail crime since the 2019 report and a subsequent loss to retailers. Incidents of violence to retail staff stood at 850 per day in 2021/2022, the cost of retail crime was £1.76b, there were eight million incidents of theft over the year and a total of £715 million was spent on crime prevention. It seems criminals are beating the security systems despite the huge investment by supermarkets. To date, there has not been much research into security solutions and their effectiveness in combating retail crime especially when they are interconnected in use.

This research aims to examine the issue of the lack of or reduced interconnectivity between different security solutions in use in retail supermarkets as a probable cause of their continuous porosity in combating retail crime using Sainsbury's and Aldi as case studies. The objective is to propose a crime prevention framework that is adoptable in retail supermarkets.

This thesis adopts a mixed method approach and a philosophical underpinning of pragmatism which allows and guides the use of a variety of approaches to answer research questions that cannot be addressed using a single method." The mixed method is a combination of quantitative data gathered through questionnaires and qualitative data acquired through interviews. The field of study is the UK retail supermarket, and the sample population is drawn from two major retail supermarkets Aldi and Sainsbury's as it is impossible to cover all the retail supermarkets in the UK. The data are analysed through the SPSS and NVivo tools.

As the issue of the effectiveness of security solutions is addressed, it becomes necessary to identify the strategic gap between their actual and potential performance so that steps can be taken to address identified shortfalls. This will also help to examine the concept of interconnectivity between security solutions as a probable strategy to their effectiveness in combating retail crime. The Ishikawa fishbone model is used as a theoretical tool to examine the cause and effect of retail crime. This will identify other causes that affect the effectiveness of security solutions.

This thesis develops a Hierarchical Taxonomy of Crime Prevention Framework which is in line with the findings using the Ishikawa model. This is the classification of the actions in hierarchical needs to achieve a tailored crime prevention framework for retail supermarkets. The research also suggests steps for situation prevention in supermarkets which can be used in conjunction with interconnected security solutions for effective crime monitoring, prevention, and reduction.

DECLARATION

This work has not previously been accepted in substance for any degree and is not being concurrently submitted in candidature for any degree.



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STATEMENT 1

This thesis is the result of my own investigations, except where otherwise stated. Where correction services have been used the extent and nature of the correction is clearly marked in a footnote(s). Other sources are acknowledged by footnotes giving explicit references. A bibliography is appended.



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STATEMENT 2

I hereby give consent for my thesis, if accepted, to be available for deposit in the University's digital repository**.**



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Dedication

This DBA thesis is dedicated to:

My dearest wife Mrs Lolo Amelia Jane Adaeze Onumonu, “Obidiya” (Nnee Wilkinson).

‘’Your love, unflinching support, and determination to be by my side since our marriage in 1995, both in difficult and good times, cannot be measured.’’

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ABBREVIATIONS AND ACRONYMS

AAM	Alarm Alert Mechanism
AI	Artificial Intelligence
APT & Si	Assert, Protection, Threat, in a given Situation
ASCONE	Approach, Selection, Concealment, Observation, Non-payment, and Exit
BSIS	Bureau of Security Board and Investigative Services
BRC	British Retail Consortium
BWC	Body Worn Camera
BCR	Benefit-Cost Ratio
COT	Crime Opportunity Theory
CCTV	Closed circle television
CPTED	Crime Prevention Through Environmental Design
CS	Chi-Square
COT	Crime Opportunity Theory
CoT	Charter of Trust
CTF	Capture-The-Flag
CPF	Crime Prevention Framework

D2D	Device-to-Device
EAS	Electronic article surveillance
FMCG	Fast Moving Consumer Goods
FBI	Federal Bureau Intelligent
IT	Information Technology
IoT	Internet of Thing
MOA	Mechanism of action
NFV	Network Function Virtualization
ORC.	Organised Retail Crime
PPSB	Private Protection Services Board
PSIA	Private security industry Act
PII	Personally Identifiable Information
QDA	Quality Data Analysis
QSR	Qualitative Research Software Developer
RAT	Routine Activity Theory
RQ	Research Questions
RO	Research Objectives

RFID	Radio Frequency Identification
SCONE	Selection, Concealment, Observation, Non-payment, and Exit
SIA	Security Industry Authority
SITO	Security Industry Training Organisation
SDN	Software Defined Networking
SAST	Static Application Security Testing Tools
SST	Self-scanning Theft
SPSS	Statistical Package for the Social Sciences
SSQ	Security Solution Questions
TRA	Theory of Reasoned Action
UWTSD	University of Wales Trinity Saint David
UK	United Kingdom
VMs	Virtual Machines

CHAPTER ONE
INTRODUCTION

1.1 Introduction

This chapter presents the foundation of this research. It discusses the nature of the study, the significance of the research, research questions to be explored, aims and objectives to be achieved, the hypothesis to be tested, assumptions, limitations, and delimitations and closes with the research outline.

There has been a steady and continuous increase in retail crime in the UK, Europe, USA and everywhere (National Retail Security Survey, 2003).

Retail supermarkets throughout the world use many and various security systems to protect their premises. This is done with the aim of reducing or eliminating risks that come from external and internal criminal activities. This research will evaluate how the security systems are used in two supermarkets in the UK and how the systems can work together for effective performance. Theft crimes in supermarkets has become a serious challenge for businesses while conducting their legitimate operations, these cause retailers to bring in situational crime prevention measures for routine precaution (Hayes et al., 2011).

The research adopts both methods of qualitative and quantitative reasoning (Brannen, 2005). The mixed methods will involve the collection of data through questionnaires for quantitative purposes and interviews (semi-structured) for qualitative purposes.

Adopting the qualitative method of research is so pertinent to this research to explore, describe and express the experiences of participants and characterise their thoughts on the subject matter which might have been difficult with the sole adoption of quantitative method (Cottrell and Donaldson 2013). The use of the quantitative method is necessary for examining relationships between variables and measuring data numerically (Venkatesh et al., 2013). Adopting quantitative methods only would not have helped in exploring the strategies used by retail supermarkets in curtailing crime as it is very important to understand certain patterns of behaviour and choices made by retailers in relation to the adoption of certain security measures in their stores. (Venkatesh et al., 2013)

The adoption of the mixed method is to expand and strengthen the conclusions of this research which I believe will contribute to the body of knowledge and fill the existing gap in the study of security solutions in relation to the retail industry.

This research is evidence based as its aim is to investigate how the three different security solutions–i.e. physical, systems and cyber securities–work effectively within a retail environment with special focus on crime prevention or reduction.

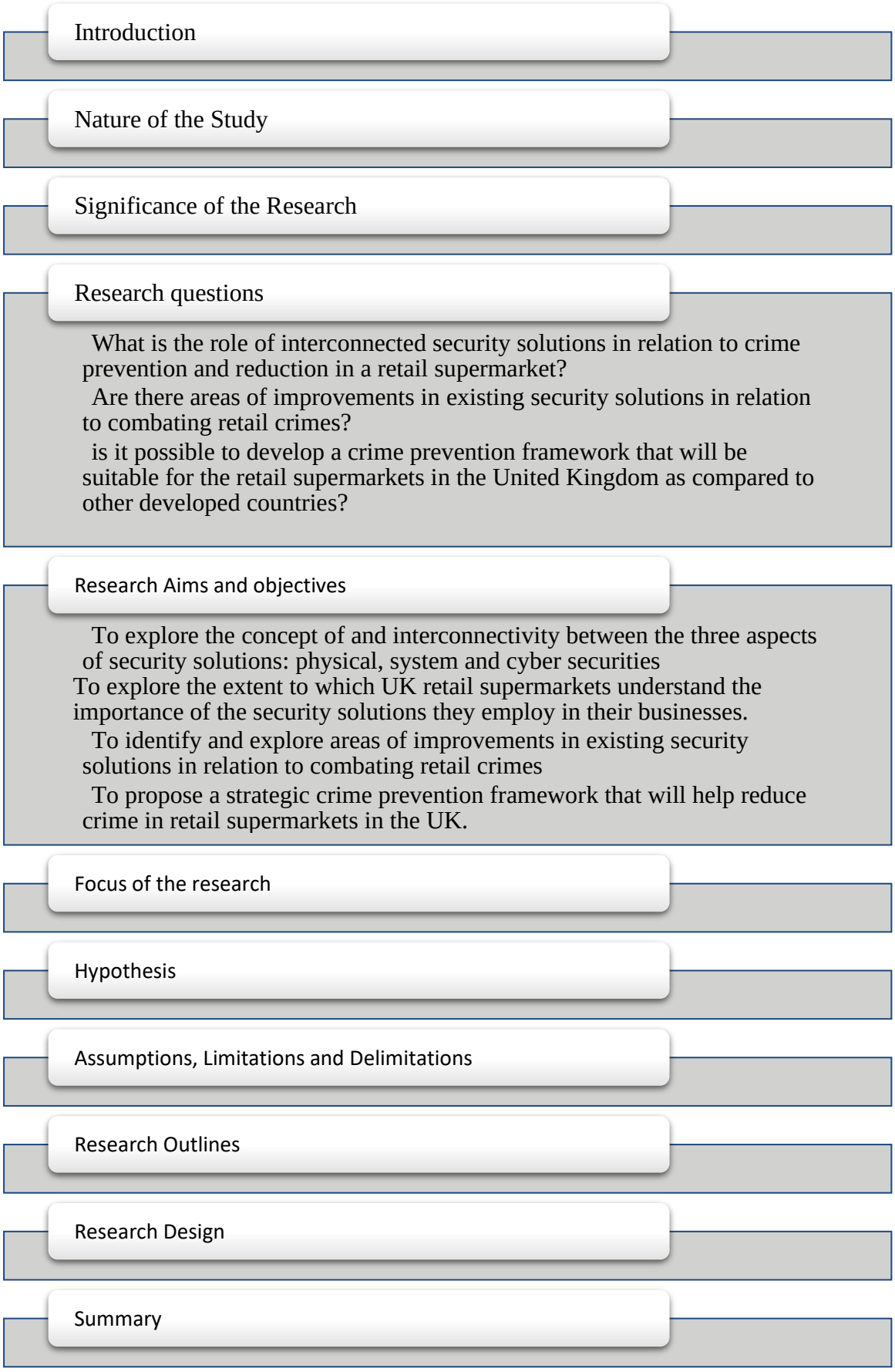
This research provides contextual mechanisms of action (MOA) that will evaluate the effectiveness of the systems and solutions which will be recommended for the purpose of future application. It will provide the accurate evidence of the three security solutions, the current mechanism of actions (MOA) on the supermarkets and the present real-world efficacy, (Security Journal, 2011).

The effectiveness and interconnectivity between the existing security solutions is hypothesised which leads the research to the triangular security systems. The essence of the investigation into their connectivity is to postulate how they can be improved upon to enhance the security of people, premises, and property in a typical retail supermarket in the UK.

The research design is a case study of Open Learn (2020) which involves a focus or comprehensive study on two retail supermarkets in the UK (Aldi and Sainsbury's). Data that will be gathered from selected retail supermarkets will come from primary sources such as questionnaires and direct interviews and secondary sources which are from existing literature, websites and articles or publications from the internet.

According to Yin (2013), multiple case study design gives a researcher an opportunity to understand the different dynamics of the organisations under study. De Massis and Kotler (2014) are also of the opinion that multiple case study enables the researcher to compare situations that lead to the adoption of certain strategies which in this case deals with the security solutions adopted by retail supermarkets under study. Expounding on other research designs such as phenomenological and ethnographic studies, I found that these would not be necessary to my research because phenomenological is a subjective interpretation of human experience (Mayoh and Onwuegbuzie, 2013) while ethnography studies the cultural experiences of a people in a particular setting according to Cruz and Higginbottom (2013) which is not the focus of this research. Therefore, my choice of multiple case study helps me to study a phenomenon from different angles.

Figure 1: Graphical representation of chapter one



1.2 Research Significance

The significance of this study shows basically the importance of the research work. Therefore, I will highlight below, how this research will be beneficial to security solutions and their effectiveness in preventing crime in retail supermarkets in the United Kingdom.

a. Contribution to further study on security solutions

Firstly, from my research on security solutions and the security industry, I discovered that there are extremely limited studies or research carried out that can help security companies thrive. Security research does not enjoy a wider coverage or interest as seen in other fields of research. This might be discouraging to prospective researchers in the field of security because of the possible challenges that might arise from limited access to resources for their research. So, I believe this research will contribute to the body of knowledge around security and retail and spark further interest in security studies especially in relation to retail supermarkets.

b. Contribution to the effective provision and use of security solutions

Secondly, having worked in the security industry for twenty-five years starting out as a security guard to being an employer of over four hundred employees, I have seen the evolution of security solutions over the years. My main area of business is in the retail sector with special concentration on retail supermarkets. My company is a provider of security solutions and would love to know how to be more effective in meeting the needs of my clients in the retail sector with the different security solutions my business provides. The major aim of security services includes crime reduction or prevention, but the question is to what extent do these security services meet the needs of intended clients? I do not just want to provide security solutions to my clients, I want to know if I am meeting their needs or not. I want to find out more on how the interconnectivity between the existing security solutions works especially in helping client's organisations reduce crime in their stores or online. I look forward to conducting this research so I can discover the best way to advise clients on the right security solutions they could employ based on their needs. I want the findings of this research to contribute to the body of knowledge in both the security industry and the retail sector so security companies and retail supermarkets can benefit from the results.

This research will help me to bring innovation and recommendations to retail companies and the security industry as well.

The research will also put me in a specialist position within the security industry as I will be able to provide both academic and practical advice on security solutions.

1.3 Research Questions

The following research questions shall be answered in this study, they are:

1. What is the role of interconnected security solutions in relation to crime prevention and reduction in a retail supermarket?
2. Are there areas of improvements in existing security solutions in relation to combating retail crimes?
3. Is it possible to develop a crime prevention framework that will be suitable for the retail supermarkets in the United Kingdom as compared to the other developed countries?

1.4 Research Focus

This research will be based on the retail sector in the UK with special focus on the retail supermarkets. Most retail companies cannot survive without putting security measures in place. For instance, 98 percent of retail companies have their check out tills at the entrance of their stores which is part of the security measures. Retail shrinkage monitoring in 1995 showed that the retail stores were losing the equivalent of 0.3 per cent of their gross revenues which have taken up to 20 to 30 percent of their profit (Tonglet et al., 1997). In view of this, the retail sector spent 449.7 million pounds on security and crime prevention between 1995 and 1996 (Wells and Dryers, 1997).

Fast forward to 2019, the total UK retail crime losses that year were estimated to be £4,821m (Retail Crime Report 2019). In recent times with the British Retail Crime Report of 2023, there had been a significant increase from the 2019 report on retail crime and subsequent loss to retailers. Incidents of violence to retail staff stood at 850 per day in 2021/2022, cost of retail crime was £1.76b, crime incidents were 8 million including theft over the year and a total of £715 million was spent on crime prevention which is like a 40% increase from the 1996 security expenditure.

1.5 Conceptual Framework

The conceptual framework for this research is based on the cause-effect framework of Ishikawa (1968). He developed a cause-effect diagram that is also known as fishbone which is a tool used to search for problems or the root of an issue (Slack et al., 2001). This comes with the

usual question of what is going wrong, when, how, why and going through how the root of the problem can be resolved.

The fishbone can be adapted to suit the needs of the research depending on the context it is applied. Originally, Ishikawa developed it for the manufacturing sector for quality management purposes. Over the years many sectors including sales, marketing and management have been able to use the fishbone in relation to their specific needs. This framework is well suited for this research as the aim is to help retail supermarkets manage crime and reduce retail shrinkage that comes from criminal activities. So, examining the effectiveness of their security system is needed in order that their organisational goal can be achieved.

Most retail shops open seven days a week, therefore, their daily, weekly, and annual activities should have a framework that could focus on developing problem-solving tools or techniques for operation managers in the three different security aspects as stated by (Slack et al.,2001).

1.6 Hypothesis

Hypothesis 1: Use of interconnected security solutions can increase their effectiveness in relation to crime reduction in retail supermarkets.

Hypothesis 2: Adopting a crime prevention framework can help reduce retail crime in supermarkets.

1.7 Aim and Objectives

Aim

To establish the interconnectivity between existing security solutions and their effectiveness in reducing crimes in retail supermarkets

This research aims to achieve the following objectives:

1. To explore the concept of and interconnectivity between the three aspects of security solutions: physical, system and cyber securities.
2. To explore the extent to which UK retail supermarkets understand the importance of the security solutions they employ in their businesses.
3. To identify and explore areas of improvements in existing security solutions in relation to combating retail crimes.
4. To propose a strategic crime prevention framework that will help reduce crime in retail supermarkets in the UK.

1.8 Background to the Study

The reliance on the security systems by retail supermarkets to carry out their daily businesses and the competitiveness among themselves have increased over the last decade (Grant & Royle, 2011). From my personal experience of being in the front line of security for 25 years, the trajectory of criminal activities has become unbearable in retail supermarkets. Shoplifters' threats have increased in the supermarkets consisting of more danger to their employees and customers. Employees and security personnel are frequently at the risk of being abused and violated as these culprits make away with stolen products (Bisong & Rahman, 2011). As stated by Susanto et al. (2011), the ineffectiveness and obsolete security systems have become a threat to the closure of many supermarkets. The research that was carried out by Ernst and Young in 2013 showed that 93% of large companies and 87% of small businesses have reported that there has been an oversight by the owners of supermarkets on security systems thereby causing them a great fortune. In response to this, these stores are trying to find out the best security systems that they can use and how these can be enhanced (Chai, Kim, & Rao, 2011). Moreover, White, Hewitt, and Kruck (2013) stated that some security companies contracted by retail supermarkets lack the required expertise and knowledge to combat threats to their business.

Therefore, this research is set to examine the possible causes of ineffectiveness (if there is any) in existing security systems in relation to crime reduction in a retail setting and to see how supermarkets can benefit maximally from the use of security solutions. One of the steps that will be needed is to examine the existing policies that are in place in supermarkets to deal with situations and the guidelines that have to be followed by the management when incidents occur. The research will look at the extent to which the employees of the supermarket and security personnel are conversant with the security systems including training updates for those involved in security management of the store.

In the UK, supermarket chains are big businesses and there are about 10 main supermarkets in the UK. All the supermarkets use different types of security, so this research examines the adoption of security systems in two supermarkets.

There are three main different types of security solutions that are commonly used in the retail environment, system, cyber and physical security. The effectiveness of these three systems will be investigated and the interconnectivity will be postulated to find out the best way to guard the supermarkets and how the security systems can be utilised. The study will investigate the

effectiveness and interconnectivity of the security solutions which can be called the triangular security systems. Despite the use of security systems in stores, shop owners still experience financial loss arising from employee theft, customer theft, internal or administrative or process error and the supplier-vendor frauds (Moorthy et al., 2015). These situations sometimes lead to in-store violence there by putting employees and customers at great risk (Hayes, 2003). As theft causes inventory shrinkage which negatively impacts the business, the question that arises is where is the effectiveness of security systems?

This study will investigate why shop owners experience these losses and the answer to this could be from the ineffectiveness of the systems or lack of proper understanding of the interconnectivity between the systems. It could also be that some existing systems are outdated and not strong enough to combat the smartness of criminals. These are speculations which will be investigated in this research with the aim of making appropriate recommendations on the effectiveness of the security solutions that could lead to the reduction of crime in retail supermarkets. Despite the fact that some supermarkets increase their spending to reduce criminality in their stores, shoplifting keeps increasing, the study will look into the psychological ownership of the personnel working at those places and the store owners deterring these crimes through their intervention behaviours to reduce these criminalities. The factors that lead to the propensity to intervene by the staff when they are witnessing deviant shoplifters, (Elsevier, 2018)

Few years back there was a Global retail shrinkage survey that was carried out by Retail Theft Barometer, which is updated every year by the Centre for Retail Research. The survey carried out in 2011 showed that customer theft was, 35.0%, employee theft, 16.2%, internal error 16.2%, and 5.6% was because of the frauds of suppliers-vendor. Subsequent research shows that retail shrinkage has been on the increase as a result of incessant retail crime. Therefore, this research will focus on the systems currently in place and how they can be used to limit the losses in future as this shrinkage affected 43 countries costing retailers billions of pounds which is equivalent to 1.45% of total retail sales (Centre for Retail Research 2019).

Supermarkets invest huge sums of money in systems that are designed to prevent shoplifting, but little is known about the perception that shoplifters have about the security systems and the technique that the shoplifters use to manoeuvre the security measures. (Lasky et al., 2016).

These security systems in place can be used as potential deterrence that will be part of security measures to counter moves by shoplifters in stealing merchandise successfully. (*Security Journal,*2017). Retailers invest a huge amount in systems as shoplifting is one of the most common crimes in the world but among the least detected or reported (Clarke, 2002).

It is a well-known fact that shoplifting is very harmful to supermarkets, retail establishments, shop owners, customers, and the UK economy. Supermarkets allocate a big budget to the security systems aimed at reducing these criminalities (Schultz, 2011).

Some of these techniques include closed circuit television (CCTV), electronic article surveillance (EAS), and the packaging that are specially designed against shoplifters, all these are part of the systems security. The research will focus on the effectiveness of these systems which can be questionable as shoplifters continue to develop counter-techniques to successfully steal from supermarkets. (Lasky et al., 2016).

This research will consider the effectiveness of existing security solutions including the anti-shoplifting mechanism in place in two different supermarkets. This will be done from the perspective of the managers of the retail shops, customers, security personnel working in those shops and the employment of these security devices (Ekblom, 1997).

In considering the effectiveness of security solutions in retail supermarkets, it will be necessary to review the systems that have been employed and the effectiveness of all the anti-shoplifting security devices. Employees that work with security systems and as physical securities will be interviewed and questionnaires will be sent out to the rest of the sample population. The data that will be collected will be analysed to see how effective each one of the systems perform. It will also show the security measures that are more effective in crime prevention and deterrence. The outcome will be discussed to recommend how to outmanoeuvre the criminals and the use of systems can be maximised.

There are situations when retailers and supermarkets conceive new security measures to deter shoplifters, but the criminals quickly come with countermeasures in order to be ahead of the retail supermarkets.

This study will evaluate the necessary steps that retail supermarkets can take to enhance the effectiveness of the systems in place in preventing and reducing crimes especially in ensuring that criminal tactics are detected and combated.

According to Ekblom, (1999), it might be very hard to completely stop the activities of retail criminals, but it is possible to enhance the security systems so that the scale is in favour of prevention and reduction of crime. He further stated that the systems focus on ways to avoid criminals getting away with their criminal activities by anticipating offenders' moves in advance. To do so, Ekblom (2012, 2014) suggested that the systems need to be aligned with the offenders' perspectives and to use that knowledge to predict their likely counter moves. This will require the systems apparatus in place to be flexible in order to adapt to any change that might arise. It is known that when systems have been in place for long, they become less effective if they are not updated periodically leading to obsoleteness as the offenders become used to techniques in response (Ekblom, 2014).

This study will focus on appraising the current systems in place to find out whether they are really being used maximally to prevent loss in the two supermarkets as there are always active shoplifters. This research will be evidence based to evaluate the three security solutions which are systems, physical and cyber securities, and the evaluation of their performance will be part of the subject matter of this study. The result can be used as evidence-based loss prevention (Hayes, 2006) and to update past records of criminality in the retail environment for future references. (Butler, 1994; Gill et al., 1999; Carmel-Gilfin, 2011).

From the various studies published on the effectiveness of security systems in supermarkets by Handford, (1994); Sherman et al., (1997); Beck and Willis, (1999); Hayes and Blackwood, (2006), very little is known about the triangular security systems and how effective they can be. In retrospect, past interviews have been conducted on those that manage the systems and the offenders as stated by Gill et al, 1999; Hayes, 1999 and Cardone, 2006, which showed how criminals react when they are confronted by a security system. It is imperative to learn from managers, security personnel, the operators of the systems that are considered effective and the ones that are ineffective in deterring these offenders so that the techniques that are best to overcome all these criminalities will be applied. The knowledge gained from interviewing the system operators in the supermarket can illuminate how the security measures can be adapted to outmanoeuvre the culprit countermoves and thereby increase deterrent in the supermarket.

It is imperative to understand the factors that are essential in order to know the economic viability of the supermarkets (Broder, 2000).

Border (2001) stated that supermarkets should prioritise risk identification and evaluating the systems they have for the growth of their businesses. This will help in providing accurate and detailed information of systems best appropriate for every section in the supermarket. Systems management is concerned with the protection of goods, assets, and resources; therefore, it is vital to conduct periodic risk analyses and evaluation to design the best practices for the use of the systems. The use of systems security is generic in every supermarket and knowing how to manage them is very essential.

The exact role the security system plays in a particular situation depends on the supermarket, the demographic nature of the location, the needs of the stakeholders and the management team. When a retail supermarket is continuously plagued by external and internal theft, it can work on improving the effectiveness of its security system. In some supermarkets where the management is less disposed towards the use of security systems, the role of the systems will be tailored towards the top management team's perception, their goals, and objectives. In such cases it will be imperative to explore the perception of the top management on the systems, the effect of the losses and the analyses of the performance of each system. The degree of the performance of any of the security systems can determine the company's future, its competitiveness and financial performance.

The research will look into the skills background and competence of the security personnel working in the systems, the extent of the knowledge of the store managers in relation to how well they are acquainted with the security systems and if there have been implementation of innovative trends to increase effectiveness and efficiency with consideration for past incidences (Kovacoa and Vackova, 2015). The level of training received by security personnel will determine their level of productivity in relation to keeping lives, properties, and premises safe. When security personnel constantly update their skills in both security system awareness and recent technological changes, this will help in preparing them to solve crisis and emergency situations that might come up. For effective performance of security systems, it is very important for the management to know the methods and forms that work better.

This study will also examine the pre-employment integrity screening measures that security personnel and the employees of the supermarkets go through before they start employment.

According to Hollinger and Adams (2008), security awareness programmes can help in crime deterrent and the use of product control mechanisms can facilitate loss prevention. Further steps taken by supermarkets as preventative strategies include investments in mechanical and electronic equipment, training videos and teaching the personnel different preventive strategies in an effort to detect or apprehend shoplifters. Some of the techniques commonly used in the store include security tags on products, video surveillance and recording. This study will examine why shoplifters are still able to circumvent the security systems despite the investment made by supermarket owners by having these systems in place (Gill *et al.,* 1999).

1.9 Assumptions, Limitations and Delimitations

The following are the assumptions, limitations, and delimitations of this study:

a. Assumptions

As the research unfolds, it is important for researchers to note that there can be restrictions and boundaries which serve as limitations according to (Simon and Goes,2013). This research comes with its own limitations, and it is my responsibility to justify the assumptions and steps taken to address the limitations of this research.

According to Marriam (2014), researchers have hidden perspectives which they assume to be true without which they may not continue with the research. Yin (2014) explains this assumption in relation to qualitative study as what establishes the modality for the commencement of the study. This study entails studying retail business owners who have been using security solutions believed to be capable of mitigating criminal threats to their businesses. According to Trafimow (2014), the validity of the results from qualitative research may be subjected to questioning because of its subjective nature. In relation to this research, the first assumption is that participants would provide honest answers to the interview questions posed at them. So, in order to ensure that participants are open in their responses, they are informed about the confidentiality of their responses and the ethical responsibilities of the researcher, a course of action encouraged by (Barker,2013) which puts the minds of participants at ease. Another assumption is the appropriateness of the population size which include managers and workers from the two retail supermarkets used as the case study in relation to assessing the effectiveness of security measures put in place.

b. Limitations

Limitations according to Madsen (2013) are the potential shortcomings that can reduce the scope or validity of research findings. As far as this research is concerned, a major limitation is the number of retail supermarkets used in this study which is based on my adoption of multicase study. In addition to that is the population size targeted in the retail supermarkets under study. The limitation on both areas is the effect on the ability to generalise the research findings as Pilnick and Swift (2011) put it which is based on the responses of the participants.

c. Delimitations

Delimitations are boundaries that guide the research study including the exclusion and inclusion of certain areas when developing the research plan. (Becker,2013). The study is limited to security personnel, managers, and store workers in two retail supermarkets who are in charge of security services. A delimitation is my choice of excluding other categories of workers from my study, nevertheless the interview questions and questionnaires capture the details of real and in-depth experiences of these sample populations as recommended by De Massis and Kotler (2014) proper assessment of security measures in relation to how retail crimes are mitigated.

1.10 Research Outline

Chapter One: this provides the overview of the research. It contains the research aims and objectives, the research questions, the hypothesis to be tested and a general introduction to the subject of the research.

Chapter Two: this contains the Literature Review which is the overview of existing studies carried out in the fields of security and retail crime. Concepts that can help in explaining the relationship between security and retail crimes will be explored and terminologies will be defined, clarified, and explained.

Chapter three: this chapter is on the adopted research methodology, research philosophy, approaches and strategies used to explore the relationship between security solutions and retail crime. It will discuss the chosen data collections and justify the reasons behind the choice of research strategies.

Chapter Four: this chapter is dedicated to the analysis of the data collected with the use of analytical tools like SPSS and Thematic.

Chapter five: Discussion of key findings from the analysis will be discussed extensively in this chapter. The findings will help in the formulation of a conceptual model to establish the correlation or lack of correlation between the two variables of research.

Chapter six: this chapter will discuss recommendations and point out areas of further research. The Conclusion which is the summary of the whole research will be discussed in this chapter.

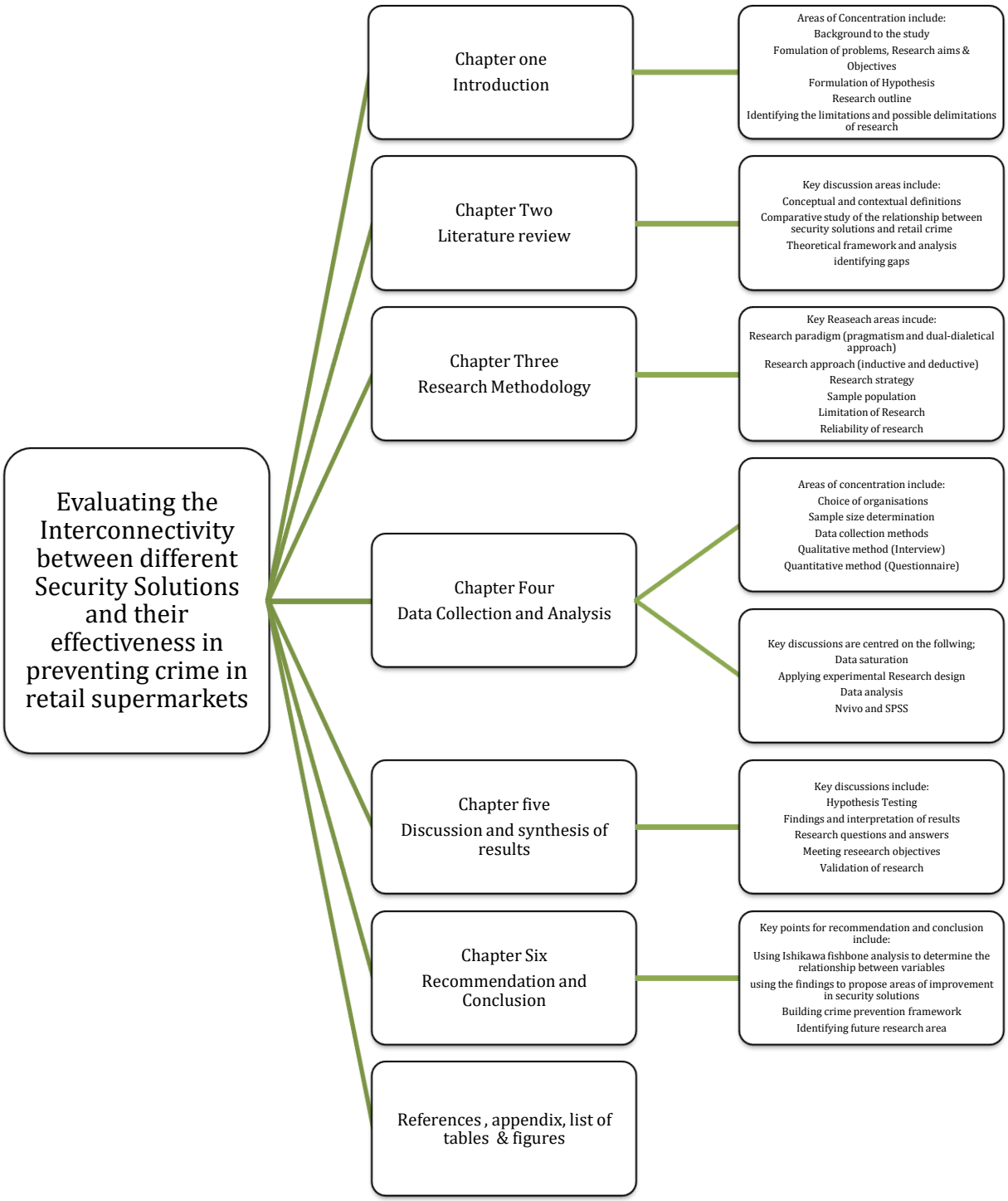
1.11 Research Design

This is the diagrammatic representation of the whole research.

The aim of the research design is to provide a framework that will guide the entire research. It will also serve as a point of reference for every stage of the research.

It starts with the research topic to be explored which is broken down into subcategories and the actions that will be taking place at every juncture of the research. It shows how the actions from one chapter to the other are linked for easy navigation. It depicts the robustness of the research and the extensiveness of each stage.

Figure 2: Diagrammatic representation of Research Design



1.12 Summary

In this chapter, the foundation of the whole research has been laid out through discussion and diagrammatic representation. The research questions have been developed which will form the focal point of this research. Careful consideration has been given to the formulation of objectives from the research aim which is to establish the interconnectivity between existing security solutions and their effectiveness in reducing crimes in retail supermarkets. I have also discussed the background to this study which is what led to the desire to carry out this particular research. The identified problem in the retail supermarkets which is incessant retail crime will be explored with the effectiveness of the existing security solutions in place. The hypothesis will be tested to see if a better understanding of the interconnectivity between existing security solutions can lead to a reduction or prevention of retail crime. Steps that will be taken to address the limitations of this research have been justified while steps taken to delimitate the identified limitations have been enumerated. The research outline and the design have also been developed as a guide for the whole research.

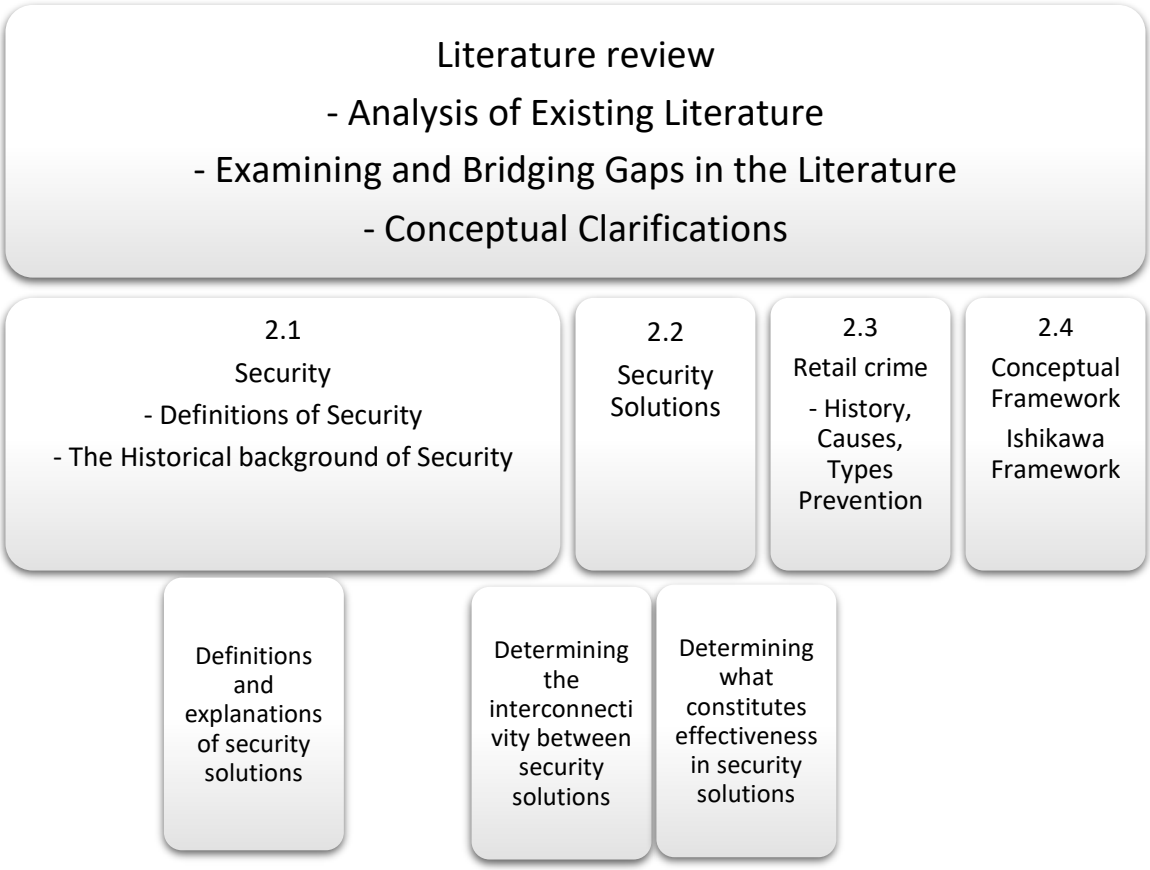
CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction

The literature review deals with the overview of existing studies carried out in the fields of security and retail crime. The research question is a combination of two distinctive but relatable domains, security, and retail crime. Existing literature on security and retail crime will be explored while gaps in literature will be examined and efforts will be made towards bridging them. This chapter will also explore concepts that can help in explaining the relationship between security and retail crimes while some terminologies will be defined, clarified, and explained. It will explore the history of security and the workings of different security solutions. It is equally important to explore the historical background to crime with emphasis on different retail crimes, their causes, types, and preventative measures that have been explored by scholars in the field of security and retail crime. In discussing security solutions, efforts shall also be made towards determining what constitutes effectiveness in security solutions and the interconnectivity between them. the chapter will conclude with the introduction of the Ishikawa fishbone model as an analytical tool for the relationship between the dependent and independent variables.

Below is the diagram that depicts the exploration of contemporary and existing knowledge about security and retail crime and serves as the whole structure of the literature review

Figure 3: Focus of the Literature Review



2.2 Conceptual Analysis of Security

The conceptual analysis of security will be discussed below. It deals with the different fields of work done in security over the years. It will highlight authors of key concepts that will be applied in the course of this study. their methodology of research will be appraised by looking at the areas of success and gaps identified in their study. This is intended to help the research identify gaps that this research can fill in the body of knowledge.

Table 1: Conceptual Analysis of Security

No	Previous Work	Author(s) (Year)	Method	Success	Gap/ Limitation
1	What is security	Giovanni Manunta (1998)	Secondary Research	The views of different academia were analysed leading to a broader perspective of the definition of security. Great fusion of variables such as Asset (A), Protector (P) and Threat (T) for the distinct definition of security	Despite the analyses of the views of different scholars on what security should be, yet there was no consensus on the definition of security. Another limitation is the fact that the definition of security as an interaction between A, P & T might be difficult to understand for an ordinary operator of security in the retail sector

NO	Previous Work	Author(s) (Year)	Method	Success	Gap/ Limitation
2	Crime prevention through environmental design	Crowe. T. (2000)	Qualitative & quantitative research	Proposed a good framework for the improvement of internal store design against shoplifting	This research fails to address the impact of external factors like demographic changes around the store location which can lead to increase in shoplifting
3	Retail employee theft: When retail security alone is not enough	Korgaonkar P., et al 2021	Secondary research	The article examined the shortcomings of previous research into employee theft and the shortage of academic research into the causes of employees' theft. It also explores the reasons why employees steal from their employers and suggest what can be done to minimise	Primary research would have helped to explore reasons for employee's theft from the point of view of employees and what they think can help minimise the crime.

				employees' theft in a retail setting	
4	Shoplifting in mobile checkout settings: cybercrime in retail store	Aloysius. J., 2019	Mixed method was used in the study	This article elaborated on how cybercrime could be detected and curtailed by training employees on cybersecurity. It also explored customer experience and how retail workers can work efficiently in retail stores	The research could have explored a comparison between the effectiveness of self-serving checkout systems and the traditional checkout systems
5	Surveillance in the supermarket: Technology and the pluralisation of crime control	Francisa, G., 2012	Primary research was carried out involving the police and staff of local stores. this was coupled with secondary research	This research discussed the facial recognition system that was first used in stores, how it helped in the re-arrest of shoplifters that have been caught before but came back to stores believing that they will not be recognised again but were caught	The facial recognition system only recognises what is in police data, while there are shoplifters that are not reported to the police, hence the aim of facial recognition system might be slightly

				when they enter the stores.	defeated in such cases.
6	"Social Change and Crime Rate Trends: A Routine Activity Approach"	Cohen and Felson, 1979).	Secondary data was used as most of the research is connected to ecological theory that facilitate activities of everyday life	This research gives a Theoretical Explanation for the causes of crime (RAT) It explains Routine Activity Theory (RAT) as a subset of Crime Opportunity Theory (COT) which focuses on crime situations. It also exposes the motivation for offenders which are an attractive target and the absence of capable guardians The studies consistently find out that the more serious the crime	There was more concentration on the 'routine activities' of everyday life of criminals but the impact on those affected was not mentioned

				is, the likelihood the crime will be reported to the authorities and the crime trend will be followed up for future deterrent.	
7	Ishikawa Fishbone Analysis	Kaoru Ishikawa (1945, 1968)	Exploratory qualitative study	It is a useful tool for teams to brainstorm on how to identify problems and their causes in the operations of the organisation. it shows the management the effects of problems identified and enables them to deal with the real issues rather than appearances	Ishikawa's approach was more focused on practical improvements rather than a scientific or formal research method. Also, as useful as it is in identifying causes and effects, it does not provide solutions or ways of identifying solutions to known issues

2.2.1 Conceptual Definition of Security

Private security can be categorised into different dimensions which require a wide range of knowledge in many domains as stated by (Brooks2008). The diversity in the sector makes the definition of security harder which necessitates segmentation of the sector for proper analysis

and discussion. A single agreed definition of security is hard to come by because it has different meaning to different people depending on the situation (Dillion,1996). According to to Manunta (1997) an in-depth study of security brings out different meanings due to different expectations in security solutions, different visions or paradigms, analysis and studies of security problems that come up. The complexity of this situation means interested parties come with their understanding of security and so define it in accordance with their understanding. This unfortunate situation creates problems of finding out the methodology and justification used when measuring performance, investigating a situation, and determining who to blame in a critical situation. (Manunta,1996). Critical examination of security can bring different definition as security measures, methodology, decisions, and performances are worthless without the definition of security, (Manunta,1998)

According to Manunta (1998) the issue of agreeing on an exact definition of security has made it imperative for urgent clarification which is felt by many in the security profession although academia is more than happy to discuss security without definition. Some agree that security could be assumed in relation to the general saying that 'security is in the eye of the beholder,' and what the 'beholder' sees could be poverty, beauty, or happiness. Security could thus be defined based on the context and who is defining it (Sutherland,1992).

Manunta (1996) however, disagreed with the notion that defining security should be based on the context and personality involved. He stated that there is a need for a general definition of security which will help in merging existing divergences in security solutions.

It is now necessary to come up with the definition of security to understand the practicality in every security that is being offered which include international relations, risk management, crime prevention and loss prevention (Manunta,1998).

2.2.2 The Reason for the Definition of Security

In the academic world or in the court of law, it might be difficult to accept that security cannot be defined because of its multidimensionality. Defining security can be difficult to achieve according to Tate (1997) because of the broad nature of the security industry with its diverse occupations and discipline (Hesse and Smith, 2001).

Manunta (1998) expatiate further on this as according to him, it is important to agree on a particular definition of security as different definitions can be confusing for it might be difficult to believe that all security issues are the same without any given context. At any time, it should be known whether goods, products, something, or somebody are secured or not. With the definition of security, situations can be assessed, and performance of security solutions measured by those using them, especially in relation to this study which is based on retail supermarkets. Users of security solutions in the retail supermarket environment include internal and external customers. Internal customers include the managers, supervisors, security personnel and general staff while external customers include shoppers, suppliers, and general public. The definition of security will also help to measure and assess the context and the parameter when there are claims relating to security as without this, the liability and responsibility cannot be measured. Without definition also, no scholar, professional or practitioner can establish the validity of any proposal brought to them to make a judgement and this can be particularly important for those who want to know the truth, ethics, knowledge, responsibility, and performance about security.

Buzan et al. (1998) also supported the necessity of the definition of security as its essence can serve the interest of power, aggression, and blame, making it possible to know when this can be invoked if violated for war or defence within the parameters of law. For this reason, it is imperative that security should be defined despite the different perspectives on what constitutes it. Many authors have disagreed with dictionaries' definitions of security, especially the Oxford Advanced Learners Dictionary definition of security as 'freedom or protection from danger and worry.'

Collins English Dictionary and Thesaurus (1992) defines security as the system that liberates a person from poverty, and it involves taking steps to secure a person or thing against theft and espionage. Craighead (2003) originally defined security as the provision of security services for the protection of people, information, and assets for those concerned or the society at large.

Manunta (1998) defined security as a **function** of the **presence** and **interaction** of three things; Asset (A), Protection (P) and Threat (T) in a given situation (Si). He gave the formal formula as [S = f (A P T) Si]

There is an assumption which forms the basis of this definition and that is the fact that operational security cannot be explained as a philosophical notion as it is an outcome of an

orchestrated condition between what security users feel and the security activities that are provided to meet a particular situational challenge. According to Manunta (1998), where there is an absence of one of the core elements (A, P and T) in the definition of security, that in effect voids the definition. To be pragmatic in applying security, these three components should be open for interaction in the environment where security is applied as without asset (A) there is nothing to protect; without the feeling of being threatened (T), there is no reason to seek for protection and then without a protector (P), there is no security. Situation (Si) is the term used to define the circumstances where security is needed. As the formal definition [S = f (A P T) Si] is drawn, it means that the security concept responds to a systemic functional perspective. When the presence of A, P, T has been established in any given situation (Si), it is paramount to understand the current needs and the whole issue at hand rather than focussing on a particular area. When analysing a given security situation, all these elements must be considered individually and holistically at the same time as this will help to determine the choice of method by which the job can be performed including the reason, the how, where, and when of performance.

Defining security as the interaction between these elements (A P T & Si) help to differentiate security from other similar and near confusing concepts like safety.

The current international politics have broadened the definition of security from both national and international perspectives. Manunta (1999) proposed that security can have shared meaning which is acceptable to different entities. However, ASIS International (2003) stated that this might be difficult to achieve and as there has not been any universal agreement yet, a view that is supported by (Fischer and Green,2004).

As there are diverse and multidimensional approach to security which makes it difficult to arrive at a general definition (Morley and Vogel, 1993). However, Fisher and Green (2004) defined security as that state of stability, a place an individual or a group of people may pursue their dreams or wants without fear of harm, disturbance, or injury.

Manunta and Manunta (2006) is of the opinion that the nature of the security industry is multi-dimensional in that it includes different categories of people with diverse perceptions of what constitutes security which makes it difficult to come to a consensus on the definition of security. However, Brooks (2007) stated that despite the difficulty in arriving at a definition

because of differentiated opinion, the conceptual definition of security can only be achieved when it is applied in context that is in relation to a particular situation.

Despite the analyses of the views of different scholars by Manunta (1998) on what security should be, yet there was no consensus on the definition of security. Although, Manunta (1998) defined security as an interaction between A, P & T but this might be difficult to understand for an ordinary operator of security in the retail sector as there are a lot of philosophies and theories around the definition especially since A P & T is in any given situation (Si). If the definition of security is based on a given situation, then it would be difficult to achieve a consensus.

2.2.3 Contextual Definition of Security

Manunta (1998) demonstrated that there is need for the definition of security which can encompass the generality of all the contexts that interpret the existing divergences in the definition of security.

Many people or organisations may view security from different contexts depending on the time, place, or the exact need of the services (Davison,2005).

There are many aspects of security with different explanations depending on their contextual application. These aspects include criminology; business continuity management; facility management; fire science; information and computer security; industrial security; security law and security technology (Brooks, 2008)

Manunta (1998) stated the need for a joint definition of security which could be done by investing the concept of security in areas of local, national, and international relations for crime prevention which is the given situation (Si). As there is no agreed definition of security, this means that security can be different things to different people depending on the context (Dillion,1996). As there are different situations, expectations, and visions, some of the paradigms can be derived from different perceptions, as different studies and analysis in security situations will lead to the adoption of different security solutions. Any given situation (Si) would involve divergence of interests, which ultimately brings out the question of the methodology used, justification of the contextual meaning, how the performance is measured and how the responsibility is assigned, (Manunta,1998). Security performance, measurement, methodology and decisions have no meaning when there is no definition.

Many terrorist attacks throughout the world have raised a concern necessitating the need for governments to protect their citizens (London, 2005; Jakarta, 2004; Russia, 2004; Spain, 2004; Bali, 2002 and New York, 2001).

When there is any security situation, countries, businesses, or organisations raise their security budget like in 2002 during the Bali attacks which touched all Australians, their government committed additional £3.1 billion to deal with terrorist threat (Howard, 2004). While in Europe a Billion Euro was allocated towards security related research projects on strategy to develop coordinated military and civilian research (Horvath, 2004).

At the national or governmental level, security is part of the defence ministry which is controlled by armed forces. It is the work of the state security services to police the nation through state civil service (Brooks, 2008). Security at this level also include national security, defence security, system, personnel, cyber and many other security solutions (Brooks, 2008) and these are for crime prevention, protecting technology, risk management and loss prevention.

There are similarities between defence and security as both deal with protection but there are many differences between the two (Tate,1997). Defence can likely be considered as security, both defence and security work in parallels as the parallelism in defence and security organisations was shown during the Australia attack when both the police and the military organisations worked together to face the country's national security challenges (Ferguson, 2004). In contract to this, there are about 30 separate government departments or agencies that help in safeguarding Austria (Yates,2004).

Security provision is done through the private and commercial means. Security provision involves paid services to prevent unwanted or unauthorised individuals and anything detrimental to loss in business or organisation (Post and Kingsbury, 1991).

2.2.4 The Historical Background of General Security

Security according to Simon Fenn (2020) is the state of being free from danger or threat.
The history of security dates to the early times in ancient Egypt. Egyptian kings called Pharaohs used security personnel as their bodyguards and to protect their property. In the same vein, the ancient Roman emperors used security guards to protect their family, properties, and business as well.

Ancient Egypt was the first in the history of the world to use systems to secure data through encryption to disguise and protect sensitive information. During the antiquity of the Spartans, they used the Arabic figures as a secret method in changing the position of letters or documents so that it would not be known by the opposition. Julius Caesar was the first to use encryption for military purposes by sending documents and shifting the words around.

Fast forward to the 20th century, at the early stage of the second world war, the Germans used the Enigma machine which is a machine-like typewriter that had codes with settings of more than 150 million and the Germans believed that the codes were unbreakable. The first code was broken in 1940 with the rest of the codes broken throughout the war.

Security evolves through IT, Cyber and Personnel, there are always technologies, processes and control that are made to protect the networks, systems, and the data from attack, (Fenn, 2020)

2.2.5 The Private Security Industry

Security is very crucial for the safety of every nation. Private security protects many institutions, lives, the infrastructure of the national systems, property, and sensitive information of the nation since time immemorial.

Many countries around the world rely heavily on using private security to perform many functions including protecting their employees, goods, conducting investigations, screening their employees before employment, information technology and many other functions, (Strom et al., 2010). Some companies hire security companies while some use in-house security and there are companies that use both.

According to Green (1981), there are non-profit oriented institutions that are using security services such as hospitals, airports, and schools. He defined private security as "those individuals, organisations, and services other than public law enforcement agencies, which are engaged primarily in the prevention of crime, loss, or harm to specific individuals, organisations, or facilities" (as described in Cunningham et al., 1990).

In the USA in the 1970s, RAND Corporation researched a five-volume series of reports examining the regulation, licensing, and the duties of security personnel and the companies (Kakalik & Wildhorn, 1971a, 1971b, 1971c, 1971d, Volumes I–V). After a decade, Hallcrest systems published two detailed studies about private security known as Private Security and Police in America: The Hallcrest Report I (Cunningham et al.,1985) and Private security

Trends 1970-2000. The Hallcrest Report II (Cunningham et al.,1990). These documents defined the role of security personnel in crime prevention in any nation, the control that the government has over them and how the industry has grown.

In the research on security at broader view, the American Society for Industrial Security (ASIS) which is the largest association of security described private security as "the non-governmental, private-sector practice of protecting people, property, and information, conducting investigations, and otherwise safeguarding an organisation's assets"(ASIS International, 2009a.) ASIS also stated that private security play crucial role in securing business , infrastructure, natural disaster, accidents, planned actions, such as terrorist attacks, vandalism and the rest (ASIS International, 2009b).

Many scholars do not agree what constitutes private security and many definitions have been used in the past. There have been explanations that will focus on the tasks at hand, the security of the manufacturing of a product, the distribution, the technology, and the protection that is put in place during the installation of equipment (Cunningham et al., 1990).

The Private Security Industry covers many companies both large and small which provide security related services which include investigations, crime prevention, order maintenance, intelligence gathering and military services (Van Steden and Sarre, 2007). There are different theories found in academic literature explaining the importance of growth in private security according to (Buuren, 2010). Some authors agree that the changes in security trends occur because of the broader social movement (Forst, 2000). Also, Reiner (1992) states that "deeper social changes of post-modernity" have recently started to transform the role of public security institute in their processes as the rise of public security organisations have become a paradigm of modernism and the process of organising the society around the central body.

Some central governments are not acting upon crimes in a direct way but through agencies like organisations and citizens. This should not be taken as off-loading the responsibility of state security agencies and the privatisation of crime control. Buuren (2009) Where this strategy works, it makes the state machine immensely powerful than before, making the government have more influence on the people. This constitutes the growth of private security shifting to global governance. Abrahamsen and Williams (2009) said what we are witnessing is the era of "global security assemblages" where different security agents and normativity interact, cooperate, and compete among themselves to produce new colleges for security, the practises

expected by the security guards and company and the forms of security governance. (Gerspracher and Dupont,2007).

2.2.6 Security Industry Authority (SIA)

The Security Industry Authority (SIA) is the regulatory body formed by the UK government to monitor the private security sector in the UK.

This organisation was established as an independent body in 2003 and reports back to the Home Secretary under the Private Security Industry Act 2001.

The structure of the Security Industry Authority contains many types of security departments which include government organisations and regulated companies, carrying out investigation and other roles.

The major role of the SIA ranges from regulating the licensing of those participating in private security service provision and to managing the Approved Contract Scheme that measures the quality of security services against independent assessment criteria. SIA also ensures that anyone working in the private security industry that requires licensing is appropriately licensed before they are permitted to work. The role every player in the security industry performs will determine whether they will be using a licence according to Private Security Act 2001 or will be exempted.

It is a criminal offence in the UK to work without licence in a security job that requires being at the frontline, failure of which attracts a penalty six months in jail or unlimited fine.

For decades there has not been any formal qualification for those working in the private security industry. Personnel who have successfully managed complex operations in security both at the national and international levels have no means of justifying to the government and new clients that they are capable of performing their roles or providing the needed security services.

Before the SIA training started, there was an organisation called Security Industry Training Organisation (SITO) formed by operators in the security industry to oversee training provision for security personnel. The Security Industry Training Organisation (SITO) over the years had introduced training qualifications successfully and many security companies were doing in-house training for their employees. What was lacking was an academic route that would give practitioners opportunities to gain credible qualification and also create a network to enhance organisational learning as stated by (Upton,2009).

Upton (2009) founded Crowd Safety Management Foundation Degree (FD) through Chris Kemp at Buckinghamshire university College (Now Buckinghamshire New University, BNU).

This metamorphosed into a two-year course supported by the United Kingdom Crowd Management Association (UKCMA). This foundation degree helped those that wanted to develop careers in security especially in the police force, military, and security operation.

The SIA was established in 2001 to regulate the security industry while many companies were looking for loopholes in order to avoid the SIA licensing. In the report that the SIA produced in 2006, it was stated that enforcement is an issue and SIA made it clear that prosecution will be the last resort as going to court can be expensive, a statement which might have been made in error as it would likely encourage licence evasion. The statement read "We know that prosecuting offenders can be expensive, and it is not always the most effective way of gaining compliance" in the reporter, it was stated that a large number of investigators are focusing their efforts on monitoring manned guards and door supervisors whom they could easily locate but leaving other sectors like Close Protection officers that are unlicensed. The Private security industry Act (PSIA) has brought professionalism to the UK Security Industry. The processes have raised the standards ensuring that all personnel are vetted, trained, and licenced (ISA, 2001).

The aim of the Security Industry Authority is to cast away the stereotype that security personnel are low paid, poorly qualified, and not a motivated workforce because their career had no future development or prospect. But since the introduction of SIA qualifications, those in the security profession have advanced to many different careers relating to security.

2.2.7 Analysing the Impact of Private Security Industry Act 2001

Private security contractors have been taking many prominent roles in the UK although the industry on a few occasions had a very controversial economic downturn which came at a period when SIA was going through a major restructuring (White, 2015).

It is pertinent to assess the success of the SIA since its inception based on its practises and against the background of its core objectives and mission.

The SIA was established to reduce criminality which was rampant in the industry before its formation and to raise standards expected of security personnel to a certain degree.

There are many private security companies throughout the UK which are highly valued by organisations. In some countries around the world the activities of the security companies are regulated by the government to maintain a degree of control and the same is applicable in the United Kingdom (UK). Within the last decades, the introduction of Private Security Industry

Act (PSIA) 2001 has brought about regulatory tools to monitor how security companies and personnel perform their duties.

This legislation has received a great amount of attention recently with three main developments: firstly, that security companies are taking a lot more prominent roles in security because of the announcement in the early 2012 that most of the functions of the police would be transferred to the private security sector (Blair, 2012; Hughes, 2012; Travis and Williams, 2012); secondly, as the security personnel need licence to perform their duties, there has been some failures on the part of big players in the industry especially the bottleneck they experienced in providing large security personnel for big public functions which has become more controversial like the inability of G4S to fulfil the conditions of £284 million London 2012 Olympics contract that was awarded to it as one of the biggest company in UK (Johnson and Davis, 2012; Prince, 2012; Travis and Gibson, 2012) thirdly, the regulatory body that has been established through the provisions of the PSIA 2001 is undergoing major changes (see Home Office, 2012).

SIA is the public body that is tasked with the day-to-day regulation of UK private security industry as a result of lots debates some decades ago about the regulation of the private security industry in UK (White, 2010), but this did not materialise till until mid-1990s when the regulation looked promising and realisable.

When the New Labour came into power in 1997, the party made plans for a regulated and more professional security industry that would focus on combating crime and disorder both in the public and private sectors (see McLaughlin and Muncie, 2000). The New Labour paper on private security regulation brought about the first major step towards the regulation (Home Office, 1999). The government built a regulatory model that mapped out the key document by which they introduced the Private Security Industry Bill into the Parliament. The bill passed through the consensual readings at the house of Lords and Commons before it was made into the statute as the PSIA 2001.

The SIA regulation started in 2004 and as of today, the jurisdiction extends to seven sectors of the industry in England, Wales, Scotland, and Northern Ireland. These sectors are; security guarding, door supervision, close protection, cash and valuables in transit, public space surveillance (CCTV) the immobilisation, restriction, and removal of vehicles and key holding.

2.3 Security Solutions

Security is both a product (intangible and tangible) and a solution. As a product, security has the potential and capacity to meet identified needs in a particular industry it is designed for. As a solution, security services are meant to solve specific industry needs or identified challenges. These challenges can be derived from the variables put forward by Manunta (1998) in his definition of security as the interaction between Asset (A), Protector (P) and Threat (T) in a given situation (Si). Security in this way is seen as a response to a given situation thus making it a solution which is developed in a particular industry which is referred to as the private security industry. The solution is targeted at a particular business problem which is why businesses seek for the adoption of security solutions to tackle identified issues relating to their operation.

There are three main security solutions that will be the subject of this research. These solutions will be examined to determine their interconnectivity and effectiveness in relation to combating crimes in a retail supermarket setting.

These are tangible and intangible solutions aimed at helping UK supermarkets in reducing crime and creating a safer environment and an enjoyable shopping experience for a customer as no one wants to shop or work in a fearful condition. As security is a response to an identified or prospective threat in a given situation, Retail supermarkets in the UK have responded with the adoption of security services which can mitigate losses and reassure customers. The typical solutions that will be explored in this research are three; Physical Security with focus on security guarding for customers in stores; Systems Security with focus on CCTV and Cyber security for online customers.

2.3.1 Physical Security

Physical security deals with physical measures put in place by organisations for the protection of people and prevention of unauthorised access to equipment, goods, facilities, material, and documents (Globalsecurity.org, 2001). These measures are supervised by security personnel who use them to minimise security incidents (ASIS International, 2009a).

Physical security solutions are used to deter potential intruders, for instance in supermarkets, warning signs such as ‘out of bound,’ ‘staff only,’ security lighting and perimeter markings are

put in place to alert unauthorised persons. When designing supermarkets, the architects, designers, and security analysts must balance the risk against security control by considering the cost of development, managing, monitoring, and maintaining with wider issues such as the structural outlook and societal norms before progressing to build the property. Physical security is used for many premises including high security buildings like prison, military base, and retail outlets. The purpose of this method is to warn possible attackers that they will not be successful.

No supermarket can operate without security challenges and risk in protecting their assets (Fennelly et al., 2004). The risk and elimination of problems in supermarkets require planning and understanding the needs of a particular security situation, conditions, threats, and the vulnerability against any attack. Physical security is the most used security for protection in many industries.

There are many layers of physical security which includes security guards, protective barriers, locks, access control, perimeter intrusion detection, deterrent systems, and others but this study will focus mainly on manned guarding while other physical security will be discussed briefly.

Also, attention will be given primarily to the physical security measures used in retail supermarkets. These measures include barriers, sensors, and the security guards who are the main object of deterrence because of their high visibility in and around stores (Cunningham et al., 1990).

2.3.1.1 Manned Guarding

Manned guarding is otherwise known as security guarding. They are referred to as retail security officers in the retail sector.

Image 1: Manned guarding also known as security guarding



Source : Deviantart (2023)

Retail-Security by security-services on DeviantArt

i. The History of Security Guarding

The history of security personnel and their professionalism cannot be overlooked as they are paid to protect lives, property, and premises by using and implementing preventive measures. The uniform security shows a legitimate authority to protect property by watching and showing their presence through patrolling and the use of surveillance cameras which are meant to prevent unlawful criminal activities leading to loss of life and destruction of goods.

During the early 1800's, there were no law enforcement agencies to chase out criminals across the borders while most nations were ill-equipped to deal with the uproar of criminality. There was a slow response to the rise in crime and this led to the introduction of the security industry. The Ramones were the first to use policing as security known as Vigilies Urban who were guarding the city. They were referred to as the watchmen in those days in Europe.

The first security company was founded by Allan Pinkerton in 1850, and it is called Pinkerton National Detective with headquarters in Chicago. This later became the largest and the most known security company in those days. They were focusing on the rail and road operators preventing crooks from robbing passengers of their cargo and personal belongings.

Security guards from security companies play many roles starting from policing, investigating crimes, patrolling the rail network, and advising the businessmen that has been the victim of lawless criminality. As security companies became profitable, many companies were opened and by 1915, the state of California started to regulate the security guards and companies

through the State Board of Prisons Directors. Their role was to regulate the increasing number of security guards and remove mushroom personnel in the state.

As it was the duty of the security personnel to uphold the law and deter crime in those days, so it is today. The security guards are highly trained and so can make citizens' arrest, or act as agents of the law. Some security guards are employed as bodyguards and sometimes may not wear uniform.

Security personnel can be hired to work in-house or on contract basis.

The job of security guard involves a lot of risk both to their lives and that of others and as such are put under rigorous requirements before they are licensed to work.

These requirements include professional training which differs from country to country. They are also required to obtain a licence before they can be deployed.

In USA, the security officers must be certified by Private Protection Services Board (PPSB) and be licenced by the Bureau of Security Board and Investigative Services (BSIS)

In the UK, the security guards are trained over a period of days, after which they must pass a required assessment before they can be licensed. In most parts of the world, underground criminal checks are performed on the candidates before the licence is issued.

Security Industry Authority (SIA) are those that issue licences in the UK.

ii. The Process of Manned Guarding

Manned guarding is the process carried out by security guards to protect goods, property, and personnel. They are an aspect of physical security put in place to protect premises, site, facility, supermarkets, and other physical assets. They prevent unauthorised access to the goods, prevent harm to the employees by shoplifters and reduce destruction of properties which make them an essential part of physical security. Security personnel are employed for different reasons depending on the specific need of a particular store or situation. The security personnel can be used in situations where there is need for observation, training, and judgement before applying security majors. When there are suspicions of irregularities, it is the responsibility of security personnel to deal with the situation. The security personnel patrol the stores, take notes, and can conduct investigations before deciding whether they would need the intervention of the police. The static security guards are those in uniform while those that act as store detectives do not wear uniform as they are there to detect crimes before they occur. These detectives move about with the suspected offenders while they are committing the crimes and apprehend them when they try to leave the premises with stolen goods.

Parfomak (2004) reveals the importance of security guards in protecting public infrastructures and assets with the example of the Bush government strategically employing about one million security guards to protect critical infrastructures such as airport screeners and key assets in the USA in the year 2003. The effectiveness of securing critical infrastructure against any terrorist attack by security personnel in the USA depended on the number of guards, their qualifications, pay and the training given to them prior to the commencement of their assignment.

Since September 11, 2001, there has been a steady increase in the guards protecting critical infrastructure both in the USA and most parts of the world. There are requirements in most states of the USA (except in two states) for security guards to obtain some qualifications or training prior to employment while in the UK, the requirements are mandatory.

Manned guarding security services have not been all that exciting but recently, with the challenges brought about by the pandemic, security personnel have played important roles in protecting people, assets, reputation, and businesses.

As Security Licencing was introduced in England in 2006, Scotland in 2007 and Northern Ireland 2009, many challenges arose as security personnel had to undergo criminal checks with many failing the screening and thus could not work in the security industry. Security guards on the average work about 60 hours a week and in some cases can extend to about 72 hours a week with both day and night shifts (Macpherson, 2009).

The security industry is characterised by low pay, long hours, lack of adequate training for personnel, high staff turnover and most times few poor service levels. Most organisations purchase the cheapest service provider in security who subsequently pay their staff minimum wage thus making them work longer hours.

In a broader sense the security Act 2001 has helped shape the industry to what it is today (Button, 2007). Prior to the security Act, the working condition of security guards was very bad as they were underpaid, undervalued with no proper training leading to low morale and a constant scout for job opportunities outside the industry. During this period the labour turnover was very high in the industry affecting the perception of the public towards them. The guards were more threatened with violence and verbal abuse, both within and outside the store and were prone to being assaulted on a regular basis. Despite all these, some of the guards were brave, dealing with hazards in their jobs, for instance, drunkards that often come to the stores

towards the evening. This shows with the Security Act 2001, a new breed of security personnel has joined there by enhancing the standard of the occupation. Security work metamorphosed to good practices thus making the security act the panacea of the old bad ways.

In many countries around the world, there are many security personnel compared to public policing (Jones et al., 1995, Waard, 1999). Most of these private security personnel were doing the job of police prior to their engagement with security jobs in the stores according to (Jones *et al.*,1998).

There have been many empirical studies about security officers such as (South,1985), (McManus 1995), (Flynn 1997), (Noaks 2000), (Rigakos 2002), (Michael 2002), (Wakefield,2001 and 2003), (Crawford and Lister, 2004a) and (Joh,2005). Researchers are still trying to find out the powers of private security in retail supermarkets and how they can use them. Security guards often do not have powers outside of work but are seen as authorities in their place of work and things can be more complicated especially when they are to exercise some powers around the store (Stenning and Shearing ,1979; Sarre,1994; South,1997; and Stenning,2000). These are some of the areas that this research will investigate as there is the need to know the extent of the powers of security personnel in relation to criminal arrest and how this can lead to a reduction in retail crime which is the focus of this research.

Private security personnel are a formidable force that most supermarkets cannot operate without. As the security personnel in the store is the representative of the owners of the supermarket, they possess considerable powers while protecting the property and the safety of the staff. It is well known that public police continue to receive more attention from academics, civil libertarians, and lawmakers than the security personnel (Button, 2007).

The physical security guards in the store have the legal powers which include the ability to search people and property, forceful removal of unwanted customers from the shop, undertaking a very intrusive surveillance and making sure that the rules of the supermarket are followed especially in the recent case of Covid-19 (Two-metre distance). The security guards in supermarkets can use the powers of citizen arrest to apprehend a shoplifter which members of the public do not have. This in effect shows the powers that security guards have despite the public misconceptions about their ineptitude and incompetence (Livingstone et al., 2003).

In a legal context, a private security guard is an ordinary employee or citizen while they are not in uniform performing their duties, (Home Office, 1979; Murrary, 1996). But when they are in uniform or working as a store detective, they are no longer an ordinary citizen (South, 1988).

iii. Security Guard Competency

Most companies look for high-performing security officers to work in their businesses. There are nine factors that determine the competency of security guards; personal hygiene, general appearance, vigilance, integrity, language proficiency, teamwork, specialist knowledge, personal motivation, conscientiousness, and interpersonal relationship as stated by (Lubbe et al., 2013).

Competency can be defined as the collection of observable and measurable characteristics of personnel which can be used to assess performance in real life and in contextual-specific job description. These characteristics may include knowledge, skills, activities, capabilities, motives, traits, attitudes, and behaviours by (Lubbe at al.,2013).

Competencies are also seen as human characteristics which can distinctly affect work performances in a particular work environment (Bakanauskiene & Martinkiene, 2011; Bartram,2004; Boyatzis,1982; Heinsman et al., 2007). The competency of the security guard is not the behaviour or the performance of the personnel but the collection of specific capabilities available to enable the staff to meet work demands more effectively than others (Campion et al 2011) and these capabilities can be work related (Zhao & Du,2011). There are underlying characteristics of a security personnel which include Knowledge, motives, personality traits, skills, abilities, behaviour and even aspects of an individual's self-image and social role (Boyatzis,1982; Heinsman et al., 2007; Rothwell & Lindholm,1999; Zhao & Du,2011). Competency can show a security personnel's potential to meet up what he is required to do at work, on real-life situation and context-specific situations (Bakanauskiene & Martinkiene, 2011; Koeppen et al., 2008; Lichtenberg et al.,2007). Different supermarkets have different requirements so competency can be used to match a specific security personnel job requirement for a particular store (Heinsman et al., 2007). This can be the ability of the guard to meet a basic minimal requirement to achieve very good job outcomes (Brown,2006; Kurtz & Bartman,2002; Potgieter & Van der Merwe, 2002). According to Rowe (1995) a security personnel cannot be partially competent; one can only be competent or incompetent and this

can be measured in accordance with a specific goal or job task. A competent employee gives the company a competitive advantage over its rival (Campion et al.,2011)

Crime remains a prominent issue in supermarkets that no store can open without putting security majors in place. Sometimes lack of training, inadequate equipment and resources can lead to underperformance from some of the staff. On a global scale, it was predicted that employment of security personnel will grow by 18 percent between 2010 and 2020 (Bureau of Labour Statistics,2012-13). In some countries private security companies are competing in growth with national police services (Alain & Crête,2009). The main point of training is to develop competence, learn new strategies of preventing crimes, regarding strategies and techniques for controlling, maintaining, and preventing loss of property (Singh,2008). Continuous training and education for security personnel is important as stated by Alain & Crête (2009), Button (2011), Kasali (2011), and Pillay (2007) but some of these necessary practices in security have not received adequate attention (Singh,2008). As there is a lack of appropriate skills and competencies in employing security managers (Button,2011), it then becomes apparent that the importance of training must constantly be reinforced while a close look at the selection criteria is needed. Some of the private security companies lack the resources to formalise their recruitment and selection practices (Singh,2008) and can mistakenly employ criminals (Potgieter et al., 2008). This laxity will show the distinction between the effective and ineffective security officers during selection. Organisations must also look into the value security personnel would add to the integrated human resource practices and the organisational performance through a competency-based selection and development approaches during the hiring of security personnel (Bartram 2004; Campion et al.,2011; Heinsman et al., 2007; Potgieter & Van der Merwe, 2002; Zhao & Du, 2011).

iv. Competency Profiling of Security Guard

The competency modelling of a security guard can be defined as a requirement of essential characteristic to perform a particular job at a given situation according to Bartram (2004) while the analysis can determine the job description, tasks, roles, and the responsibilities of the guard while doing the job (Sanchez & Levine,2009). As each store is different, a competency modelling of security guard in a particular store will contain the essential competencies that is written for a successful implementation of a particular job in a workplace (Campion et al., 2011; Lucia & Lepsinger, 1999; Teodorescu, 2006) and this can form part of the strategy during the interview selection (Potgieter & Van der Merwe, 2002; Saunders, 2002).

One of the pioneers of developing job-related competency models McClelland (1973) stated that if you want to test who will be a good policeman, go out there and find out what the policeman does, you can follow him around making the list of his activities and that can be used to interview applicants. The determination of what the guards actually do in a particular job context can lead to identifying behaviours that can have superior performance (Lucia & Lepsinger, 1999; Rowe, 995). There are many types of competency profiling strategies used to collect data during selection of security personnel and they include observations, focus groups and the particular job description (Campion et al., 2011; Lucia & Lepsinger, 1999).

The generic organisational competency models of an organisation can be useful when hiring a guard (Delamare le Deist & Winterton, 2005; Mansfield, 1996), but job-specific competency models are usually more efficient when applied in human resources practices during the selection and development in security. It is very good that a thorough tailored approach is used during the selection of security personnel that will enhance fairness and efficiency in the process, especially in the small to medium private security business context.

v. Integrity of the Security Personnel

The integrity of this context can refer to the ability of the security personnel to be honest and be able to distinguish right from wrong in delivering their duties. For instance, a security guard is not supposed to cover shoplifting when he should take proper action. Integrity is trustworthiness so it is expected of the guard to be trustworthy and not to use his presence to cover syndicates that come to steal from the supermarkets.

According to the University of Notre Dame (2009), a behavioural model on integrity is described as the ability to demonstrate honesty, high ethical behaviour, trustworthiness, respectability, and honour. Bernard (2011) stated that both honesty and trustworthiness are the essential competencies of integrity which every security personnel must possess in a retail setting if retail crimes would be reduced.

vi. Language proficiency Requirements for Security Guards

Language proficiency is the ability of the security officer to be able to converse on the phone, intercom, or radio expressing himself and his thoughts properly in English which is the official language in the United Kingdom. Inefficiency can be linked to the personnel's poor communication skill, inability to communicate with customers, staff, and management while on the phone as confirmed by O* NET Online (2010). The security personnel must have the ability to read, comprehend, spell, and speak as these has been highlighted as part of the

important skills required of the security guard. The importance of writing cannot be overlooked as the security personnel has to write an incident report when there is an issue and use the logbook which is where every occurrence of the day is written down. The Bureau of Labour statics (2012-13) stated that security guards should have verbal and written abilities to document suspicious behaviour consistently. The context of language profiling in security personnel includes verbal and written communication, which is the ability to write and communicate, speak clearly, also applying appropriate understandable grammar, syntax, and the language style (Saville & Holdsworth, 1996) in order to relate to the appropriate audience.

vii. Team player

Team player is the ability of the security guard to work with others in a harmonious way, interacting with the clients, customers and relating to anyone that might enter the premises as the first point of contact.

The Commonwealth of Virginia's guidelines on developing competency-based systems (2002) define teamwork as the "collaboration and cooperation of a group of
employees to combine their talents to get the job done," this can relate to having a positive and optimistic attitude towards their co-workers. The guidelines describe an efficient security guard as the personnel that has a positive attitude towards his work colleagues, behaves well at work, works nicely with everyone and is not in acrimony with his colleague. The opposite of this is when the security personnel disagree with everyone, does not cooperate, argues whenever an instruction is given to him and finds it difficult to follow laid down procedures. Saunders (2002) stated that workers should have constructive conflict handling sessions as part of their interpersonal repertoire during teamwork training. Saville and Holdsworth (1994) defined teamwork in competency modelling as cooperating with co-workers to achieve organisational goals by sharing information and supporting one another, O*Net OnLine (2010) stated that security personnel should display an understanding, good-nature and cooperative attitude which can be helpful while discharging their duties.

viii. Specialist knowledge Requirement for Security Guards

Specialist knowledge starts with going through the four days training in the security sector and two days training in First Aid as stipulated by the Security Industry Authority (SIA). The process of acquiring the specialist knowledge includes taking exams, passing, qualifying and being able to perform security officers' duties as described by SIA which must be seasoned

with vigilance, observance, and seriousness in job roles. Specialist knowledge must be practical, relevant and can be used in the job as stated by (Boyatzis,1982).

ix. Motivation for Security Guards

Personnel motivation involves the passionate attitude to work and a sense of commitment towards work which is shown when staff do their duties with utmost devotion and interest. The security personnel's motivation can reflect in their commitment to continuously self-develop in their job. Somebody who always asks questions will always learn, this is part of going an extra mile in delivering duties. According to Monk (2001), personal motivation is a competency that improves drive, having a sense of responsibility, getting the job done and arriving at work early. The managers of security companies can have personal motivation by being enthusiastic and working hard to achieve their organisational goals.

x. Conscientiousness in the Delivery of Duties

Part of the component of a good security personnel is compliance with the company rules and regulations. Hattingh (2006) observes that compliance with instructions and procedures is a competency that must be displayed by the security guard, making sure that schedules are carried out when allocated and showing commitment towards the organisation. It is also important that guards make it their duty to write situational reports of incidents at every shift. The handling of relevant equipment, policies, procedures should be known by the guard coupled with strategies that can help promote an effective operation of work in the company.

xi. Interpersonal Relationship of Security Personnel

Interpersonal relationships include relationships with the management and clients. The interpersonal relationship with the management shows the level of respect that the security guard shows to store staff and management.

Clients' interpersonal relationship relates to the way the security officer communicates with customers. O*NET OnLine (2010) stated that it is essential for security guards to develop and maintain a good client's relationship which can include going an extra mile to assist them with out-of-duty chores whenever the need arises but not at the detriment of their primary duties.

xii. Security Guards Responsibilities

The main core responsibility of the security guards is protecting people, premises and property from accidents and crime. They do this by monitoring and patrolling in order to prevent the

property from catching fire, stopping shoplifters, and reducing theft in stores, stopping vandalism and other illegal activities. In UK supermarkets, security guards carry out citizen arrests in the store or on their employers' grounds, conduct incident interviews, prepare incident reports, and can give witness statements in the court of law. The security guards work in different locations like shops, banks, building sites, offices, and many other locations. In some businesses or organisations, security guards use radios and telephone to contact the police, fire bridge, ambulance, or their office for backup or the alarm company.

Most of the job description of the security can be monotonous but, on a few occasions, the security guard can have a unique job description tailored towards the needs of a particular employer. For example, in supermarkets, they work mainly to keep customers safe, protect the company goods and premises. The security personnel also work in banks, apprehending criminals before police arrives, protecting travellers in the stations, buses, and trains. In most countries, they screen the passengers for explosives and banned weapons and ensure that properties are not stolen while they are loaded in the conveyer bay or being offloaded.

The security guard can question an individual and also prevent entry into the property that they are controlling or monitoring, failure to comply can lead to trespass and subsequent arrest. However, the citizen's arrest must be in accordance with the law of the country or a state when witnessing a crime. In the UK, security guards are trained to comply with an armed suspect's demand.

Supermarket owners can arbitrarily exclude certain customers who have violated the rules of the store including shoplifting, assault on the staff and other crimes against the store which Charles Reich called 'Internal exile' (Gary,1994).

2.3.1.2 Access Control

Another type of physical security is Access control. Access controls are known as barriers which are used as the outermost part of security to prevent customers from passing through check outs that are not in use. Barriers could prevent attacks and are used to psychologically deter unwanted intruders from passing through the perimeter excluded part. In some buildings, tall fencing with barbed wire, razor or metal spikes can be used but there must be signage warning the general public of such. Supermarkets operate access control by placing expensive

products at the top of the shelf and a customer would need the assistance of the store staff to get them.

2.3.2 System Security (CCTV)

Image 2: CCTV camera in a retail supermarket setting



Source : Intelligent HQ (2023) https://www.intelligenthq.com/small-business-security-5-biggest-benefits-installing-cctv-cameras/

The first CCTV (Closed Circuit Television) was developed by Siemens AG in Germany to observe when rockets were launched even from the bunkers during the war in the 1940s. It was also used to monitor weapons during the war in 1942. The inventor of CCTV was Walter Bruch and the USA company that first commercialised the product through a government contractor was Verizon. New York City was the first county to install CCTV cameras, which were put in Times Square to monitor, deter, and reduce crime in 1973.

The UK installed its CCTV in the seaside of Bournemouth in 1987, from there may cities started installing the CCTV cameras. System and information have grown immensely with the advance in computer technology which include CCTV systems, and the apparatus used to operate on the systems.

Throughout the world, video surveillance has continued to grow exponentially and security budgets for corporations, government and private sector keep increasing according to (Haeringet al., 2008). These technologies help in detecting crime, tracking, and analysing behaviour to improve accuracy and reliability. Some of the CCTV can connect wirelessly to

the office PC, the monitor, the security guard patrol camera while in motion and the reception desk.

The research from market trends in 2009 showed that the CCTV market was going to accelerate to about 36.9% annual growth in the security industry.

There has been an increase in the deployment of Close-Circuit TV (CCTV) systems around the world, enabling the monitoring of hazard to those performing duties for longer hours which is expensive, tiring, and ineffective (Hearingat al., 2008). In addition, any personnel assigned to work with the CCTV will lose their attention after 20 minutes regardless of their dedication to duty.

Image 3: Sainsbury's self-checkout machines with CCTV to monitor shoplifters



Source: *Epigram April 2019 (online @ https://epigram.org.uk/2019/04/06/why-are-the-sainsburys-self-checkouts-angry-at-me/)*

In retail supermarkets, the close circle television recently can connect to the body cameras worn by security guards.

2.3.2.1 Functions of the CCTV Systems

The main function of system security in supermarkets is to detect and alert situations that can impact businesses (Sobieski, 2017). Access and video management are the main components

in security systems which must be interconnected to other systems within the organisation (Nunes-Vaz & Lord, 2014). Security systems are very vital in an organisation, their discontinuation can expose the organisation to a high risk (Bukovetskiy, Stepanov, & Tatarnikov, 2015). Such risks include financial and reputational losses to businesses (Hall, Heath, & Coles-Kemp, 2015).

One of the most important functions of system security is to follow procedures in accordance with a given business process. In most cases, the business and the end users can influence the performance of a system based on the operational needs of the business, an instance of this configuring an alarm to react when there is intrusion (Rajagopal et al., 2015). Rajagopal et al (2015) stated that when the system is obsolete, there is delay in performance. Periodic system assessment, maintenance and update are needed in any business so as to avoid system ineffectiveness (Strouse et al., 2014). When a business uses systems that are obsolete and deficient, this can lead to unnecessary risks which threaten the continuity of the business (Hester & Mahadevan, 2010; Rajagopal et al., 2015; Strouse et al., 2014). This view is also supported by Bartels et al. (2012), it is particularly important that retail supermarkets upgrade their systems in order not to jeopardise their processes which can lead to financial losses, legal action, and loss of confidence by their clients. For the systems to be up to date, businesses must spend a significant amount of money for periodic upgrading and installing new systems. Freedonia Group, a market research firm projected 7% annual rise in electronic security products in 2019 to be $16.2billion, leading to higher risks and faster evolution of security systems (as cited in Parrish, 2015). With the advancement in technology, security systems can easily be obsolete in supermarkets without periodic updates.

Roelofse (1995) stated that modern equipment is used at large by society and big businesses to prevent crimes, harms and deter intrusions. Roelofse (1995) highlighted that physical security systems are essential in supermarkets as they portray the reliability and dependability of the business. Managing and maintaining a security system is crucial as neglect can lead to security breaches (Vintr, Vintr, & Malach, 2012).

In the security systems solution, access and video management systems help in the combined efforts of security functions which include deterring those that plan to offend, detecting the crime before it occurs, delaying so that the criminals will wait for police to arrive, alerting the owners and the employees about the unwanted act and curtailing nefarious activities that might occur. (Garcia, 2006 & 2008)

Closed circuit television systems (CCTV) are becoming more popular as they are being used in many supermarkets, offices, housing estates, roads, parks, and many public places. It is estimated that there are about 4.2 million CCTV cameras currently in operation in the United Kingdom (BSIA 2013). Monitoring these systems have been part of the culture of many parts of the world especially in Europe, America, Far East, Africa, and other countries. In retail supermarkets, CCTV helps in automated detection and recognition of goods when they are being taken out without being paid for. CCTV is used to build the algorithm that alerts the security guard and the owners of the supermarket when a shoplifter wants to steal in the shop. In most supermarkets, the meat, alcohol, specials, and most expensive items have tags that can trigger alarm when passing the till without the item being paid for. CCTV can help to propose a situation where there can be a near-zero rate of false alarms.

As stated in the CCTV Operational Requirements Manual (2009), it is the responsibility of the operator to monitor, control, detect, observe, recognise, and identify individuals that are potential threats to customers, clients, and property. (Cohen et al.,2009).

For effective operation in the supermarkets, it is advisable that CCTV operators are not overloaded with work as a system that generates algorithms to alert the security guard and the CCTV operator against any perpetrator. There are also security systems that deal with fire detection according to (Marbach et al., 2006).

As stated by Grega et al. (2015), the city of London has eight million inhabitants and it is estimated that there are about 900,000 cameras and the police have access to about 60,000 with 3000 in Heathrow Airport, all these are used to monitor London providing a great access to information leading to many arrests. People's reaction and resistance are to be expected in the installation of new technological systems. This has been the case in some areas where residents' initial reaction was reluctance but after the CCTVs have been installed with the benefits seen in terms of statistically significant improvement in the security in the areas that are monitored and decrease in crime, residents' reactions are now that of acceptance.

The presence of CCTV systems in retail supermarkets has helped in the detection and recognition of known shoplifters which lead to rapid response and reduction in crime. Stores make use of automated alarms, but these can never substitute the human operators of the CCTV. Alarms can be useful where there are single operators monitoring numerous CCTV

cameras for many hours which naturally dulls their awareness and the ability to react to a situation.

There are many concepts of CCTV image analysis and detection in supermarkets which has been proposed and analysed and they can be used in solving complex problems in the stores. These systems can be used for observation and prediction based on human silhouette detection for suspects in the store (Chein et al., 2010). They are also used on days that the stores are very busy (Velastin et al., 1994) while Dever et al. (2002) proposed a system for automated robbery recognition and detection based on the behaviour of the culprit.

There are times when stores experience armed robbery and this has led to the initial concept of automated detection of gun crime as proposed by (Darker et al.,2008) which was also part of United Kingdom-based MEDUSA project (2007). This team was able to identify the cues that might indicate that an individual might be concealing firearms or knives (No author, 2008). Furthermore, Arslan et al. (2015) proposed a firearm assessment using visual hierarchy of the situation and the conceptual firearms ontology of a particular area. This entails a video-based firearm detection which is a preventive measure that include acoustic gunshot detection with the local alerting the owners of the supermarkets or premises (Maher, et al.,2006) and (Chacon-Rodriguez, 2011)

Algorithms also help in the detection of knives in a supermarket through visual descriptors and machine learning. They are used to detect knives near the human silhouette which immediately calls for attention as it is a known fact that possessing a knife is dangerous with other customers around in a supermarket. The CCTV can help to distinguish whether the culprit is having the knife at hand and when it is on his body. When the knife is held at hand, it is expected to be used against another person. Nevertheless, in occasions like this, CCTV operators are expected to operate with caution in order to distinguish between the offender and defender so as to avoid unlawful arrest.

2.3.2.2 Anti-Theft System

In some supermarkets, mobile phones, tablets devices, and many kinds of electrical equipment are commonly displayed in a “Big Box” as these devices are more prone to theft. Thefts in supermarkets have become more sophisticated that the managers must think of the best way to protect expensive items. In modern security systems, the tether is the cord with wires that

provide power to the puck and the security sensors while short adapters can also be used to connect the power jack on the device to a similar fitting in the pack. These sensors can take different forms when they are being used but on many occasions no matter the form, the sensors usually involve triggering a switch or breaking a circuit when there is a shoplifting or unauthorised access that involves removing a handheld that is displayed. This security system is then communicated to the under-the-counter control electronics that triggers the alarm; this alarm could be audio, visual, or other forms that warn the supermarket owners of any security breach. As the employees are trained in matters like this, when the alarm sounds, they will immediately recognise the system that the alarm went off.

These security systems face ongoing challenges that relate to the fact that hand-held-technology is continually evolving which is a big challenge. It is pertinent that these systems should be built to adapt the supermarket's needs to swap-our new versions of hands-held that could easily be managed by the owners of the stores.

2.3.2.3 Surveillance in Facial Recognition System through CCTV

Some supermarkets are equipped with facial recognition systems to detect known shoplifters. These cameras can compare faces of individuals in the store with police known shoplifters which enables the supermarket owners to combat crimes actively and resolutely in the store. The known shoplifters' photos are stored in the systems and can be recognised by smart cameras. The security guards can be alerted when a match is established between a suspect having entered the store and the database of the store. (Francisca,2012). The introduction of facial recognition in the supermarkets increased the use of technology in crime surveillance.

There are many actors involved in facial recognition in relation to monitoring and controlling the crime in stores and they include the security agencies, retailers and suppliers of facial recognition technology, security guard, CCTV operators and store employees (Van Steden,2007). The involvement of various actors can also affect the relationship between those that work, monitor, and control the supermarket. As police are involved in facial recognition, the UK government actively and openly seeks to partner with other security providers (Rose, 2000). The government should be known as the one that extends the crime control network that includes a variety of public and private agencies, managing the relationship, the programmes, and techniques (Den Boer, 2004; Loader, 2000; Rose, 2000; Van Steden, 2007).

As facial control becomes rampant in many supermarkets, it is now a significant development in pluralisation of crime control which brought more intense and ubiquitous forms of monitoring and social control in the store (Lyon, 2007; G.T. Marx, 2002).

Recent studies suggest that technologies play an important role in the process of linking different actors in networks and complexes of surveillance in facial recognition (Introna & Wood, 2004; Prainsack & Toom, 2010). The technologies used in facial recognition can make connections by integrating databases from the store, other local retailers, and police information to create a profile for a specific individual.

There are many ways the facial recognition tool can be used in a supermarket to visualise a target among the customers. When artefact is made and stored in the system in a particular supermarket, they should be integrated with the relations in strategies, techniques, norms and what is preferred at a particular site, a process which can involve contingency and resistance (Akrich, 1992; Callon, 1986b). Christopher Gad and Peter Lauritsen (2009) stated that surveillance works very well when the systems, devices and human actors interact together. This shows to the store that facial surveillance cannot be a single operator but a heterogeneous mixture of humans, artefacts, and sources of information at a particular place and time (M'charek,2008).

In surveillance in the supermarket, visions can constitute the views of the management which arises from a skilled practice drawn by collective experiences of those trained to use the artefacts of a particular supermarket, the routines, and the context for their use. Included in these artefacts in the organisational hierarchy are team members, store managers, local authority (Police) and security personnel (Grasseni, 2007). He also stated that the team negotiation on these crimes can be between standardisation (Latour, 1990) and individual subjectivities (Norris & Armstrong, 1999).

In the supermarkets, the employees, security personnel, CCTV operators and the managers adapt their own strategies and routines through the artefact that has been built in the CCTV system.

For supermarkets to be using CCTV and Artefact, it is generally believed that it is always problematic because of the disproportionate amount of shoplifting going on. Most supermarkets are in local residential areas or city centres and security personnel might find it

hard to control shoplifting physically as some of the supermarkets are surrounded by drug dealers, homeless people, and shoplifters of many kinds which might be known to the police. These groups are always threats to the supermarkets and with facial recognition systems, anarchy can be prevented in the stores. This could be achieved when CCTV operators, the security guards, and the management work together to foster interconnectivity between them thus leading to prevention, detection, and deterring suspects. Through this, in 2004 the supermarkets started implementing a banning order which was known as Anti -Social Behaviour Orders in the UK (Donoghue, 2008). This banning order will reduce police intervention as it gives the shop owners and security personnel the authority to enforce those rules when there is an offender where facial recognition system will help. Some of the rules cover theft, harassment, eating the product before payment and being a nuisance to the store. With the facial recognition system, a suspect that has been banned by the store could easily be recognised and charged for trespass and the security personnel can call the police when the occasion calls for it.

2.3.2.4 The Use of CCTV to Detect Offenders through Facial Recognition System

The security personnel and the management of the store follow set regulations, using knowledge of the CCTV, the goods in the supermarkets, the internal layout, and customers in order to detect and arrest offenders at the supermarket. The primary aim of this is to catch people while they are stealing following the procedure of facial recognition surveillance. In supermarkets, shoplifting can only be a fact when the culprit passes the till and try to exit through the door. When the security personnel see a suspect, he follows them through the CCTV cameras to observe what they are doing, until they pass through the till without paying, and this will be caught on the cameras. When the suspect exits the door, they are then arrested following the ASCONE procedure. The suspect will then be taken to the security or waiting room where their photo will be taken, and a banning order given.

To capture the image of the offender, security personnel examine the displays from the CCTV cameras which can be zoomed in and out with the angles changed. The coloured photos of the offenders can be displayed in the staff canteen for every member of the team to see, in some instances, the security guards can make note of the type of offence and the behaviour of the shoplifter.

Security personnel and CCTV operators use their professional skills to detect the behaviour of suspects, so it is paramount that they increase in acquiring knowledge on the use of devices that identify suspects. Security personnel are trained with the conception that anyone who is a thief might not look like a thief but to watch the behaviours, nervousness and hesitation that give a suspect away.

The CCTV operators work hand in hand with guards to keep an eye on familiar faces like already known shoplifters, risky individuals especially those that have been banned and those loitering in front the stores that were not necessarily banned. Criminals could play a game of cat and mouse with security personnel as they try to learn their routine patrol in order to be ahead of them. It is the duty of the guard to advise the owners of the supermarket how the physical environment should be to ensure a very good visibility for CCTV operators (Francisa 2012).

2.3.2.5 Facial Recognition System in Supermarket Using CCTV

The facial recognition system can be used as an automated method to detect known shoplifters and offenders of a particular supermarket. The cameras in the store can capture real-time images of those entering the store and comparing them with the database of those that have committed crime previously in the store as all offenders have a banning order that is recorded against any of their names. The basic principle of this facial recognition is extracting features of individuals from different facial points which eyes cannot do at this time and comparing them with what has been stored. The system would have an inbuilt algorithm that can express the characteristics of those entering the supermarkets and the algorithm in the database in a particular supermarket to alert the security personnel of any suspect. This can be a challenging operation in an environment that is unregulated where the suspects can easily turn their faces for the system to pick and the condition can vary (Philips et al., 2005). No march of any suspect can be established 100% till the identity has been checked.

The facial recognition system helps to recognise those that have been banned from the stores and this can be connected to police databases which help to locate the frequent offenders. The police in the UK have the telephone number of the CCTV control rooms in the country and can call security personnel when there is a serious suspect in the store. The frequent shoplifters and offenders are responsible for the variety of minor offences that affected the general public, supermarkets, loitering and pick pocketing (Ferwerda et al., 2003). As the security personnel

are working with police through facial recognition databases, this will not only solve supermarkets' problems but also contribute to reducing the problem that are those suspects in the society.

The facial recognition system in retail can be designed to organise the collection of human faces and artefacts for security personnel which then enables them to spend more time in preventing shop crime and looking after the premises.

Facial recognition systems in CCTV can help the security personnel or store employees to prevent a violent offender before he or she commits the crime (Raad van Hoofdcommissarissen, 2001). This can also be used in deterring a suspect before the crime is committed and can help in a proactive approach in dealing with the offender.

Sometimes when the permanent security guard in a particular store goes on holiday, the facial recognition system in the supermarket will help the guard covering the shift to recognise the presence of a banned suspect.

The facial recognition system can be used in the court proceedings against the offenders which can help in the conviction of the suspect.

2.3.2.6 Police Collaborative Work with Security Personnel

Supermarkets make use of security personnel and the knowledge they have in dealing with shoplifters, suspicious individual's behaviours, paper works and taking photos of the criminals while knowing their limits within the law. The relationship between the police, the security team and the shop owners is centred on the occasion of shoplifting, or any crime being committed in the store which warrants the invitation to the police for their intervention.

The police always want to cooperate with security guards more closely, but private regulations do not allow them to share information anyhow, nevertheless, they can discuss the activities of the targeted offenders with store owners. The police encourage the security personnel to report any suspected activity as soon as they are aware of it. The police on the other hand are responsible for ensuring that the guards do not use threatening and repressive forces in arresting criminals. They also ensure that security personnel follow government guidelines on the banning order, which include monitoring, preventing, and having proactive behaviour when

they approach a suspect before they walk away. They follow the ASCONE procedure in dealing with suspects while the criminal activities would be captured on CCTV.

Shoplifters are the problem of the police when they are outside the premises but become the responsibility of the security guards when they enter the store. These offenders include drug users, drunkards, kleptomaniacs, those that assault the employees of the supermarkets and may likely carry out damages to the store.

Security personnel carry out their surveillance and policing by using the rule of 'Semi-public space' to their advantage by not being too strict to enforce code of conduct as police would have done which gives them certain degree of freedom in dealing with diverse and sometimes undefined problems of the supermarkets (Francisa,2012). Some of these will include taking photos of the arrestee and issuing banning orders.

2.3.3 Cybersecurity

Cybersecurity can be described as security systems put in place to deter criminal activities that occur over the internet. When computers are used for illegal activities, such as fraud, identity theft and violation of people's privacy, these are referred to as cybercrime. Cybersecurity is the security software installed in computer systems to protect organisations against cybercrimes such as fraud, identity theft, computer virus, software piracy, and data infringement.

It is imperative for businesses to develop processes that encompass cyber security. Cyber and physical security work together as there is a mutual concern about the vulnerabilities present in both security types meaning that they can both be exploited which warrants the importance of employing one with the other as stated by (Boakes,2015).

Cyber security in retail can be complex as it requires knowledge of the domain and cognitive abilities to predict possible threats from the amount of data available. Some retail supermarkets install personified Intrusion Detection System (IDS), which allows individuals with limited knowledge in cyber security to detect malicious events and awareness of attack on the supermarket network systems.

Employees with experience in cyber security can distinguish between different types of cyber-attacks which might not be known to neophytes in the business. (Ben-Asher, 2015)

Cyberattack can have a measurable effect on a company's reputation, that is why they spend a lot in making financial decisions on cybersecurity. A supermarket's reputation can seriously be affected when its systems experience a cyberattack, especially when it is widely reported in the media.

According to Patel (2019), 50% of software developers cannot spot when there are vulnerabilities in source coding which signifies that there could be a serious problem with security when customers are shopping online.

Cyber security in retail can be complex as employees in charge are required to have the knowledge of the domain and cognitive abilities to predict possible threats from the amount of data available. Some supermarkets develop their personified Intrusion Detection System (IDS), which allows any employee without the knowledge in cyber security to detect malicious events and be aware of attacks on the supermarket network.

On the other hand, employees that are experienced in cyber security are able to distinguish between different types of cyber-attacks whereas neophytes will not be sensitive to these attacks. (Ben-Asher, 2015)

The result of a cyberattack can have a measurable effect on cyber security which could affect the company's reputation as they typically spend quite a lot in making financial decisions on cybersecurity. A supermarket's reputation can seriously be affected when there is a cyberattack on the company which is widely reported in the media.

Part of the work of cybersecurity is to protect data processing and service provisioning on the Internet which is generally a centralised structure by which data is collected before sending it to a remote data centre for storage, processing, and networking. This process is referred to as the cloud architecture of computing which helps in bringing the cost down for users and creating a demand for pay-as-you-go services to enable the flexibility of the service (Pan, 2018). Cybersecurity is a prominent issue in the business world today which has necessitated a paradigm shift on the Internet of Things (IoT). IoT refers to a system of interrelated wireless devices that are connected through the internet for the collection and transfer of data without human intervention (Kumar et al., 2019). This means that a massive number of mobile and wireless devices that are located at the bottom of the Internet hierarchy will be connected to organisational systems and could generate a huge amount of data at a very high speed.

2.3.3.1 Challenges for Internet Systems

A massive number of systems with poor IoT devices could be more vulnerable to all kinds of attacks due to lack of computation, enough storage and battering resources which can affect the provision of a quality service in security. This lapse could lead to security breaches which can cause businesses a huge amount of economic loss (Blog, 2016).

IoT devices have limited capability to run standard encryption, authentication, and lower access control to the algorithms of the supermarket.

The supermarkets can be vulnerable to targeted Denial of Service (DoS) when cyber attackers make an attempt to overwhelm the internet connection of their legitimate customers there by making it unavailable. They do this by driving unending traffic to the websites of targeted supermarkets over a prolonged period of time making it impossible for the legitimate users to shop freely. Further attacks on IoT situation devices include employees' interference and theft of data, codes, and keys. which could be prevented by conducting background checks on them before employment; forging of identity which compromises data integrity, eavesdropping on shared channels and using fake codes to jam the link between IoT devices. Cybersecurity could play an important role in assisting the IoT devices to coordinate security functions in the systems, helping to detect and protect against any type of attack.

Network Function Virtualization (NFV) and Software Defined Networking (SDN) are two types of technology that work with each other to enable a virtualised and shared edge cloud platform. NFV can provide Virtual Machines (VMs) security through software like firewall or intrusion detection applications in the supermarkets. When SDN has embedded separation of control and data forwarding, it can be adapted to work with NFV to network, configure, control, and manage the VMs, good integration of NFV and SDN will bring an agile edge cloud platform which can easily be configured and managed for future of IoT applications. Jianli (2016)

NFV and SDN can be configured together to give supermarkets maximum protection. Most of these in IoT devices in supermarkets that are connected to the internet generate a huge amount of data by processing customers' transactions at a very high speed. Some of the supermarkets store this data in a centralised place and this data will be processed at many decentralised edge computing nodes. On some occasions, it will be better to process the data by the company

instead of using a cloud which can be controlled by an outside provider and the security might not be very secure.

Cybersecurity is very important to businesses as it helps to mitigate actions that are detrimental to customers information, promotes confidentiality, integrity, and trust in the supermarket. Everyone buys goods in supermarkets in one way or another which makes the data very sensitive in nature. Supermarkets are very vulnerable as they are open to the public and this puts the stores in a position to attract cybercriminals who capitalise on porous networks and other systems to steal information, manipulate data, and disrupt the operations within the ecosystems of supermarkets (Okereafor, 2020).

Part of the responsibility of cybersecurity is to proactively detect planned attacks in the supermarket, systematically prevent cyberattacks that are targeting the supermarkets systems and respond to attacks immediately thus minimising the impact.

Cybersecurity systems help to strengthen the security, monitor the data, and preserve surveillances' integrity.

2.3.3.2 Personally Identifiable Information (PII)

PII is the information that identifies an individual, distinguishes one person from another and can trace an individual's identity, the information of which is one of the most central concepts in information private regulation (Okerafor and Adebola, 2020). PII can be associated with an individual's name, date of birth, national insurance number and other details that might be related to a person, which is helpful in preventing unauthorised individuals using another person's credit or debit cards.

Supermarkets always attempt to find ways to improve customers' safety and reduce cost in running their businesses, but this can have devastating consequences leading to reputational damage through the media which can ultimately tarnish the image of the business for a long time.

2.3.3.3 IT Governance for Framework in Supermarket

Gartner (2020) defined Information Technology (IT) as a system process that ensures businesses operate in such a way that can maximise their effectiveness and efficiency in order

to achieve their organisational goals. Businesses do their best to acquire a consistent set of secure and trustworthy systems to use, process or interact with their data. Cybersecurity is the key for most successful trustworthy data.

It is a known fact that the data of supermarkets are classified as critical assets especially with the recent covid-19 lockdown which brought about a sharp rise in online shopping thus necessitating cybersecurity as a paramount tool in most supermarkets.

Cybersecurity is an important aspect of this research as there is the need to go through a proper understanding of the magnitude of the issues with cybersecurity in supermarkets. An in-depth cybersecurity approach may help to mitigate against cyber threats in supermarkets which is one of the major areas of investigation in this research in relation to crime prevention.

2.3.3.4 Cybersecurity Challenges

Cybersecurity challenge is the serious naval genre which is set up to raise standards for the industrial software developers, creating awareness for secure coding, securing the coding lines, and bringing the best practices. Patel et al. (2019) stated in their recent studies that not up to 50% of software developers can spot the vulnerabilities in source code which is a serious problem (Schneier, 2019)

Some supermarkets that use subcontractors use companies that are members of Charter of Trust (COT). This organisation was established to develop the wide principles in software and product development. Any software company that signed this is expected to adhere to the rules and it is the COT responsibilities to create cyber awareness and educate the industrial software developers. Many companies in COT have joined together to form the SAFE Code Charter Members (2020) which specialises in the best practices.

Some supermarkets use Static Application Security Testing Tools (SAST) which are automated tools that pick out both the positive and the negative information but can produce both false and true outcomes (Aloraniat al., 2019 & Li., 2020). To mitigate this, Gasiba et al. (2020) suggested that work should be done manually to filter the false positives from the true positives. In these systems, a clear indication that there are false negatives shows that the tools are not perfect, and additional measures are required to ensure a good software (ISO. ISO 250xx Series, 2005). It is therefore imperative that organisations using this should concentrate on

awareness training for their employees on cybersecurity, while they keep them motivated by instructing the software developers to carry them along with the process they are putting in place.

Capture-The-Flag (CTF) are games that are created by the supermarkets to improve system penetration skills and to simulate cybersecurity breaches scenarios (Leune, at al., 2017). The reason for this is for those in charge of the systems to learn more about what might come up and how this can be dealt with. The participants in CTF games increase their knowledge on attacking and defending IT systems as they usually work together (Gasiba et al., 2020).

2.3.3.5 Employee Awareness

Any employee assigned to oversee systems needs to undergo awareness training as stated by Mcllwraith (2006) where their behaviour will be monitored. The methodology that they will be applying to the systems will be learnt and the baseline for implementing training. Mirkovic et al (2014) stresses on the importance of educating employees on attack and defence. Hansch et al (2014) came up with the concept of IT security awareness which include three components of awareness: first is perception which is knowing the threats, second is protection which is knowing existing mechanisms, and third is behaviour which is correctly acting according to the circumstance that attack came from

2.3.3.6 Interaction Between Edge and IoT Devices

The IoT will help each other with different tasks depending on the resources available and the incentive policy (Pan, 2018). Some of these tasks and collaboration can be very concerning as the codes need to be scheduled to execute on different systems of the IoT devices, when there are cross code devices, they must be secured.

Some supermarkets build their own cybersecurity systems for logging transactions, messaging, user's authentications, identifying their employees and access control for the staff.

From a cybersecurity perspective, it is good to apply artificial intelligence (AI) and Machine Learning to analyse behaviours, identifying potential threats, addressing vulnerabilities, and detecting malicious attacks in the computer systems that can disrupt the business of the day. With this in place, the system could collect the data to predict the specific user's behavioural

pattern and can match that with a specific type of attempted attack on a specific sensitive data. (Pan, 2018).

Some businesses could use AI and Machine Learning to build an automatic robot that can silently scan and check all the environment to see if there is any potential threat, vulnerability or malicious act going on in the store. AI could also be used as a reminder to human administrators and respond to some threats when there is specific data that the AI is trained with which can also serve as a model (Pan, 2018).

2.4 Retail Crime

Retail crime is an act against stores, their subsidiaries, properties, employees, or customers (Armitage *et a.,l* 2018). Retail crime takes place when goods are taken from the retail shop by customers or employees with the aim of evading payment.

Retail crime is committed not only because of financial needs but also to satisfy psychological needs arising from societal influences and the desire of having expensive materials for enjoyment and entertainment (Krasnovsky and Lane,1998). High retail crime is carried out as an organised crime which is referred to as organised retail crime.

2.4.1 Organised Retail Crime (ORC).

Organised Retail Crime is made up of professional shoplifters or groups of criminals that steal merchandise, data, or cash from the retail environment. This is not a case of one person acting alone. These criminals move from one store to another and from one city to another. According to Nadeau (2007) who was formerly at the FBI Organised Retail Theft Program. “These aren’t shoplifters taking a pack of guns, they are professional thieves.” The FBI estimated that the losses in organised retail crime could reach up to 30 billion dollars in a year (Nadeau,2007) while in UK, the British Retail Consortium annual crime survey for the year 2013-2014 estimated that the loss on retail would be about 40% of the thefts from shoplifting (Retail Crime, 2015). There are many types of thefts that these criminals commit which include theft from consignments, vehicles that deliver goods and stealing from warehouses. This can involve a very big scale organised shoplifting and refund fraud whereby they use small time thieves whom they might have recruited to commit these crimes. Some gangs may use coercion to ensure that there is compliance by the staff of the stores. Centre for Retail Research (2019) estimated that 28.2% of the losses in the supermarkets from external crime came through organised retail crime which came to an estimate of £562m.

2.4.2 Leakage in Retail

Retail leakage occurs when local customers go outside their locality to do their shopping. Leakage can be described as consumers spending outside their local market, that is where income moves from the local economy to other areas. This happens when there is unsatisfied demand in a particular area, however, it does not create opportunity for the new area where the customers are patronising. Leakage is usually triggered by fierce competition of some products within some localities or customers experiencing incessant harassment from retail criminals which make them look elsewhere for their shopping (University of Wisconsin-Madison, 2021). Leakage in retail is the cause of some of the losses that retailers record in addition to shrinkage which is caused by other factors. These factors will be discussed under the section for types of retail crimes in this chapter.

2.4.3 Shrinkage

Retail crime cannot be discussed without shrinkage. Shrinkage is a measure used to check the loss rate by removing the actual level of sales in a year from what sales should have been based on the goods supplied. (*Retail Crime Costs in the UK, 2019***).** The difference between the two values can cause price increase and reductions leading to wastage which is termed 'shrinkage' meaning that goods have somehow disappeared.

2.4.3.1 The Shrinkage and the losses caused by crime in the supermarket between 2018-2019.

According to Charles (2011), shrinkage is the loss of goods by retailers through theft and other means. It is a well-known fact that shrinkage in retail is a consistent growing problem (Elder, 1989). During the inventory of any supermarket, there are always unknown results in the losses (Kennedy and Benson, 2016). There are four main significant causes of shrinkage which are shoplifting, employee theft, supplier fraud and administrative errors (Bamfield, 2006). It is very important for retailers to understand what causes shrinkage so that they can mitigate against it. The average shrinkage in this one year was 1.42% or almost £5,5bn. These figures include administrative errors, such as when the goods are not priced correctly, or delivery mistakes, this shows that the losses experienced in supermarkets are not all about crime.

The table below shows the shrinkage in 2019.

Some external thefts are included such as robbery, cybercrime and criminal damage, the total UK retail crime losses in the 2019 are estimated to be £4,821mn.

Table 2: The *Retail Crime Costs in the UK for 2019*

Retail Shrinkage and Crime 2019 UK

Source of loss	£millions	As percentage of shrinkage
External theft (shoplifting)	£1,993	34.6%
Internal theft (staff theft)	£1,305	22.1%
Losses caused by suppliers & warehouse crime	£915	18.0%
Crime subtotal	**£4,214**	**74.7%**
Error	£1,202	25.3%
Total shrinkage	**£5,416**	**100.0%**

Source: Retail Crime Report (2019)

The British Retail Crime Report (2023) showed a significant increase from the 2019 report in retail crime and subsequent loss to retailers. Incidents of violence to retail staff stood at 850 per day in 2021/2022, cost of retail crime was £1.76b, 8 million incidents of theft over the year and a total of £715 million was spent on crime prevention.

2.4.4 Causes of Retail Crime

Retail crimes do not just occur. It is a big concern to the retail industry and all its stakeholders as losses from retail crime are passed down to customers in higher prices of products.

There are many reasons why retail crime is on the increase despite all the steps taken by retail supermarkets to curb it and the support received from law enforcement agencies.

Studies have shown that dysfunctional behaviour (e.g. shoplifting) have been published in several social science studies which include marketing, sociology, education, ethics, criminal justice, and psychology(Daunt and Harris, 2014; Dootson et al., 2016; Fullerton and Punj, 2004; Greenberg, 1990; Harris, 2010; Pierce et al., 2015; Yi & Gong, 2008). Dysfunctional behaviour of the customers includes physical altercations between shoplifters and the employees especially when the culprit has been deterred from stealing (Korgaonkar *et al*., 2020).

There has been continuous globalisation and revolutions which have affected lives of most people round the world, causing a dramatic shift in the human race (Guthrie and Guthrie, 2006). Tene and Polonetsky (2015) stated that such progress can be the cause of criminal offence, ethical injustice and inequality which can also be fuelled by peer pressure and the desire to live above an individual standard. In order to satisfy those desires, some individuals will resort to

criminal activities which include shoplifting (Elder, 1989). Shoplifting and the offences in the retail sector affects retailers financially, socially, and emotionally (Kennedy and Benson, 2016).

2.4.4.1 Theoretical Explanation for the Causes of Crime

It is paramount to consider a combination of theories while discussing causes of retail crime. Theory of Reasoned Action (TRA) and Routine Activity Theory (RAT) suggest that retail crime comes from social and situational factors, ethical considerations, and the retail environment.

Cohen and Felson (1979) developed RAT during their studies in criminology and sociology. The notion RAT is based on the motivation and the opportunity to commit the crime. Some scholars writing on retail crime explore TRA which was developed by Fishbein and Ajzen (1975). The TRA is based on the behavioural intention of the criminal that is the behaviour of the person in question and the social norms that regulate the individual at that particular time.

However, some of the write-ups in management, marketing, and psychology (Brooks & Writer, 2013; Cox et al., 1990; Gross-Schaefer et al., 2000) conclude that theft can be as a result of the location of a particular shop and the cognitive moral development of an individual.

On the other hand, Routine Activity Theory (RAT) which is a subset of Crime Opportunity Theory (COT) focuses on crime situations and states that motivated offenders have an attractive target at a particular time which is also in the absence of capable guardians (Cohen & Felson, 1979). The COT theory postulates that crime is the result of the convergence of three conditions: (1) motivated offenders, (2) suitable targets, and (3) the absence of capable guardians (Brunet, 2002; Cohen and Felson, 1979; Felson, 2000; Felson & Clarke, 1998; Groff, 2008; Pearson & Weiner, 1985; Pratt & Cullen, 2005). RAT in relation to the retail store shows the existence of motivated offenders including shoplifters that are willing to engage in criminal activity when there is an opportunity with no guardian that has the ability and skills to prevent the offender from doing so.

When criminals have developed behaviour that occurs regularly in committing crimes, this act will lead to a convergence in space and time of three main elements. So the routine that offers easy targets and lack of capable guardians in the presence of motivated offenders will likely be an opportunity for retail crime to occur(Brunet, 2002; Cohen & Felson, 1979; Felson & Clarke, 1998; Groff, 2007).

Causes of retail crime can be unlimited as millions of customers and employees steal goods from retail outlets, this will include alcohol, drugs, low self-esteem, and peer's influence. (Felson and Clarke, 1998).

2.4.4.2 Motivation for Criminal Activity

Routine Activity Theory (RAT) states that the main motivators for criminal activity are financial gain or economical needs, societal factors, and beliefs. Financial gains relate to issues that are created by poverty, greed, expensive habits, and drug usage. The societal factors include peer pressure, envy, coercion, rebellion against the government, the desire to look good and many other societal conditions. Shoplifters most often target well-known brands in the supermarket as there is always enough secondary demand in markets for the sale of these goods. Some of these products can easily be concealed and sold as stated by (Clark and Webb1999).

However, Samenow, (2014) is of the opinion that there are those that commit retail crimes with the belief that they are not wrong or causing harm to others and these motivate them to commit these crimes.

For Babin and Bain (1996) and Cox et al. (1993) shoplifting in particular, is motivated by power, fear, and thrill-seeking which are part of driving forces in retail crime.

The hypothesis by Korgaonkar et al (2020) showed that the higher motivation to commit these crimes leads to a positive attitude towards theft and the higher motivation to steal indirectly leads to greater behavioural intentions about stealing.

RAT indicates that for opportunities of crime to occur, there must be certain variables that must be present which include individuals, objects, or places. Those who offer easy and suitable targets have been identified in many contexts depending on the situation of the supermarket.

2.4.4.3 Deregulation of Alcohol

Alcoholism which is excessive intake of alcohol is a major cause of retail crime. Alcohol is one of the most shoplifted products in retail stores. Alcohol has many effects on consumers and innocent people in the retail environment which includes violence and fatality. There have been many policy decisions whether alcohol should be more competitive and deregulated in distribution chain (Urback, 2014., Beer Store, 2014).

There are many benefits in deregulating the distribution of alcohol in retail stores. One of these is the fact that the government is able to accumulate savings as they will no longer be

responsible for the high extensive overhead cost of the configurations of retail outlets while the revenue collected from alcohol sales tax will increase (Gamingy, 2015).

Deregulating the sale of alcohol in retail stores also has social consequences (Sen,2016). It has been suggested that this will enhance access to alcohol in the retail stores which will subsequently lead to increase in crime within the locality (Cayley,2014).

Alcohol deregulation does not result in crime reduction in retail stores while on the other hand an average alcohol sale in some jurisdictions that have deregulation might also not link to high increase in crime (Sen,2016). There has not been any clear consensus between alcohol deregulations and the crime committed in a particular area(Zhao, Stockwell, Martin, Macdonald, Vallance, Treno, Ponicki, Tu, and Buxton,2013). Nevertheless, the indirect impact of alcohol deregulation brings more people into accessing alcohol products which in turn impair their judgements leading to violence in the store and its environs.

2.4.4.4 Rational and Utilitarian Consideration

Many shoplifters stated that they are influenced to steal by rational or utilitarian considerations (Carroll and Weaver,1986). Weaver and Carrol (1985) asked a neophyte and an experienced shoplifter to think aloud before stealing in the store and they found out these criminals were thinking of how easy it will be for them to reach the goods and the risk of being caught. Whereas the experienced shoplifter will easily think of a way of overcoming those risks like checking the location and visibility of security devices. According to Montmarquette et al (1985) the frequency of deterrence in shoplifting is negatively subjective to the offender being caught stealing. There are other studies that state that the motive can be seeking excitement (West and Farrington, 1977), depression, (Ray, 1987) and personal problems (Schlueter et al., 1989).

2.4.4.5 Employees Related Problems

To understand retail crime, there has been much research on the reason customers shoplift but less attention is paid to the reason why employees steal from their working environment (Fukukawa et al., 2018; Vermeir et al., 2017). Studies on employees' theft have so far been based on cognitivism and consequentialism with the adoption of expectancy-based calculus to explain how the likelihood of possible outcomes and desirability influence their choice to steal from their employers.

Some crimes are committed by employees which cost retailers about 32 billions of dollars every year in the USA, and this has shown that employee theft causes retailers more than

customer theft (Retail Knowledge, 2015). In the UK, employee theft causes four times more than that of customer theft (British Retail Consortium, 2015).

When individuals shoplift, customers are forced to pay higher prices in United Kingdom taxes and the retailers lose quite a lot of revenue (Budden et al., 1996). Recently, in the year 2020, the retail industry has experienced turmoil because of COVID-19 virus and Internet competitors as most consumers are ordering online during the pandemic. The employees have security knowledge of the surveillance systems of the retail outlet they work, this will make it easier for them to steal and to encourage their friends to do so. Most of these retail outlets are family businesses and some of these thefts go unreported (O'Brien et al., 2018).

Part of retail crime is caused by the level of employees' wages as low income can influence them stealing from the store (Chen and Sandino, 2012). Other causes relating to employees include dishonest staff (Hollinger & Davis, 2015), the personality of retail employees (Kolz, 1999), the tactics of random inspections and internal controls by supervisory staff (Mishra and Prasad, 2006), and the theory of planned behaviour (Guthrieet et al., 2006), among others.

2.4.4.6 Demographic Characteristic of Retail Criminals

Identifying the demographic characteristics of retail criminals are crucial. Pratt et al (2010) and Stranahan and Kosiel (2007) when they were investigating online fraud, looked at the level of education of users and analysed how it can lead to criminal acts.

Schreck et al. (2006) stated that risky lifestyles of individuals like drug users or those that engage in prostitution can easily be a temptation to commit retail crime to fund their habits.

Drug addiction is part of the causes of retail crime throughout the world (Parker, 2018). Drug addicts shoplift to feed their habits and sometimes sell products for reuse. Retail crime to such a category of people can be addictive and most of the offenders are prolific offenders. There are people that would like to steal in order to please their friends and to belong to a particular group. Some commit retail crime because of what they cannot naturally afford and would like to live above their means.

In some stores, inadequate guards can present an easy opportunity to steal, insufficient employees, insufficient surveillance cameras and stores that operate at night will present good opportunities for criminals (Cardone, 2006; McNees et al., 1980; Oliphant & Oliphant, 2001). Specifically, Cardone (2006) stated that visual clues present in stores will affect the perceptions of the risk that shoplifters will be associated with.

2.4.4.7 Alcohol Consumption

Alcohol consumption is seen as normal and is an integral part to many social and cultural activities throughout the world in recent times (Mandelbaum,1965; Measham,2005). Studies have shown that people's behaviour has been more aggressive and irrational when they are under the influence of alcohol (Heron at al., 2021). Therefore, it is pertinent to examine the situational decomposition that causes people to steal in the supermarket when they are under the influence of alcohol. Binge drink is contemporary, and it is common among the youths because it is perceived as a 'social lubricant' in reducing anxiety and making them feel good (Measham, et al.,2005). It has been suggested that excessive alcohol intake can cause psychological changes which may lead to emotional instability, risk perception on cognitive changes that can make the culprit to shoplift (Bushman,1997; Chermack *et al.*, 1997; Ito et al., 1996; Steele *et al.*, 1990). Excessive alcohol consumption is associated with lack of self-control and impulsivity which can influence shoplifting.

2.4.4.8 Peers' Influence

There are social factors that lead to retail crime as a vast majority of studies show that when friends are together in a retail setting, it can affect their moral judgement and behaviour (Harris and Ogbonna, 2008; Lahno and Serra-Garcia, 2015). Crimes can be committed when the moral cognitive mechanism in a person in company of his friends deactivates selective behaviour in him in order to please his friend (Aquino, Reed II, Thau, & Freeman, 2007).

2.4.4.9 Moral Disengagement

Moral disengagement has been defined as a collection of interrelated cognitive mechanisms which will make an individual not to be morally self-regulatory in processing decisions (Bandura, 1999; Bandura *et al.*, 1996). One of the important psychological mechanisms that promotes unethical decision-making in retail crime is moral disengagement (Bandura, 1999; Bandura, Barbaranelli, Caprara, Pastorelli, 1996; Bollmann and Krings, 2016; Johnson and Buckley, 2015). This occurs when a criminal disengages his mind from the crime he or she is committing and might not see it as morally wrong or illegal.

2.4.4.10 The Effects of Suitable Guardians to Retail Crime

Security control elements can reduce pressures from family and friends which can also reduce the intention to steal. Some of these controls include surveillance monitoring systems,

inventory tracking systems, security guard body cameras, CCTV, point of sale scans, and other security control measures (Korgaonkar *at a.,l* 2020).

There are also some factors that can prevent staff theft which could be some punishments from friends, parents, and co-workers (de Vries and van Gelder, 2015; Hollinger and Davis, 2006). Bernberg and Thorlinsson (2001) stated that going out with law breaking peers will lead to delinquent attitudes. Those that have propensities towards their family are less likely to be committing crime frequently. On a few occasions in retail outlets, the negative perception of work colleagues, friends and relations can influence those committing illegal activities. But monitoring through detection and punishment when caught will reduce these crimes (Pierce *et al.,* 2015).

When there are no security control and the threat of punishment is low when the offenders are caught stealing, retail crime will be rampant.

Retail store staff like shop floor and till attendants sometimes consider themselves marginalised as they tend to earn low wages, thus having lower statuses in the organisation which make it hard for them to climb the organisational hierarchies (Korgaonkar *et al*.,2020). Some of these employees lack organisational commitment and thus are not emotionally attached to that particular retail outlet while some find it hard to accept the organisational culture. They do not always have the willingness to remain in the organisation and this can affect the way they behave towards the business. (Caillier, 2015). The commitment of the staff will influence their attitude towards stealing as those that are not committed are more prone to stealing from the retailer (Meyer *et al*., 1993; Solinger *et al*., 2008; Thoms *et al*., 2001).

2.4.5 Types of Retail Crime

Retail crimes come in different shapes and forms. Some crimes are committed by external people like customers and suppliers in collaboration with internal criminals among staff while some are committed by internal people especially the employees of retail supermarkets. The crimes detailed below are from previous research carried out into retail crime in supermarkets.

a. Shoplifting

Shoplifting can be defined as the act of stealing from a supermarket by a customer during the opening hours of the business (Francis, 1979). Shoplifting occurs when a customer deviates from the normal behaviour expected of them while shopping (Atluna *et al.,* 2016, Bain and Babi, 1996). This involves taking goods without payment or the intention to pay which is some

sort of stealing (Walsh, 1978). This has been occurring for centuries (Seagrave, 2001) and it is the most common crime in society.

The table above shows external theft, which includes shoplifting to be around £1,993m which is equivalent to 34.6% of the total shrinkage. For low level crime such as theft that is less than £200, the police may avoid getting involved once the offender pleads guilty through a letter as they may not need to attend court. (Anti-Social Behaviour, Crime and Policing Act, 2014). However according to Evans (2019), this leeway can also make some shoplifters commit more crime by frequently stealing goods that are less than £200. The number of shoplifting cases recorded by the police at the end of March 2019 was 374,395 (Home Office, 2019), but the actual may be 15- 21 times higher than this.

The first incident of shoplifting was recorded in 1838 by two French physicians-Jean-Etienne Esquirol and C. C. Marc. Both coined the term "Kleptomania" to describe shoplifting as an involuntary and irresistible action by a customer (Abelson, 1989). Shoplifting is an act whereby a customer acquires a product in a supermarket unlawfully (Cox et al., 1990) and can also be defined as the acquisition of goods through stealing (Cox et al., 1990; Fullerton and Punj, 1993; Tonglet, 2001). There are certain categories of customers who engage in an act of stealing goods from the shops either for fun, money or to satisfy their psychological needs (Cameron, 1964; Coxet *et al*., 1990; Moore, 1984). Ray (1987) stated that customers who perceive that shoplifting is not a bad thing would likely engage in the act of stealing.

Retail crime most times can be caused by the criminogenic settings which give criminals autonomy to commit crimes. Scholars have studied different gender and age groups to understand the reasons customers shoplift, such as peer pressure, psychological needs, experiential beliefs, and monetary benefits (Blum *et al.*, 2018; Cameron, 1964; Cox *et al.*, 1990; Grant, 2006; Krasnovsky and Lane, 1998; Moore, 1984). These crimes are committed by either professional criminals to resell the goods they have stolen for monetary benefits or some customers who have chronic impulsivity to shoplift (Cameron, 1964). There has been well known people that has been caught committing retail crime. "I take full responsibility for the mistake I have made − shoplifting, I know that this goes beyond me letting my school down. I let the entire country down," said Codey Riley, one of the three UCLA Bruins basketball players accused of shoplifting in China (ESPN, 2017). Retail crime is not only meant for those that are economically well off as these players were from the advantageous section of the society. There are wealthy celebrities like Megan Fox who stole from Walmart, Britney Spears

stole a one-dollar lighter from a gas station and Lindsay Lohan who stole a $2500 necklace from a jewel store (Tinubu, 2018).

In the United States of America, according to the National Association for Shoplifting Prevention (NASP), there are about 27 million shoplifters and 1 in every 11 customers is a shoplifter. In these figures, 25 percent are juveniles and 75 percent are adults (NASP, 2018).

In the United Kingdom, The British Retail Consortium (BRC) published in their retail Crime Survey (2021) showing the scale of violence in the stores and the abuse faced by the staff. The survey that was carried out shows that there were 455 incidents of abuse or violence each day in the UK between 2019/20 which is a 7% rise from 2018/19. The studies also show a total cost to retailers on these crimes and their prevention was £2.5 billion which is an increase of 14% on the previous year (£2.2 billion), (Retail Crime, 2021).

The cost of these crimes have gone up in the last three years, from £0.7bn in 2016/17 to £1.3bn in 2019/20. The most significant of this was the theft from the customers which cost companies £935m and this continued to rise despite the fact that retailers spent £1.2 billion on prevention. Shoplifting happens in different stores which include departmental stores, drug stores, supermarkets, thrift shops, specialty shops, music stores and convenience stores.

Supermarkets are particularly more prone to shoplifting as they carry a broad selection of items catering to the needs of people (Luo et al., 2015). The survey that was carried out by Jack L. Hayes International, Inc (2017) stated that 90% of retail crime was due to shoplifting by customers and the remaining was due to employees' thefts, goods stolen on transit and administrative error.

Shoplifting in retail has serious implications not only for the industry but for the society. When sales revenues are lost due to shoplifting which could be used for the betterment of the society (Potdar et al., 2018), the retailers will increase the prices of goods to accommodate the loss from stolen goods.

Many scholars who have written about shoplifting in criminology as well as the retailing field have provided a motivational belief that there are various types of shoplifting (Blum *et al.*, 2018; Cameron, 1964; Cox *et al*., 1990; Grant, 2006; Krasnovsky and Lane, 1998; Moore, 1984). Loftin and Christina (2020) assess whether those arrested for shoplifting in socially disorganised neighbourhoods are different from less socially disorganised neighbourhoods. The data they gathered from the Meridian Police and from an American community survey (2018) showed few gender differences in demography in shoplifting. The shoplifters are more likely to shoplift in stores like Aldi and Walmart. Those from less privileged backgrounds

always shoplift at one-dollar stores, off-licences, and convenience stores and they always get convicted when taken to court. There are millions of shoplifters that are arrested every day (Cook and May 2019), but retailers and the media underreported shoplifting over the years (Segrave, 2001). Despite this, scholars are not writing as much as they should about shoplifting as they considered shoplifting insignificant (Klimke, 1992). However, there are literature that provide insights on the preventive mechanisms ranging from peers' influence on shoplifting (Cox *et al*., 1993) and employees' theft (Vermeir *et al*., 2017).

b. Self-scanning Theft

Self-scanning is also known as self-service technology (SSTs) which is a technological interface that gives the customer opportunity to serve themselves without direct employees' involvement (Fernandes *et al.,* 2016). There are limited studies on the impact of service delivery, customer satisfaction, and retention of customers on self-service technology. Some customers evaluate the quality of service they get from self-scanning based on five different attributes: speed, ease-to-use, control, reliability, and finding the usage enjoyable. Customers also consider (i) whether the quality of service differs according to demographics and usage frequency; and finally (ii) if the quality of service delivered by self-checkout will bring overall customer satisfaction and future retail patronage (Fernandes *et al.,* 2016). In the last decades, many customers' interactions with supermarkets have changed because of self-service technology (SSTs) (Wang *et al.,* 2013; Orel and Kara, 2014). Dabholkar (1994) was the first person that introduced self-service technology which he refers to as the activities or benefits based on technology that is carried out by the customers.

Many supermarkets including Aldi and Sainsburys have now installed self-scanning machines which have incidentally been associated with increase in shoplifting. In order to curtail this, stores are beginning to assign employees to overseas customers using these equipment. Some of the retailers that have embraced self-scanning are looking for ways to minimise losses by theft or customer errors when they are using self-scanning machines. (Centre for Retail Research, 2019).

c. Employee Theft

It is very hard to estimate the cost of staff theft as it is not easy to detect. Centre For Retail Research (2019) estimated that staff theft will be around 22.1% of shrinkage or £1,305m.

Employees steal by colluding with customers who are friends, relatives or outsiders who intimidate them. They carry out this crime by deliberately over-looking to scan goods bought by their collaborators, give excess change or place goods where they can steal them later. Goods can be left near the waste bins for later collection and sometimes fake refunds can be given to their friends for goods that are not bought.

d. **Suppliers & Warehouse Theft**

The retailers found out that lots of fraud occurs involving the warehouses and suppliers costing about £915m which accounts for 18.0% of the total retail shrinkage for 2019. (Centre For Retail Research,2019).

Warehouses are distribution centres that operate 24 hours, and this can be where large-scale as well as small-scale thefts occur.

Most supermarkets with warehouse components suffer loss due to inventory shrinkage caused by employees' theft. There is no single solution to warehouse theft. Warehouse theft can occur where there are no strong security processes. good security systems, a good warehouse management software and good hiring criteria to make sure that honest staff are hired. There are many other ways by which warehouse loses can occur, they are listed below;

- when the stocks are not accurately recorded, this will come out during inventory. Some warehouses do not track their stock which could lead to stock missing without being noticed.
- Ignorance and lack of adoption of cycle counting which is where stocks are counted more regularly can cause losses and when there are losses, they can be detected easily when this process is in place.
- Lack of proper education for employees on the company policy on theft and failure to instil zero tolerance for theft and fraud.
- When some employees that have suspicious behaviours are not being monitored it can lead to loopholes for stealing.
- Absence of a strong managerial authority in the warehouse can lead to the staff stealing.
- When there is no monitoring, planning, and forecasting, the criminals among the employees can strategically use that as an opportunity to hide goods.
- Having excess stock without barriers can lead to those stocks vulnerable to theft without being noticed.

- When there is no CCTV in the warehouse monitoring and recording the staff, the employees can steal once they believe they can get away with those products.

e. Errors

The errors in administration were estimated to cost retailers about £1,202m or 25.3% of shrinkage in 2019. These errors come through planned sales, wrong computer prices and goods mistakenly taken to other stores.

Retailers accept that a significant part of the losses they encounter are usually through incorrect information in the central system, maladministration and staff failing to adhere to the company procedures (Centre for Retail Research,2019).

f. Daigou / Surrogate Shopping

This is where an individual or a group exports goods outside a country which can be called cross-border exporting. These syndicates or individuals can sometimes purchase goods such as groceries and luxury goods in a particular country and sell them outside of that particular country for profits. (Parker, 2018).

Daigou is conducted illegally using the country's loopholes to circumvent the import taxes of a particular country (Menendez and Enrique,2016).

h. Refund Fraud

This is the act of defrauding a supermarket by way of returning the goods stolen from the store. In addition to returning stolen goods with the intention of cashing in some money, criminals use many avenues to defraud retailers which include stealing a receipt and trying to come and pick up items that will match the receipt from the store. The most commonly used tactic is called "wardrobing" or "free renting" where a person buys a product, uses it, and returns the product to get the money back (Loss Prevention Media, 2003).

i. Money Fraud

Money fraud occurs when these criminals use illegal methods to buy goods from retail outlets which include counterfeit cash, stolen credit cards and fraudulent cheques. These bring shrinkage to the retail outlet as payments from stolen cards can be reclaimed by banks on behalf of the owners.

j. Burglary

Burglaries are common when the business is closed either at night or during major public holidays. Criminals smash and grab items by forceful entry which also attract looters leading to retail loss.

k. Vandalism

Retail businesses sometimes encounter vandalism of their properties and premises. An example of this is when hooligans smash their windows, putting graffiti on the building and damaging signboards.

l. Online Scams

There is a massive movement towards online sales, faster checkout, and prompt delivery. Fraudsters have hijacked this to get hold of customers' data digitally and use them to commit fraud or rake in debts in the name of the customers. This is cybercrime which is a major threat to online business.

m. Violence and Threats Against Employees

Violence and threats against employees of the retail stores have increased rapidly in recent times according to Helen Dickinson, Chief Executive of the British Retail Consortium in her 2022 retail crime report published in July 2023.

Report from the law firm Anstey found that 31 percent of male workers and 23 percent of female workers in this industry have experienced physical or aggressive behaviour at work (Nazir, 2019). An average of 25 percent of retail workers have experienced violent behaviour or physical aggression.

Benefit-Cost Ratio (BCR) (2019) estimated that about 115 employees were injured every day by unprovoked attacks, and this has doubled since 2022 when 41,000 incidents of violent behaviours were recorded. Benefit-Cost Ratio reports identified three main causes of violent behaviour, (a) when stealing from the store (b) when challenged as required by law for buying alcohol, cigarettes, knives (c) when intoxicated by drugs or alcohol. Use of weapons had doubled to 850 incidents per day in 2022.

2.5 Introducing the Theoretical Analysis

This study is centred on evaluating the interconnectivity between different security solutions and their impact on minimising or preventing crime in a retail setting.

Having introduced the various aspects of security with scholarly discussions on the concept of security, security solutions and retail crime, it would be pertinent to briefly introduce at the literature review stage part of the theoretical framework that will be used for subsequent analysis of results. The aim is to review existing literature on the theories for the analysis here while the discussion and full application will be treated at the analysis of the result stage. One major analytical tool is Ishikawa Fishbone which will be used to identify the strategic gap that might be created from the actual state of security solutions in retail stores in comparison to what should be the desired state.

2.5.1 Strategic Gap Analysis

Ishikawa Fishbone analysis cannot be introduced without strategic gap analysis as Ishikawa Fishbone is an analytical tool that is used to identify strategic gap in the performance of products within an organisation or the productivity of the organisation itself. The literature of gap analysis involves the comparison of the actual performance with what is expected to be achieved, that is, the potential or desired performance of any business, organisation, or service in industry (Well, 2018). An organisation is deemed as not using their full potential when they are not making use of their full current resources and overlooking capital or essential investment with their technology.

Gap analysis can be used to compare what has been achieved with the projected performance (Cohenet al., 1973). In projection in an organisation, it is particularly important to identify the shortfalls of the business at a given time which can help to predict future problems. Johnson et al (2014) says that when strategic gap analysis is conducted, the gap identified can be small or big and the size will determine the extent to which the strategy will change.

In every organisation, there is always a general expectation which has to be agreed by the management and once those performing the duties understand what is expected of them, the comparison will be between what is achieved and the expected outcomes. A shortfall becomes the gap which is the difference between the expected outcome and the actual.

Gap analysis can be used to identify what a business is currently doing and where they want to be in future, (Layout guidelines, 2016).

Gap analysis can be used to checkmate inefficiencies even where there are no problems, this can be used to analyse performance level, productivity in services and the competency of the employee of an organisation.

Examining gap analysis can be focusing on what is the current state of affairs and aligning that with what the organisation wants to achieve.

Gap analysis works hand in hand with the Deming cycle (W E Deming, 1950). This cycle is termed continuous quality improvement process and is aimed at understanding the core quality or improvement requirements in an organisation as stated by (Henshall,2020). This will be applied at the recommendation and conclusion stage of this research.

Security companies that provide security solutions to retail supermarkets also strive to gain competitive advantage by closing identified gaps in the services they render to improve clients' satisfaction. This can help to reduce cost for the supermarkets, increasing profits and productivity, thereby maintaining the highest quality of their customer satisfaction (News Bites, Nov 2019).

The strategic gap analysis will be used to assess the management of security solutions in supermarkets and how they are currently applied, identifying the gaps, and recommending how these can be filled. There are policies, standards, guidelines, and procedures relating to the use of security solutions which should be followed and when these are not complied with as supposed, there might be a gap in their operations causing inefficiency in their outcomes.

One of the major areas of analysis will also be the identification of gap in the security management compliance by security personnel (Munirul et al., 2011). There are different methods, frameworks, guidelines, and standards that have been proposed by security consultants and professionals to protect organisational assets (Choobineh et al., 2007). Strategic gap analysis will be used to identify where the gaps are in the current security solutions in the supermarkets with regards to expectations concerning their use in-store. The outcome of the gap analysis will lead to recommendations for supermarket owners considering their desired security solutions. Increase in demand for security solutions is usually caused by an increase in crime rate which might indicate that there are gaps in the efficiency of existing security solutions. The analysis of gaps can help in the implementation of supermarket's security solution plan leading to the store's effectiveness in security operations (Sora *et al.,* 2018).

The importance of identifying these gaps is that the more they are left unattended, the more they widen which can adversely affect the survival of the supermarket and the security

solutions. In examining these gaps, it would be necessary to find out where they are and their exact cause. Each Gap in security requires different solutions and identifying the gap is very crucial for the supermarkets with the aim of developing strategies to close them.

In the gap analysis, the historical trends of the security solutions will be evaluated looking into where the gaps are, how they can be improved and closed, leading to the profitability of the stores. By analysing how the stores are currenting making use of security solutions, new ideas will be developed to close the identified gaps.

2.5.1.1 Identifying the Cause of Gaps

Several tools can be applied to identify the cause of strategic gaps in an organisation. The major tools that will used in this study are the following: Ishikawa fishbone and strategic gap analysis.

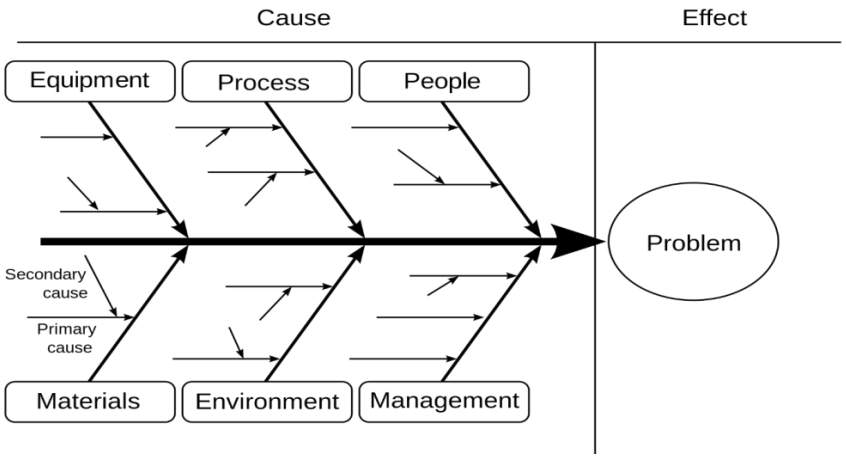
2.5.1.2 Ishikawa Fishbone Analysis

According to Satyanarayana *et al.* (2009) many studies have supported the adaptation of Ishikawa Fishbone analysis (FA) and its application to current issues in identified sectors. Many strategies have been developed from the application of Ishikawa fishbone to combat strategic issues facing any organisation at a particular point in time.

An important tool used to identify the causes of gaps in the provision of security solutions to retail supermarkets is based on the cause-effect framework (Ishikawa,1968). Ishikawa (1968) developed this framework originally for the manufacturing industry which he termed the fishbone depicting the cause-effect diagram used as a tool used to search for problems especially their root (Slack *et al.,* 2001). Ishikawa Fishbone is depicted in the diagram below.

In this diagram, there are questions of what is going wrong, when, how, why and going through how the root of the problem can be resolved.

Image 4: The Original Ishikawa Fishbone Diagram (1976)



Source : Enlaps (2023) https://enlaps.io/us/guide/ishikawa-diagram.html

Fishbone diagram has been used to evaluate many services leading to solutions in many sectors some of which will be explored further. For instance, Bonetti, (2000) used fishbone diagram to evaluate healthcare service in hospital environment to reduce and assess some of the patients that were undergoing coronary thrombolytic therapy and find out the improvement needs of the physicians, nurses, carers, and the method that could be used in applying for that. (Cohen, 2002). Yu (1998) and Constantinides (1999) also used the Fishbone analysis to evaluate the effect value and the exact causes of software coding faults and software communication failure. Fishbone analysis can be used to improve the qualities in processing the effectiveness of business in a particular time and increasing the turnover in the revenue as shown by (Lore,1998); Geerts & McCarthy,2000; Wilcox & Discenza,1994; Clark,2000).

The fishbone analysis has been applied in engineering to solve many products' problems and develop end of the life strategies for many products and this has been supported by many studies (Barr, Schmidt, Krueger and Twu, 2000; Ishii and Lee, 1996; Lee, Rhee, and Ishii, 1997; Otto and Wood, 1996; Rose and Ishii, 1999).

The cause and value effect of Fishbone Analysis which is seen by the studies carried out will be used to find out the exact causes of security failures in many supermarkets and to categorise them. Fishbone analysis can be used to evaluate the effectiveness of security services while at the same time serving as a planning tool to improve the quality of services that has been rendered to supermarkets, helping in reducing losses and increasing profitability.

It will therefore be used to evaluate security services, assess their performances, identify improvement strategies on the security systems and how training can be given to the operatives of those systems.

When there is a serious problem in an organisation in order to find a lasting solution to it, it is important to explore the exact cause or the root of the problem. The fishbone diagram illustrates how the cause-and-effect analysis is carried out. It is a useful tool for teams to brainstorm on how to solve identified problems thus enabling them to deal with the real issues rather than appearances.

2.6 Summary and Conclusion of Literature Review

The views of different academia were analysed leading to a broader perspective of the definition of security. Manunta (1998), is a major publication that gave a more robust approach to the definition of security; he postulated a great fusion of variables such as Asset (A), Protector (P) and Threat (T) for the distinct definition of security. However, despite the analyses of the views of different scholars on what security should be, yet there was no consensus on the definition of security. Manunta (1998) could have brought a definite solution to this but his definition of security as an interaction between A, P & T might be difficult to understand for an ordinary operator of security in the retail sector. Security is more practical than theoretical and most operators in the security industry tend towards this practicality which Manunta overlooked.

Various articles and scholarly journals were explored on the different types of security solutions, physical security, CCTV systems and cybersecurity. According to Fennelly *et al* (2004), no supermarket can operate without security challenges and risk in protecting their assets hence the need for the first type of security solution which is physical security. These risks and elimination of problems in supermarkets were explored including the planning and the understanding of the needs of a particular security situation, conditions, threats, and the vulnerability against any attack. Several aspects of physical security measures were also mentioned which include barriers, sensors, and the security guards who are the main object of deterrence because of their high visibility in and around stores according to Cunningham *et al*., (1990). The second type of security solution which is CCTV was also explored. The main function of system security in supermarkets is to detect and alert situations that can impact businesses (Sobiesky,2017). A review of the importance of CCTV systems was also analysed

with the findings that their discontinuation can expose the organisation to a high risk (Bukovetskiy et al.,2015). Such risks which include financial and reputational losses to businesses were identified by (Hall, Heath, and Coles-Kemp, 2015). The third type of security solution which is cyber security is the most controversial of all the security types of the extent of damage it can bring to any organisation. According to Kumar et al. (2019) cybersecurity is a prominent issue in the business world today which has necessitated a paradigm shift on the Internet of Things (IoT). The work of Okereafor (2020) was explored to understand the vulnerability of supermarkets which puts them in a position to attract cybercriminals while solutions proffered by (Mirkovic*et al*.,2014) on the importance of educating employees on attack and defence and (Hansch *et al*.,2014) on the concept of IT security awareness were also discussed. The section on security solutions was concluded with the discussion on the possible interconnectivity between these security solutions in a retail organisation. The aim of the exploration on the interconnectivity was to examine the possibility of the three security solutions working to reduce crime from the point of view of previous scholars on the subject as this will serve as a bedrock to the outcomes of the primary research which will be conducted and discussed in the research methodology section and the analysis of the results.

In examining the issue of crime, which is the dependent variable in this research, the works of Cohen and Felson, (1979) on Social Change and Crime Rate Trends: A Routine Activity Approach" was explored. This work was necessary to the research on crime as it gave a theoretical explanation for the causes of crime which they termed Routine Activity Theory (RAT) which focuses on crime situations. It helped to expose the motivation for offenders which are an attractive target and the absence of capable guardians. The gap in the study is that of more concentration on the 'routine activities' of everyday life of criminals at the neglect of the impact of those crimes on those affected. In addition, the work of Crowe (2000) on crime prevention through environmental design was examined as it provided a good framework for the improvement of internal store design against shoplifting, a major crime committed in supermarkets. The gap found in this research work is its failure to address the impact of external factors like demographic changes around the store location which can lead to increase in shoplifting. The work of Aloysius (2019) on shoplifting in mobile checkout settings was also explored and among others it helped to elaborate more on how cybercrime could be detected and curtailed by training employees on cybersecurity. The gap identified in this study is the failure to explore the comparison between the effectiveness of self-serving checkout systems and the traditional checkout systems. One major twist to the issue of retail crime came from

the work of Korgaonkar *et al.* (2021) on retail employee theft. The research examined the failure of previous studies in exploring employee theft as most concentration have been on other types of retail crime like shoplifting and cybercrime but not much was done on employee theft and its causes. It dealt extensively with the reasons why employees steal from their employers and suggest what can be done to minimise. The gap in this research is the absence of primary research which would have helped to explore reasons for employee's theft from the point of view of employees and what they think could help minimise the crime. The aspect on retail crime was concluded with steps that could lead to reduction in crime.The work of Francisa (2012) 'surveillance in the supermarket: Technology and the pluralisation of crime control' was explored. Notably, there was the use of primary research which involved the collaborative work between the police and staff of local stores. The aim was to see how the facial recognition system could help in the re-arrest of shoplifters that have been caught before but came back to stores believing that they would not be recognised. Although it helped stores in the recognition and arrest of repeat offenders, the downside was the fact that the facial recognition system only recognised faces that had been recorded in police data, while there are shoplifters that are not reported to the police, hence the aim of facial recognition system might slightly be affected.
Critical analysis of crime was emphasised as a very important technique to prevent shoplifting (Ekblom,1986 and 1988; Burrows,1988); Hope,1991).

The literature review concluded with the introduction of the Ishikawa Fishbone analytical tool needed to explore and analyse the causes of retail crime and their effects on retail supermarkets. Ishikawa fishbone is an important tool used to identify the causes of gaps in the provision of security solutions to retail supermarkets and it is based on the cause-effect framework of Ishikawa (1968). The detailed analysis of this will be carried out at the analysis of results and discussion of findings stage of this research. The work of Munirul et al. (2011) was also briefly introduced on the importance of identifying the gap in the security management compliance by security personnel which will be fully explored in the analysis of the result section.

Overall, the literature review has been carried out to explore the various thoughts on security as a concept and the different types of security solutions and their impact of their interconnectivity in preventing crime in retail supermarkets.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter provides an overview of the different research techniques which are employed in this study. It deals with the research problems, the purpose of the research, data analysis, and limitations of the research. The research explores the hypothesised connection between the three security solutions and their effectiveness in reducing crime in a retail store as any security breach can be catastrophic to any business. The essence of this research is to answer legitimate questions that have not been answered in the past (Jones and Kottler, 2005).

The major research technique is the mixed method which is the combination of the qualitative and the quantitative research (Brannen, 2005). It will also discuss the research approaches which include inductive and deductive approaches. The research strategy used for this research is a case study which is carried out on two supermarkets and the sample population include security personnel and store management team.

The mixed method involves the collection of data through questionnaires for quantitative purposes and interviews (semi-structured) for qualitative purposes.

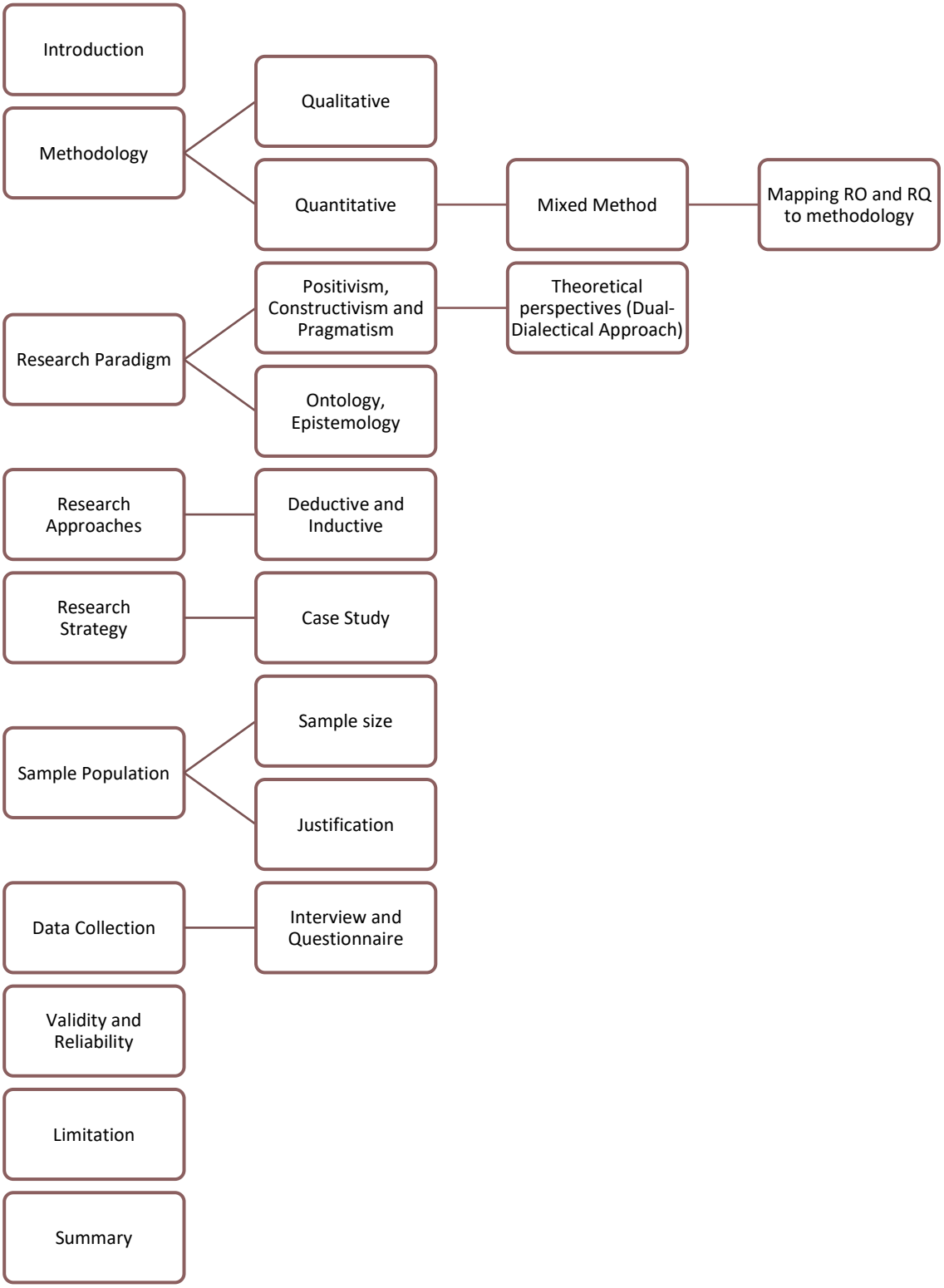
The adoption of the mixed method is to expand and strengthen the conclusions of this research that will contribute to the body of knowledge and fill the existing gap in the study of the three security solutions in relation to the retail industry.

A diagram will be provided to show the link between the methodology, research objectives and research questions.

Data will be collected through questionnaires for customers and security personnel and interviews for security staff and management team which also form the sample population.

The limitation of this research is also discussed, and steps taken to mitigate its impact on the conclusion of the research.

Figure 4: Diagrammatic Representation of Research Methodology



The diagram above shows the different steps and methods that will be taken to conduct purposeful research.

3.2 Research Methodology

This section outlines the methodology that is used in this research. The methods used are qualitative and quantitative methods which will be applied on three security solutions which are physical, systems and cyber securities. It discusses the combination of the qualitative and the quantitative research methods and the reason behind the choice of the mixed method.
The qualitative research technique used is interview and quantitative technique is the administration of questionnaires through emails to respondents.

3.2.1 Qualitative Research

Qualitative research based on an interpretive paradigm will enable researchers to access more information in a particular environment supported by the narratives of the participants (Liamputtong and Ezzy, 2005). This approach will be applied in this study to find out the difficulties encountered by those involved in the use of security solutions and how they can be improved so as to experience more qualitative security services in the stores.

During the study, the researcher will obtain interviews on the sufferings, social injustices and things that might be shocking to a section of the participants (Morse and Field, 1995). For instance, the experiences of security personnel when challenging shoplifters, the injuries encountered which are both physical and emotional, then the court cross-examination and the subsequent leniency of the judges towards offenders which might trivialise the attempts of security personnel to deter criminals. All these are major points of exploration with the interview which is semi-structured so as to allow the interviewees freer hand to discuss their finding which is of immense help to further discoveries.

Qualitative research can pose many challenges to the researchers which is a growing concern to the academia (Birch and Miller, 2000; Campbell, 2002; Etherington, 1996; Ferguson, 2003; Gale, 1992; Gilbert, 2001a; Hart and Wright-Crawford, 1999; Hutchinson and Wilson, 1994; Johnson and Clarke, 2003; Kitson et al., 1996; Langford, 2000; Liamputtong and Ezzy, 2005). Some of the challenges that researchers encounter include maintaining boundaries (Dickson-Swift et al., 2006; Gale, 1992), in this situation, the researcher might decide to be a customer service adviser, intervening when there is security situation that might need trained security personnel, developing unnecessary rapport with those he/she is interviewing

(Liamputtong and Ezzy, 2005) becoming more friendly than necessary (Ceglowski, 2000; Higgins, 1998) and becoming flexible instead of focussing in the interconnectivity between the security solutions and effectiveness of the solutions that the research has been tailored to (Ellingson, 1998; Kiesinger, 1998). Also, some of the security personnel and the management team can be traumatised remembering the past and managing their emotions in this study might not be an easy task (Dunn, 1991; Gilbert, 2001b; Payne, 1994; Rager, 2005). As this study will involve details of criminal activities that have been experienced in the past and how they were dealt with, this will involve sensitive and difficult subject areas (Alty and Rodham, 1998; Lee, 1993, 1995; Lee-Treweek and Linkogle, 2000a; Lee and Renzetti,1993; McCosker *et al*., 2001).

According to Milling-Kinard (1996), in view of the sensitivity in this research involving the use of qualitative technique which can impact on the participants and the researcher, there should be openness that issues might arise which include efforts to enhance more published accounts of the investigation detailing the effects of sensitive and emotional topics. In interviewing, it is important for researchers to be aware of the previous experiences of participants, the subsequent sensitivities in security solutions' research and their impact on those participating as it involves delving into people's lives. They could be in crisis and stress at that particular time, the participants will be asked to talk about their detailed experience in what might not be their most relaxed topics (Cannon, 1992; Glesne and Peshkin, 1992; Liamputtong and Ezzy, 2005; Morse and Field, 1995; Ribbens and Edwards, 1998).

The qualitative research employs semi-structured interviews where some questions are prepared while some are not so as to allow the interviewees to speak more on areas which the interviewer might not have a previous knowledge of.

Dickson-Swift *et al* (2007) discuss the importance of research ethics to the researcher in that the researcher ought to acknowledge that entering other peoples' lives is part of the characteristic of qualitative research, which is unique. The participants might find this process too hard which is why the researcher must show some levels of discretion, respect, and appreciation.

The researcher initiates a rapport-building from the first encounter with the participants in the stores to build a research relationship that gives him access to their story (Ceglowski, 2000; Goodwin *et al.*, 2003; Grbich, 1999; Liamputtong and Ezzy, 2005; Minichiello *et a*l., 2000; Payne, 1994; Taylor and Bogdan, 1998).

The interviews are conducted with the management teams and security personnel working in the supermarkets. Qualitative research aids the researcher in the area of monitoring the behaviours of the security guards, and questions directed to security guards and the management team. The interview is carried out in an ordinary circumstance in the store which is the canteen or staff office where the researcher can observe, investigate, and look into the areas of interest without external control or interference (Beuving and Vries, 2015).

3.2.2 Quantitative Research

According to Cohen (1980), quantitative research is a social science that uses empirical methods to examine a phenomenon and arrive at a conclusion. The data gathering method used in this research involves the sending out questionnaires to participants through emails targeting ten to thirty participants in each store used in the case study. The questions are tailored towards finding out the experience of participants on security solutions currently used in superstore which could help in determining the degree of standards set out by the researcher to meet the requirement of the research.

As quantitative research uses numbers that will be analysed, SPSS analytical tool is employed to analyse the number of feedback from selected participants. Generally, because of the nature of this research, there are sensitive questions which some participants might find intrusive thus evoking emotions as they are being answered. It then becomes imperative to use the quantitative method as participants will not need to see the researcher when questionnaires are being sent to them which makes it easier for them to answer and appropriate data is generated. The research instrument includes some key questions aimed specifically at the participants' phenomenal experience in the stores before, during and after the incident they witnessed. Examples are close-ended questions like this, ‘Do you think that violent customers should be allowed back to shop in your store again? And the answers given may be within this range ‘Agree, strongly agree, disagree, or strongly disagree,’ measuring the answers will bring out the social reality.

The questionnaires include close-ended and open-ended questions which are flexible to suit the research needs.

There are many supermarkets in the United Kingdom with a large workforce which would be impossible for the researcher to cover, hence two retail supermarkets have been chosen for the purpose of this research with a sizeable number of participants. The accuracy of this will produce a phenomenal result from the participants which are segmented into different groups

including security personnel and store management. Using quantitative techniques in this study enables the detection of factors that might bring inefficiency in the security solutions.
This then helps in the testing of the hypothesis which is measuring the performance of the current security solutions in relation to their effect on retail crime in the chosen supermarket.

3.2.3 Why Mixed Method

The journal of mixed methods (2006) defined mixed method as a type of research in which the researcher collects and analyses data using both qualitative and quantitative techniques which also helps to arrive at a conclusion from the findings of that particular study. Creswell and Clark (2007) stated that mixed method is a research design with philosophical assumptions that show the direction of the collection and analysis of quantitative and qualitative data in a particular study. The mixed method is the central premise that is used in combining the understanding of the research problems and the critical evaluation. The use of both the quantitative and qualitative techniques will bring the in-depth analysis of the effectiveness of the security solutions used in the stores.
The mixed method approach is used in this study because of the flexibility needed in the research which serves as the foundation of the epistemological knowledge in relation to the state of the current security solutions.
As security is a complex phenomenon, the mixed method approach will help in conducting an in-depth investigation for a proper understanding of factors leading to the complexity of the nature of security. Mixed method is also needed to investigate multidimensional nature of issues in sectors including retail and security (Andrew and Halcomb, 2006; Creswell and Clark, 2011).
Mixed method also offers alternative methodology for researchers to address complex issues in a way that if either of them were used solely the result would not be as extensive as it should be (Andrew and Halcomb, 2012; Simons and Lathlean, 2010).
A paradigm war that was historically against using both the qualitative and quantitative techniques in research has since been silenced by researchers so using both research methodologies helps in providing answers to most of the research questions in this study (Glogowska, 2011; Maudsley, 2011; Simons and Lathlean, 2010; McEvoy and Richards, 2006).
Gathering the evidence of qualitative and quantitative elements that are interlinked to bring about the actual accounts of the effectiveness of the security solutions through mixed methods will enhance the research (Glogowska, 2011; Zhang and Creswell, 2013). As a mixed method

will combine quantitative and qualitative techniques in this study, this multi-method will involve data collections from the same paradigm such as interviews and questionnaires (Andrew and Halcomb, 2009). The use of both qualitative and quantitative data collection methods brings a new dimension to research on security solutions. The mixed method is tailored towards bringing both the strengths of qualitative and quantitative research, ameliorating the weaknesses to provide thorough answers to the questions that would be asked (Scammon *et al.*, 2013; Wisdom *et al.*, 2012; Andrew and Halcomb, 2009).

3.2.4 Mapping Research Questions and Objectives to the Methodology

The emphasis of this section is to explain the link between research questions, objectives, and mapping these with the appropriate research method used to achieve the set objectives.
The table below shows the appropriate research methodology that can be used to answer the research questions (RQ) and achieve the research objectives (RO).

Table 3: Mapping RQ and RO to the Methodology

Research Question (RQ)	**Research Objectives (RO) which objective is this linked to the RQ**	**How to achieve it Methodology Interview Questionnaire Secondary Research**
R Q 1 What is the role of interconnected security solutions in relation to crime prevention and reduction in a retail supermarket?	RO1 To explore the concept of and interconnectivity between the three aspects of security solutions: personal, system and cyber securities	Secondary research, Interview and Questionnaire
RQ2 Are there areas of improvements in existing security solutions in relation to combating retail crimes?	RO2 To explore the extent to which UK retail supermarkets understand the importance of the security solutions they employ in their businesses. RO3 To identify and explore areas of improvements in existing security solutions in relation to combating retail crimes.	Secondary Research and Interviews
RQ3	RO4	Secondary research, Interview and Questionnaire

Is it possible to develop a crime prevention framework that will be suitable for the retail supermarkets in the United Kingdom as compared to the other developed countries.	To propose a strategic crime prevention framework that will help reduce crime in retail supermarkets in the UK	

3.3 Research Paradigm

The table below shows the different research paradigms considered in this research. It shows the different approaches to each paradigm which are the ontological, epistemological, theoretical perspectives, methodology and methods. They are there to explain the scope of each research paradigm.

Table 4: Research paradigm and research philosophies

Paradigm	Ontology	Epistemology	Theoretical Perspective	Methodology	Method
Positivism	The single reality in the ontology of this research is that security solutions affect the rate of retail crime	This reality is measured by digging into previous research on security solutions and retail crime and conducting interviews and sending out questionnaire to the target audience	The theoretical perspective is Post-positivism which enables an in-depth analysis	Survey research is applied	Questionnaires and interviews are statistically analysed
Constructivism or interpretivism	Different realities are considered in relation to retail crime and the effectiveness of security solutions by interviewing selected security guards and managers	All the answers to the questions are interpreted to find out if the reduction in retail crime would be dependent on the effectiveness of security solutions or other factors	The theoretical perspective is interpretivism and the approach is Phenomenology	Ground Theory and phenomenological research will help in finding out the reality	This research is also qualitative in nature hence the methods of data gathering is interview and the strategy is case study

Pragmatism	Reality on the security solutions is renegotiated	Combining positivism and interpretivism to answer the research questions and resolve research aims and objectives	Dual-dialectic approach which is a combination of the quantitative and qualitative techniques	Mixed methods towards research aims and objectives	Data collection through questionnaires and interviews which aids the testing of hypothesis

The achievement of the purpose of this research which is to explore the effectiveness of security solutions in relation to retail crime demands the application of an appropriate research paradigm. Kuhn (1962) described the research paradigm as a philosophical way of thinking. In Greek, paradigm means 'pattern' which describes the usual way the store staff often manage security matters in their respective stores with special focus on past occurrences of security breaches. According to Kivunja (2017), the word 'paradigm' has been used to describe research worldview in any particular research and in this case it is being applied to security solutions in supermarkets, a view also supported by (Mackenzie and Knipe,2006). The worldview perspective is used to get into the thoughts of security personnel and the managers in order to find out their shared experiences on the security solutions which is interpreted through the data collected. Lather (1986) explains that the research paradigm constitutes the beliefs and principles that guide any researcher which is also reflected in the choice made in this research. Research paradigm is the conceptual lens which the researcher uses to examine the methodological aspects of a particular research thereby determining the methodology, method, theoretical perspective, collection, and analysis of data. Guba and Lincoln (1994) stated that research paradigms are a basic set of beliefs or worldviews that guide how the investigation should be carried out. From the ontological point of view, Denzin, and Lincoln (2000) see paradigms as human constructions that arise from the findings of a researcher which influence how the collected data will be interpreted.

The research paradigm adopted is pragmatism which is a combination of positivism and constructivism.

Research paradigm in context consists of four parts: ontology, epistemology, methodology, and methods as stated by (Dammark,2015). Ontology relates to the nature of existence at the beginning of research (Crotty, 1998) while Grix (2004) considers this as where the research finishes. The epistemological and ontological assumptions determine the methods and methodology in this research which include case studies, visiting the stores, sending out questionnaires and interviewing.

As Burns, (1997) described research paradigms as a systematic investigation or inquiry that involve the collection, analysis and interpretation of data collected. Mertens (2005) suggested that the nature of the research can influence the theoretical framework upon which the research is built.

Methods are the action plan, and strategy that justify the choice of the research paradigm and the techniques to achieve research aims and objectives (Crotty, 1998).

Epistemology deals with the nature of knowledge (Crotty,1998) which in this study involves the examination of the knower who are those involved in the security solutions and their level of knowledge about the effectiveness of the current interconnectivity in the systems.

3.3.1 Positivism

The positivist paradigm is the scientific method of investigation Kivunja (2017) which in this study is looking into the effectiveness of the interconnectivity between the security solutions in relation to retail crime. Positivism is a worldview used in observations to measure entities as some part of this research is measured through SPSS Fadhel (2002). As this research is based on inductive and deductive reasoning, positivism is applied through deductive reasoning by sending out questionnaires to test the hypotheses leading to extrapolations of the answers from the participants to arrive at a conclusion. By going through these processes, the researcher is able to gain more understanding about the reason behind certain actions. The assumption of this empiricism is for the research to investigate the objectives, using the appropriate data that is supported by a particular theoretical framework that will be used to test the hypotheses. Comte (1856) also wrote about the epistemological perspective based on the postulation that the reason behind experimentation and observation is to understand human behaviour and the legitimate way of extending human knowledge and understanding. This could be associated with the behaviour of the offenders (retail criminals) and how these affect the participants

(security personnel and sore staff) while they are performing their legitimate duties. The researcher interviewed the security personnel and the managers to understand the effectiveness of the interconnectivity in security solutions in relation to retail crime with concentration on cause and effects. Positivists try to replicate procedures to control and understand the natural world. The researcher follows the daily routine of those participating in the research and the sequences of events during the trading hours noting the particular times of the day more criminal activities take place. Positivist utilises neutrality, statistical measurement, quantifiable elements, and observable events to establish the rules of any organisation (Seale, 2000). Sending out questionnaires through email will be used to measure the quantity of responses from the managers and the security personnel which are analysed through SPSS. Grix (2004) is of the opinion that positivism encourages the possibility of establishing cause-effect relationships. This is measured by weighing the effect of the absence or presence of sporadic checks in the security solutions in relation to retained crime. The positivist advocates the use of quantitative research methods as a bedrock of all research as this gives the researcher the opportunity to analyse, interpret and understand the relationship between the data that is analysed.

3.3.2 Constructivism / Interpretivism

The researcher interviews the security guards and the managers to find out the causes of the supposed crime increase and their individual experiences with the security solutions with special focus on the level of effectiveness in their interconnectivity.

The interpretivist paradigm is used to understand the subjective world of security guards and the managers' experiences in using security solutions (Guba et al.,1989). It enables the researcher to understand reality by engaging the participants in in-depth interviews in order to dig into their thoughts and interpret them appropriately.

The researcher detached himself from the studies to understand the scenario from the viewpoint of the participants rather than the viewpoint of the researcher during the interviews. Emphasis is placed on understanding the security personnel, the managers and how they view security solutions around their working environment. Interpretivist paradigm can be socially constructed (Bogdan & Biklen, 1998), and the researcher used this approach for the participants in the supermarkets. In this manner, data is gathered and analysed using grounded theory (Stauss *et al*.,1990).

The subjectivist epistemology in this research means that there will be cognitive processing of the data gathered in the process of interaction with the participants. The researcher will

construct knowledge of the setting of the environment of the supermarket and the real-life experience in these natural settings to further help the investigation Punch, (2005). It is assumed that the researcher and the participants are engaged in interactive processes about the security solutions, their interconnectivity, the sporadic checks, and their effectiveness on curbing retail crime. This will involve dialogue, questions, listening from both sides, reading, and writing while the data will be recorded. The assumption of a relative ontology means that the situations in the supermarkets are studied in multiple realities in many stores, the finding can be explored through human interaction between the researcher and the participants that use the security solutions (Chalmers *et* al.,2005). The research outcome will create knowledge in relation to supermarkets' security solutions and retail crime, this will help in understanding the cause and effects phenomenon.

Guba (1981) suggests that research carried out in the Interpretivist paradigm obtains the criteria of internal and external validity which should replace the four criteria of trustworthiness and authenticity: credibility, dependability, confirmability, and transferability. Lincoln (1995) initially challenged this idea, but many scholars have since accepted it (e.g. Merriam, 1998; Erlandson *et al*., 1993; Silverman, 2000; Bouma & Atkinson, 1995).

3.3.3 Pragmatic Paradigm

Pragmatic paradigm came up when some researchers argued that it was not possible to access the 'truth' by virtue of a single scientific method which advocates positivism paradigm, nor can social reality be constructed through Interpretivist paradigm only (Kivunja, 2017). This research did not use the mono-pragmatic approach, but a mix-method put forward by many philosophers (Alise & Teddlie, 2010; Biesta, 2010; Tashakkori and Teddlie, 2003a, and 2003b; Patton, 1990). They also argued that this worldview is needed to provide methods of research which are appropriate to this area of study.

Pragmatism is also the paradigm that accommodates mixed methods which is the application of both quantitative and qualitative techniques. Doyle, Brady, and Byrne (2009) stated that "The philosophical underpinning of pragmatism allows and guides mixed methods researchers to use a variety of approaches to answer research questions that cannot be addressed using a singular method."

Security is a sensitive topic which needs to be addressed carefully. Some theorists looked for approaches that could be more practical and pluralistic which could allow a combination of methods thereby shedding light on the actual behaviour of the participants, their belief, and

experiences. When this is applied to security solutions in different supermarkets, there might be different types of crime because of the demography and the locations of the store.

The mixed method is derived from the combination of positivism and interpretivism. The positivism approach is the use of questionnaires for quantitative purposes to generate a general consensus while interpretivism approach uses interviews to generate an in-depth response all geared towards what can be done to enhance the effectiveness of security solutions in these stores.

The pragmatic approach of using mixed methods helps in exploring the depth of the lapses on security solutions and the effects of their independent operation as against interconnectivity of operation.

3.3.4 Ontology

Ontology is the nature of our beliefs in a particular reality (Richards, 2003). This reality is the effectiveness of interconnectivity between the three security solutions. Researchers have assumptions about a particular reality, how it exists and what needs to be known about it. The ontological questions leads the researcher to try and find out the type of reality that exists in any research which can be "A singular, verifiable reality, and truth (or)...socially constructed multiple realities'' (Patton, 2002).

Ontology is known as the description of entities, their properties, and their relationships with each other (Grüninger & Fox, 1995). The relationship with the three security solutions will be examined by the researcher using domain ontologies that express conceptualisation which is specific to security domain systems. This will critically examine the rate of crime and how they are dealt with through the flexibility of the security solutions.

Timpf (2002) describes two ontologies as 'wayfinding' that can also be used to discover the inefficiency of the security solutions.

Ontologically, the hierarchical structure of security is made up of three branches which are cyber, system and personnel security. The semantic analysis in security solutions can bring a more effective and efficient way of managing the solutions.

The ontology is the security solutions currently existing in the store and the form they are during the research.

The ontological commitment in these stores will be used to assess whether the effective representation of the security solutions are used to the advantages of the owners in relation to crime reduction in the stores.

The ontological method will be used in testing and assessing ways of refining the systems by measuring the effectiveness of these security solutions.

The research will examine the current security systems in existence in the stores and how they are utilised.

Ontology seeks to provide the holistic definitive and exhaustive classification in cyber, physical and system securities which is applied in this study. For this to be definitive in the actual sense, it must seek to answer inefficiency questions in the current security systems as crime is still on the increase and to find out whether the systems are efficiently managed.

The ontological entity that will enlighten the researcher includes speaking to the managers, deputy managers and security personnel about their experiences in using security solutions, which brings about the ontological exploration of the reality of the systems in the stores.

3.3.5 Epistemology

Epistemological perspectives are prominent in many academic experiences. Epistemological questions arising from this research as to the nature and extent of knowledge led to the researcher debating on possibility and desirability of objectivity, subjectivity, validity, and generalisability of findings (Patton, 2002). Adhering to an ontological belief which is the reality of the security solutions currently used in the stores and their interconnectivity can lead to certain epistemological assumptions that are tested in the first and second hypothesis.

The truth verification assumed by the researcher and his posture as the knower was one of objective detachment giving freedom to the participants to state how things are and how the security solutions work (Gube & Lincolin, 1994).

The required knowledge resulting from this research is gathered by approaching the managers and security personnel of two selected supermarkets on matters relating to their security solutions.

The essence of this research is to find out the extent to which the chosen security solutions are interconnected, and the resultant effect of the absence of sporadic checks on them.

The information gathered during the interview of the participants on their epistemological beliefs relating to working with security solutions will influence the strategy that would be proposed (Schommer et al., 1992), the cognitive processes both for the participants and the researcher (Kardash and Howell, 2000), and the conceptual change in learning of current performance of these systems (Qian and Alvermann, 2000). Epistemological research helps to resolve competing knowledge claims that there is still an increase in crime in supermarkets, evaluates new information gathered and steer the fundamental decisions that can change lives

thus making the work environment a safer place while reducing crime in stores (King and Kitchener, 1994; Kuhn, 1991). Choosing full-time employees with longest services in stores helps the concreteness of the information given. The participants hold the knowledge about the security systems, their performance and how they are currently working which are part of the basic epistemological beliefs (Jehng *et al*., 1993; Kardash and Howell, 2000; Kardash and Scholes, 1996; Qian and Alvermann, 1995, 2000; Schommer, 1990, 1998; Schommer *et al.*, 1992).

Through epistemology, the research encounters new information on security solutions which are evaluated, interpreted implicitly or explicitly.

3.3.6 Theoretical Perspective

The theoretical perspective is sometimes referred to as the paradigm that can influence the way the knowledge of any research is gathered and interpreted (Mertens, 2005; Bogdan & Biklen, 1998). It guides the gathering of answers to the research questions of the intent, the motivation, and the expectations of the research.

The theoretical perspective in this research is dual-dialectical.

3.3.6.1 Dual-Dialectical Approach

The dual-dialectical approach has been described as the theoretical psychotherapeutic conceptualisation that can be based on three key rules: duality, contradiction, and complementarity (S. Naron, 2015). The duality in this research is the application of mixed methods which also suggest that some information from the participants may be contradictory. The dual-dialectical approach is used to assess the discourse between two people that hold different views on a subject matter.

In this perspective, mixed methods by themselves are heteroglossic (Bakhtin, 1981) because it integrates a pragmatic approach.

This involves the combination of positivism and constructivism approaches.

When the researcher applies positivism through objectivity and interpretivism by subjective paradigm, this will open up “multiple-constructed realities.” (Johnson & Onwuegbuzie, 2004). The mixed method research is sometimes used in tandem, by this way both approaches can reflect the purposes of conducting this research which includes complementarity (Greene, Caracelli, and Graham, 1989), as the stronger methods can compensate for the shortcomings of the other. This is the reason for the duality of theoretical perspective.

The researcher uses this opportunity to dig into the past by assessing the situation that might possibly lead to the criminal activities and the effectiveness of the interconnectivity between the security solutions under study.

The right questions for the questionnaires and the semi-structured interview are prepared to get the accurate answers from the managers and security personnel.

The essence of combining two divergent perspectives using qualitative and quantitative research will bring the best from the participants, giving them the freedom to answer questions freely.

Crotty (1998) argues that the presumption that there is a great division between quantitative and qualitative research methods is not justified, while Tuli (2010) stated that these are two main research methods.

The qualitative methods are usually associated with normative paradigms (Ferguson, 1993) while quantitative methods are usually associated with positivist/post-positivist paradigms.

Positivist Methodology explains the relationships between the cause and the effects, (Creswell, 2009; Grix, 2004; McDonough and McDonough,1997).

Through this methodology, questionnaires are sent out to the participants, hypotheses of the interconnectivity of the security solutions and sporadic checks on the security solutions are tested and verified by analysing results.

The cause-effect relationship is between the independent variable which is the security solutions and the dependent variable which is retail crime. The research examined the possibilities of lapses in the security solutions, any cause for improvement and subsequent actions that would need to be taken leading to supermarkets benefitting from the finding.

True experimental and quasi-experimental designs are used to find out the impact of the absence of sporadic checks in security solutions during the interview and the inter-relationship between the three security solutions.

3.4 Research Approach

The research approach deals with the plans and procedures consisting of the general assumptions of this research to details of data collection methods, analysis, and interpretation of the results. The research approach adopted is based on the research question to be answered in this research.

The research approach is designed to direct how this research will be carried out in the stores and the procedures for sending out questionnaires by emails. It also shows the process that qualitative and quantitative research will be carried out. The goal of this research is assessing

the effectiveness of the security solutions in the two supermarkets used in the case study in relation to retail crime so the research approach will detail the process of research.

Cresswell (2007) stated the importance of research approach as an effective strategy to increase validity of the study.

This research is using the inductive and deductive approaches.

3.4.1 Inductive Approach

The inductive approach in this study starts with observing the security personnel in the chosen supermarkets, monitoring the pattern of events as they occur, developing explanations for the occurrence of incidents, testing hypotheses to determine the relationship between variables and the rationale behind certain responses by the security guards. The purpose of using an inductive approach includes establishing clear links between the evaluation of the security solutions and the current situation of retail stores, finding out how to achieve the research objective, summarising the data collected and developing a framework for the underlying structure of experience during this process. (Thomas,2006). Inductive research provides access to an easily used and systematic set of procedures for analysing both qualitative and quantitative research in order to bring out valid findings. Patton (2002) stated that many literature documents with underlying assumptions associated with analysing qualitative data and evaluation of data use the inductive approach. Some research are associated with specific approach like grounded theory (Strauss and Corbin, 1998), phenomenology; as the researcher will see incidences happening (Van Manen, 1990), analysing incidents with the security guard and store management (Potter and Wetherell, 1994), and narrative analysis (Leiblich, 1998). Some analytic approaches are generic and are known as specific traditions of qualitative research (Ezzy, 2002; Pope, Ziebland, & Mays, 2000; Silverman, 2000).

Inductive approach in this study uses a systematic procedure guiding both the quantitative and qualitative to specific research objectives which include the interconnectivity between the security solutions, understanding the importance of security solutions to those that use them, the effectiveness of the solutions and the strategies to improve the existing ones.

The main purpose of this research is to allow research findings to emerge easily from the dominant or significant themes inherent in raw data, without imposing the structured methodologies that interfere with the findings (Thomas, 2003).

Inductive approach is evident in many data analyses especially grounded theory which is useful when data has been systematically collected and analysed especially in a study like this which involves uncovering social relationships and behaviours of the personnel involved (Strauss &

Corbin, 1990). The application of the general pattern of research is described by other scholars in different ways (Miles and Huberman, 1994, p. 9; Pope *et al*.,2000).

Inductive approach is adopted in this research to aid the understanding of complex data collection through the development of summary themes and raw data. The explicit nature of inductive research has been described by scholars (Backett & Davison, 1995; Stolee, Zaza, Pedlar and Myers, 1999) while to some, its nature is unknown (Jain and Ogden, 1999; Marshall, 1999).

3.4.2 Deductive Approach

This is the process that helps the testing of the hypotheses through an existing theory based on the dependent variables which is retail crime and the independent variables which are the security solutions. The deductive approach helps in looking at the problem holistically and also to start the research from the generalisation to the specifics. This will involve examining the increase in crime rate in retail settings in relation to the type of security solutions used in such settings. Deductive approach leads the researcher to examining the different security solutions applied in the case study, checking whether or not there are sporadic checks carried out by the management of stores. It starts from the effect to the cause which helps to work the hypothesis backward so what is missed using the inductive approach could be detected and added using the deductive approach analysing if the effects of these variables could lead to crime reductions. Deductive approach will be used to hypothesise the effectiveness of these solutions. Through deductive approach, the general principles are applied to arrive at a single conclusion. This approach involves the process of reasoning from one or more statements to another. The deductive approach will link all the questionnaires and answers got from the participants to a logical conclusion.

The two variables in this research are the effectiveness of the security solutions (independent variable) and the state of retail crime (dependent variable). The inductive approach starts with the independent variable to the dependent variable examining the connection between them while the deductive approach starts with the dependent variable to the independent variable. The combination of both the inductive and deductive approaches help to solidify the conclusion of this research.

3.5 The Research Strategy

A research strategy in this study is the overall plan to conduct the research and a strategic guide in planning, monitoring, and implementing the process (Churchill and Sanders, 2007; Remenyi *et al*., 2003).

According to Saunders *et al* (2009) research strategy shows how the researcher will be answering questions and also asking questions; therefore, the appropriate research strategy is selected for this research based on the research questions and objectives, the current knowledge on the security solutions, the time spent researching and the resources available for the studies. The research strategy used in this research also aims at satisfying the three recommendations given by (Yin,2003): he type of research questions, the control the researcher has over the behaviours of the participants and the degree of historical or contemporary events.

There are many research strategies that exist (Yin,2003; and Saunders *et al.,* 2009); there are also large overlaps among them, but the best fit should be considered for any study. Some of these research strategies are experiment, survey, case study, action research, grounded theory, ethnography, archival research, cross sectional studies, longitudinal studies, and participative enquiry (Easterby-Smith *et al.,* 2008; Collis and Hussey, 2009; Saunders *et al.,* 2009).

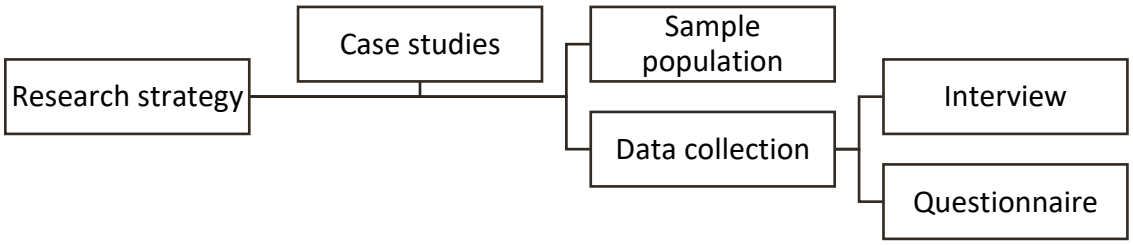
From these many strategies, this research will adopt a case study research strategy.

The research strategy details the step-by-step guidelines on how the process of this study is carried out in the chosen stores based on the thoughts and efforts of the researcher. The steps include data collection from the sample population through interview and questionnaire.

Case Study

The diagram below depicts the research strategy as it links with the sample population and the data collection methods.

Figures 5 Case study strategy



According to Yin (2003) case study is empirical inquiry which investigates a contemporary phenomenon in a real-life context which in the case of this research is within the supermarket, especially when there are boundaries between phenomenon and context that are not clearly evident. The case study for this research involves two retail supermarkets, examining the security solutions in their stores, the peculiarity, and the technicality of situations that participants encounter in their working environment, collection of multiple sources of evidence, gathering of data and analysing evidence by the researcher. According to Dul and Hak (2008) case study can be a single or multiple case in research, so in this study, three security solutions have been selected in real life context and the findings are analysed in a qualitative manner. In as much as Yin (2003) and Hak (2008) associate case study with contemporary phenomenon, Eisenhardt and Graebner (2007) pointed out that the research can also be historic. For them case study is a methodology that is used to explore a single phenomenon in a natural setting which to this research is finding out the effectiveness of these solutions by using a variety of methods to obtain in-depth knowledge of the current and the past experiences from the sample population. Security study is flexible, so case study is adopted here as it is capable of accommodating different research techniques which will help in the acquisition of in-depth knowledge needed to treat a particular situation. Case studies is used in both qualitative and quantitative studies giving the researcher opportunity to get a rich mix of data from the studies (Yin, 2003; Gerring, 2007).

Case study has been chosen for this research as it is very flexible compared to other research designs as it allows the researcher to experience a real-life event while gathering empirical data. Case study is unparalleled as it has the ability to consider a single or complex research question in a supermarket environment with contextual variables. The two supermarkets used

as case studies are Aldi and Sainsbury. Through questionnaires and interviews, the researcher had the advantage of producing sets of independent and dependent variables from the feedback from the participants which will be analysed. The case study enables the researcher to ask how and why questions from the participants from a holistic point of view (Yin, 1984).

3.6 Sample Population

The sample population includes the store managers and security personnel, the selection of these enables a thorough analysis of this research (Delice,2018). The qualitative and quantitative techniques are the processes of naturalistic inquiry that will look into the in-depth understanding of social phenomena in these supermarkets in relation to the security solutions (Ahmad *et al.,* 2019). In qualitative research, the researcher focuses on the 'why' and not the 'what' of social phenomena, which when applied to the retail environment, will centre on the direct experiences of the guards and the managers in the day to day running of the supermarkets. During the process of gathering the sample population, this research follows logical and statistical procedures including historical analysis of what has happened in the past and what is happening presently.

Participants were chosen on the basis of full-time shift. The reason for this is that they would be in the best position to know the day-to-day occurrences in the chosen stores as those who work part time might not be able to provide the full information needed to determine the effectiveness of the interconnectivity in security solutions in relation to retail crime.

Participants were also chosen on the basis of their contact with customers.

Some participants were also randomly selected so as to have a more robust opinion on the subject matter.

3.6.1 Sample Population Techniques

This process is taking the selected managers and security personnel as representative of the entire population in relation to security solutions in the selected stores.

Sampling will be done to save time and resources as these are limited. The essence of using case studies as part of this research is to obtain reliable, valid, and accurate results, with this the participants chosen can be relied on and the techniques can be verifiable.

3.6.2 Non-Probability Sampling

This study will apply the non-probability sampling as all the employees that work in selected stores do not have an equal chance of being selected. It can be argued that the sample does not represent the whole target population, but the researcher deliberately chose the employees that work full time, that is those that work at least five days a week to represent the entire population. Non-probability is used to select the stores as case studies.

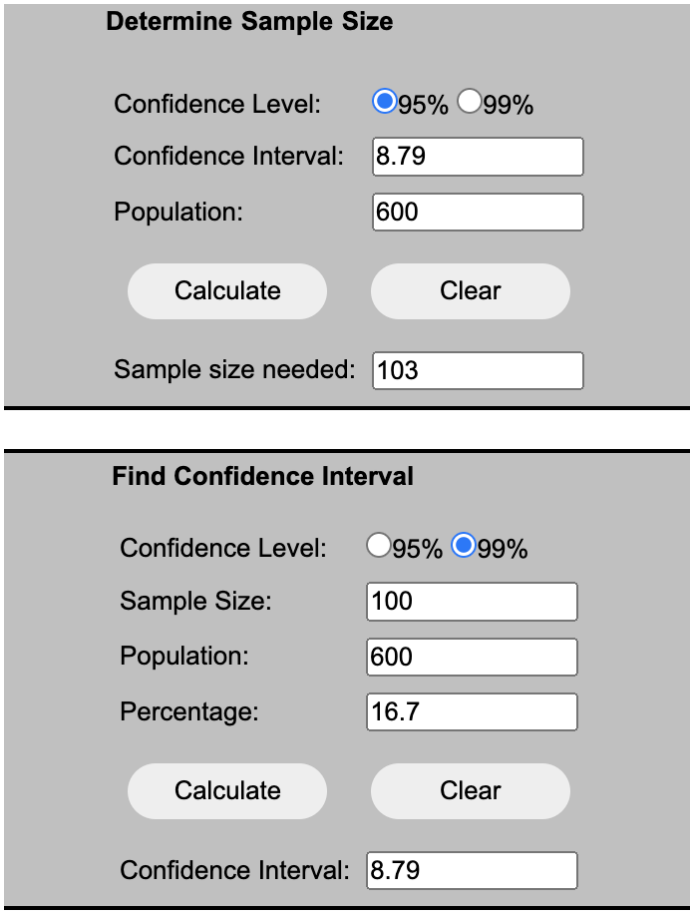
3.6.3 Steps Taken in Recruiting the Sample Population

1. The target population are those working in Aldi and Sainsbury superstores, the criteria used in selection include, full time security personnel, managers and those involved in managing security solutions of those stores.
2. The researcher will visit the selected stores to interview the participants and those that cannot be reached can be assessed through zoom.

3.6.4 Sample Size Calculation

The sample size calculator is used to determine the number of participants that will take part in the research which will represent the target population precisely.
Sample size calculator has two main terms that will be applied in this research which are the Confidence interval and Confidence level.
Confidence interval measures the degree of certainty and uncertainty in the sampling method. It is calculated using the confidence level of 95% to 99%. It is used to see how each sample may represent the true value of the population variable. Confidence interval is also known as margin of error.
Confidence level on the other hand will tell us how sure we can be within the percentage of the answers and represents how often the true percentage of the population would pick an answer that lies within the confidence interval.
The research will target 95% confidence level which is certain.

Figure 6: The sample size calculator



Source : https://www.surveysystem.com/sscalc.htm

3.6.5 Sample Size Justification

Justification of the sample size is a very important step in research. The aim of this is to explain how the data are collected to provide valuable information for the researcher to achieve his goals.

There are several ways sample size can be justified as stated by Lakens (2022), but the choice here is based on resource constraints and heuristics.

There are thousands of participants which could represent the entire population of workers in the security section of retail supermarkets including those that work closely with security solutions, it will be practically impossible for the researcher to involve the whole security personnel, managers and those involved in the security solutions throughout the country.

Retail supermarkets are located sporadically throughout the country and the researcher has limited resources, which will affect the choice of sample size. It is a common factor in many studies that resource constraints can limit the amount of data collected (Lent, 2001). Part of the decision for the sample size is the resources available, which are always limited in supply even though they are considered a secondary justification (Lakens,2022). Hence a heuristics approach to sampling has been adopted so for the purpose of this research, the sample population has been narrowed down to six hundred.

The questions are based on the three security solutions in the selected stores in order to collect sufficient data that would lead to an estimated desired level of accuracy.

When there are inconsistencies in answers from the participants after analysis and testing, they can be statistically rejected.

The questionnaires and interview questions are based on heuristic focusing on the general rules of the norms on how security solutions operate.

The sample size has been chosen focusing on achieving the goals.

To achieve these goals and objectives, certain criteria are put into perspective.

1. Selecting stores with a high crime rate as they are the proposed beneficiary of this research.
2. Ignoring supermarkets that do not employ security because of low crime rate.
3. Selecting stores based on their use of the three security solutions; security personnel, cyber security, and CCTV.

3.6.6 Stages of Participants Selection and Sample Size

The diagram below shows the different stages of sample size selection. It contains the criteria for the choice of retail supermarkets, the stores targeted, the interviewees selected, the participants for the questionnaires and the reason for these choices.

Figure 7 Steps to participants selection and sample size



Below is the explanation for the contents of this diagram which are the steps taken towards the selection of participants and determining the sample size.

Step 1

Several Aldi and Sainsbury's stores were carefully reviewed.

Step 2

Out of the several stores reviewed, 3 Aldi stores were selected in 10 regions and 1 Sainsbury's store in 30 distribution centres totalling 30 Aldi and 30 Sainsbury’s stores.

Step 3

The selection was narrowed down to 15 Aldi and 15 Sainsbury’s stores based on the regular adoption of the three security solutions. That is, these stores were selected because they were making use of the three security solutions under review in this research.

Step 4

The stores were further reduced to 10 Aldi and 10 Sainsbury's stores based on high retail crime. So out of the 15 stores chosen from each of the organisations used as the case study, 10 stores were selected having reviewed the rate of retail crime and those with high incidence of retail crime were selected so the dependent and independent variables could be compared.

Step 5

From the 10 stores chosen from both Aldi and Sainsbury's totalling 20 stores, 7 full time staff were considered for participation in the research. Full time was a choice because the research needed those who come in contact with the security solutions on a regular basis and who were also in stores regularly enough to witness retail crime. The total participants were 140.

Step 6

Out of the total 140 sample population, 20 were selected for interview while the remaining 120 were selected for questionnaires.

Step 7

Out of the 120 selected for the questionnaire, 103 returned the consent form. So, the 103 participants were sent questionnaires giving the confidence interval of 8.79 and the confidence level at 99%.

3.6.7 Justification of Sample Population

Qualitative research methods have a component of epidemiologic investigations which is utilised in this research which is why the sample population has to be those working in these stores. Their values, opinions and the organisational norms on security issues will be discussed within the parameters of this research. Those that work directly with the security solutions including the managers, assistant managers and security operatives will only be involved. There will be open-ended inquiry methods which are very essential in formative research for exploring the contextual factors to select the participants and their roles in the security solutions as they are directly involved.

This research is situated within a post-positivist tradition and retains a certain degree of commitment to realist ontological premises with the supermarket on their security solutions, focusing on the validity and the generalisation of supermarkets' security systems(Fusch and Ness,2015;, Robinson,2014; Sandelowski,1995 to 1996).

The sample chosen for qualitative purposes are twenty participants which would support the depth of case-oriented analysis (Sandlelowski,1996). Participants are selected by virtue of their capacity to provide richly-texture information on the security solutions that are relevant to the phenomenon under investigation.

3.6.8 The Rule of Thumb Bias in the Justification of the Sample

Justification of sample is guided by a rule of thumb which is using a heuristic set of rules in selecting the participants for the study.

It is agreed that human brains can be powerful but have their limitations. Questions are posed at participants which they are expected to process leading to cognitive biases. The biases in the rules of thumb help the participants to process the questions at a relative speed. As the participants are asked questions relating to what happened in the past and recently, there might be errors in their thinking while processing and interpreting the information which could subsequently affect the decisions and judgement made by the interviewer.

3.7 Data Collection Methods

The recognition of method as an important tool in case studies regarding the issues on community-based problems (Johnson, 2006) is applicable in this research.

The design of this study involves selecting managers and security personnel that have the mindset to relate to the researcher. The method adopted in getting data from them are two: questionnaire and interview.

3.7.1 Questionnaire

During quantitative and qualitative research, the methods help to explain the process of the interviews, the design of questions contained in the questionnaire to be distributed to the security personnel and the managers, complete observations where necessary, reconstruction and analysis of the data from the participants at the end (Tellis, 1997).

The questionnaire was designed through google form and the link sent to participants for completion. The design was done with consideration for GDPR, and participants could contact the researcher for further information or issues of concern that might arise while completing the questionnaire.

3.7.2 Interview

The interview questions are semi-structured giving the researcher an opportunity to dig deeper into the thoughts of interviewees with the aim of knowing reasons behind actions and reactions to standards set for security solutions in stores. The interview was conducted both online and face to face so that participants that would be difficult to reach through face-to-face means could be reached through video conferencing platforms like Zoom.

The qualitative and quantitative data collected from the participants are analysed to make sense of the situation, the patterns, and categories of incidents in the supermarket that the participants encountered (Cohen *et al.,* 2000). Coding through SPSS is one of the analytical tools applied to the quantitative data while the qualitative data is analysed through the NVivo so that data gathered are categorised in terms of their relevance. All the data gathered are examined with respect to the known sources that are used in the research field (Baykul, 1999; Cohen *et al.,* 2000; Karasar, 1999; Patton, 1990).

3.8 Validity and Reliability of Research

The reliability of this research is the extent to which there are the same results yielded when different participants are being asked the same questions. The tendency towards consistent response when this is carried out many times is referred to as reliability (Miles & Huberman, 1994). The researcher ensures direct contact with the managers and the security personnel in order that accurate data might be gathered. The researcher's target is 98% response rate across board but up to 90% would be seen as consistent, acceptable, and reliable (Miles & Huberman, 1994).

3.9 Limitation of Research

The limitation in this research is the access to few stores which subsequently mean access to fewer staff that could be interviewed. This limitation however has been addressed and mitigated with the questionnaires sent out to reach a larger number of respondents to cater for what is missing in the interview. Also, the stores have been carefully selected with effective criteria including geographical accessibility, larger representative sample, crime rate and participants full time status and access to security solutions so their opinion could represent other supermarkets that could not be reached because of time constraint and limited resources.

3.10 Summary and Conclusion of Research Methodology

This chapter has expounded on the research tools used to discover meanings to the research questions while endeavouring to meet its aims and objectives. Reasons for the choice of research methods, strategies, approaches, theoretical perspectives, and paradigm have been discussed with special focus on meeting the objectives of the research. The main aim of the research has been taken into consideration to determine the appropriate methodology which is the mixed method comprising the qualitative and quantitative techniques. The qualitative study is used to find out the difficulties encountered by those involved in the use of security solutions

and how they can be improved so as to experience more qualitative security services in the stores. Challenges of getting in-depth information using the quantitative technique are taken care of with the adoption of the qualitative technique as probing questions help in unearthing deep seated emotions and information needed to make an informed recommendation in this research. The adoption of the quantitative technique in addition to the qualitative is because of the nature of this research. There are sensitive questions which some participants might find intrusive thus evoking emotions as they are being answered. It then becomes imperative to use the quantitative method as participants will not need to see the researcher when questionnaires are being sent to them which makes it easier for them to answer and appropriate data is generated.

The research questions and research objectives were mapped with the appropriate methodology so that the research questions are answered, and the objectives met.

Both the inductive and deductive approaches are used because of the two variables in this research which are the effectiveness of the security solutions (independent variable) and the state of retail crime (dependent variable). The inductive approach starts with the independent variable to the dependent variable examining the connection between them while the deductive approach starts with the dependent variable to the independent variable. The choice of these of both the inductive and deductive approaches is seen to help to solidify the conclusion of this research.

Case study has been chosen as the research strategy because of its flexibility compared to other research designs as it allows the researcher to experience a real-life event while gathering empirical data. Two supermarket giants were chosen as the case study to represent other supermarkets in the UK.

The mixture of research paradigms is derived from the combination of positivism and interpretivism. The positivism approach is the use of questionnaires for quantitative purposes to generate a general consensus while interpretivism approach uses interviews to generate an in-depth response all geared towards what can be done to enhance the effectiveness of security solutions in these stores.

The pragmatic approach encapsulates the use of both the positivism and interpretivism which help in exploring the depth of the lapses on security solutions and the effects of their independent operation as against interconnectivity of operation.

The epistemological and ontological assumptions have been used to determine the methods and methodology in this research which include case studies, visiting the stores, sending out questionnaires and interviewing selected participants.

The theoretical perspective in this research is based on the dual-dialectical approach which is adopted because of the anticipation of the discourse between two people that hold different views on a subject matter especially in relation to the focus of this study which is security.

The sample size has been chosen based on the criteria of who would ensure the research objectives are met. Sample size calculator has been used to carefully determine the right size of participation in the research.

Justification has been made for the choice of sample size and methods used in the process of data collection leading to the next stage of analysis of findings using the SPSS and thematic tools.

CHAPTER 4
DATA COLLECTION AND ANALYSIS

4.1 Introduction

This chapter deals with the collection and analysis of data. It also introduces the selected organisation, Aldi and Sainsbury's and the reason for their selection. It includes the data collection procedure employed and the choice of experimental research design with its required steps which will be used to test the efficacy of the hypothesis for this research.. Experimental research design has been chosen to give the researcher the knowledge of cause-and-effect of variables that are being tested. The process of data analysis will be explored using the SPSS for quantitative data and NVivo for the qualitative data. Data saturation will be checked for the credibility of this research and to demonstrate that the right sample is used for validity purposes.

The data in this research have been collected with a clear view to achieving research objectives as any deviation can jeopardise expected results because a robust and excellent data collection and implementation approach make evaluating and analysing of data easier (Peerman,2014).

The data are analysed by applying logical techniques to describe, summarise, and evaluate so as to move towards possible recommendations and conclusions (Shamoo and Resnik, 2003)

The data to be analysed have been collected through interview and questionnaire in order to further establish the reliability and credibility of this research. Interviews were carried out face to face and on zoom while the questionnaires were sent out through google forms.

In interviewing participants, consideration has been given to their perception and understanding of the reason for the research as this is very important in qualitative research. The interview was conducted with the careful thought and preparation that the participants must have knowledge of what they will be asked.

In this research a semi-structured interview was conducted which involved meeting face-to-face with the participants (interviewees) either in-person or through video calls as this gave the researcher an opportunity to dig deep on the subject matter with the participants (Hassan, 2011).

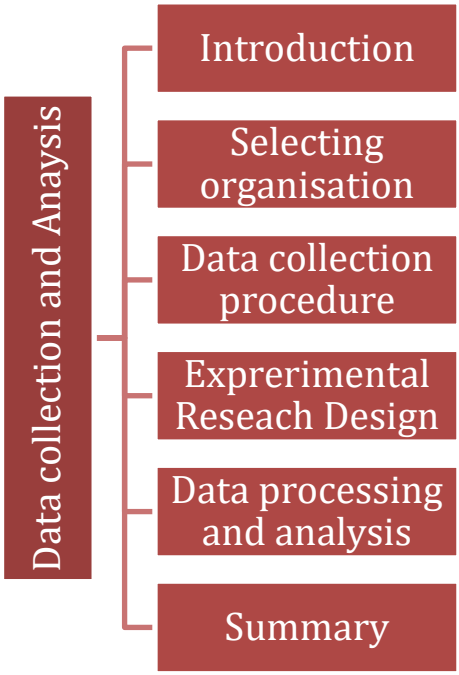
The interviewees were given prior notice with the outline of how the interview would be carried out as required by research ethics. The researcher adopted the method of recording, monitoring the participants performing their duties on the security solutions and interviewing while notes

were taken. As the participants allowed the data to be recorded, this gave the researcher the opportunity to go back after the interview and check if there was any missing data.

The data needed in this research were collected using the mixed-method approach because of the mixed nature of research participants. This was done in accordance with the view of Constantinos et al (2011) who stated that questionnaires could be best for some participants who might find face-to-face interviews too sensitive especially in this type of study which is about security solutions and retail crime.

The diagram below gives an overall view of chapter 4

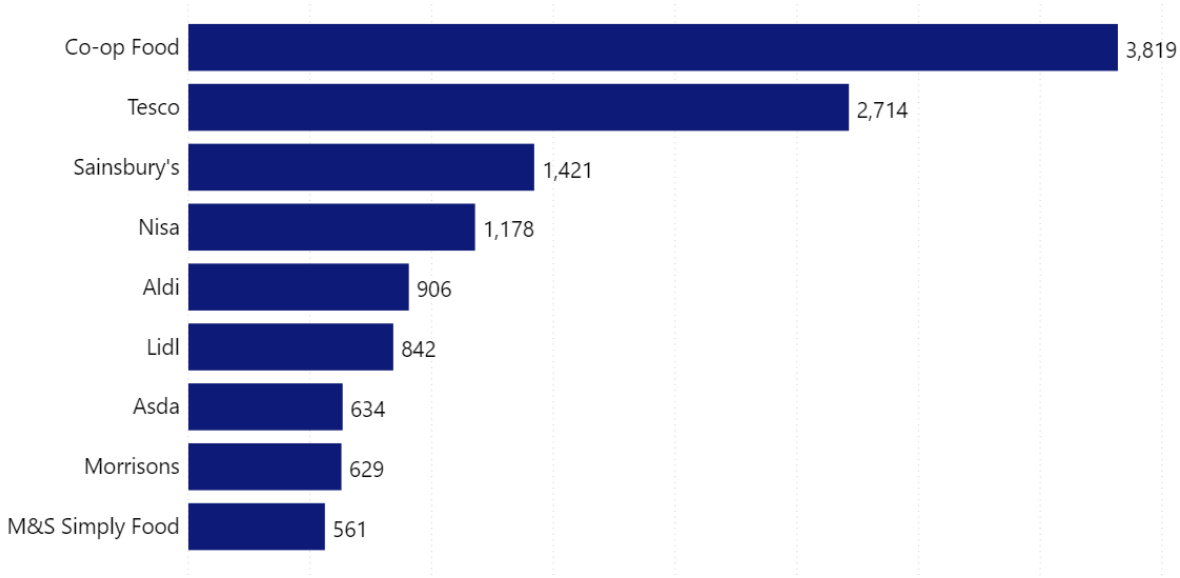
Figure 8: The summary of chapter 4



4.2 Selecting Organisations

The choice of organisation for this type of research was not taken lightly because of the vastness of retail supermarkets in the UK. This is because there are 16 supermarket chains operating in the UK with more than 12,704 stores spread across various regions of the country.

Figure 9: Retail supermarkets in the UK



Source: Scrape Hero research October 2020.

The figure above shows the distribution of stores belonging to the supermarkets in the UK. Co-op Food with 3,819 distribution stores has the highest number of stores while M&S simply Food with 561 stores has the lowest number.

Out of the 16 supermarket chains in the UK in the above chart, 4 are regarded as the superpowers of the sector and they are Tesco, Sainsbury's, Asda and Morrisons. They are regarded as retail giants because of their huge market share in the UK retail supermarket share. This research has chosen two supermarkets in its case study; Sainsbury's as one of retail superpowers and Aldi as an upcoming supermarket. More reasons for their choice are discussed below.

4.2.1 The Choice of Sainsbury's

Tesco and Sainsbury's have the largest market share out of the four and so one of them (Sainsbury's) was chosen as part of the case studies for this research. The choice of Sainsbury's was not only because it is one of the biggest two in the supermarket chain sector, but also the fact that it is an indigenous company founded by a British couple according to their history in their website (www.sainsburys.co.uk/aboutus).

Image 5: Sainsbury's Store



Source : https://www.thedrum.com/news/2019/04/30/sainsbury-s-follows-amazon-s-footsteps-with-checkout-free-store

4.2.2 The Choice of Aldi

Aldi was not founded in the UK. It is a foreign company but came to the UK in 1990 and has since become a formidable force to be reckoned with in the retail supermarket sector.

Aldi was chosen because it is a non-indigenous company, and it would be appropriate to pair it with an indigenous Sainsbury's to represent the retail supermarket sector. Aldi is also widely spread into different geographical locations in the UK, making it well positioned for different customer groups.

Image 6: Aldi Store



Source : Aldi Global (2018)

4.2.3 Meeting Research Aim and Objectives

The choice of organisations was made after carefully assessing the aim of this research which is to establish the interconnectivity between existing security solutions and their effectiveness in reducing crimes in retail supermarkets. As it would be practically impossible to visit all the supermarket stores in the UK and there is the need for a comparative study of similar but contrasting supermarkets, these two organisations were chosen to represent the UK supermarket chain.

4.2.4 Representation of Different Market Group

In addition to the physical, financial and time constraint in reaching all the supermarkets in the UK, these two were selected because of the consideration of different market groups that they attract leading to their locations which may influence crime occurrence. Aldi is known for its diverse low-cost products servicing the low-income earners and while Sainsbury's target is quality products even though it does competitive pricing. Sainsbury's operates three major segments: financial services, food and general merchandise and clothing. Aldi sells most of its products in stores which makes physical security and CCTV very important and necessary for them while Sainsbury's operates both in stores and online sales at a higher rate making every aspect of security very necessary. Both organisations are security conscious because they

attract a large number of customers for the same and diverse reasons. Consideration for diverse information required and easier accessibility because of locations led to the choice of two large and widespread supermarkets representing different sections of the consumer community.

4.3 Data Collection Procedure

The data collected in this research include questionnaires, online surveys, field notes and audio recording. These data were processed before they were available for further analysis. The researcher during one-to-one interviews with the participants in the supermarkets made notes and recorded some of them as they gave permission for them to be recorded. The interviews were conducted in the shop floors, managers' offices, and the canteens. During the interview, some of the selected quotes or acrimony were noted especially the ones that were repeated several times. All interviews and online surveys were done in English language as participants could speak and understand English fluently. Some of the participants were working when they were being interviewed, this sometimes gave the researcher an opportunity to witness real live incidences in those stores.

As security is very sensitive, the researcher observed the facial expressions, tone of voices and explanatory gestures of interviewees which would later help in the conclusion of the analyses and also summarise their thoughts. The notes taken during the interviews were converted into reports as recommended by Hassan (2011).

These reports were reviewed by the researcher, amended for accuracy, and analysed with the rest of data. The records were organised in a database for easy understanding as stated by Hassan (2011).

4.3.1 Pilot study

The main essence of a pilot study in a research is to critically examine the feasibility of the approach which can be used for future larger-scale-study. Porta (2008) stated that a pilot study is a small-scale test method which is being prepared for future larger scale. Pilot study shows logistics problems which can likely come up at the ground studies (Porta, 2008). There are many reasons why Pilot study is very important before the main study.

- ✓ Pilot studies can reduce a number of unexpected problems. This is because the researcher can change some parts revealed by the pilot study which might not be suitable for the research.
- ✓ The pilot study gives the researcher ideas, clues and approaches that might not have been seen before conducting the research.

- ✓ Pilot study saves a lot of money as they provide the researcher enough information to know if they will proceed or not.
- ✓ Pilot study allows the researcher to check the statistical and analytical procedures before the research giving the opportunity to evaluate the data and can make alterations if required during data collection.

Key personnel in the two supermarkets were contacted prior to the qualitative and quantitative method being applied.
The selected stores were chosen from different parts of the country representing the two supermarkets.
Schedule of the time and the days, weeks, and the month when particular area/ region will be covered and drawn by the researcher.
The managers, supervisors and security personnel that were interviewed were informed. prior to the researcher attending the store.
The participants were briefed about the research and its aims, making it easy to know those that preferred anonymity and preparations made for them to participate in the research.
The participants from both organisations were informed to expect the questionnaires. through google form which they could receive through emails or messaging (WhatsApp).

4.4 Theoretical Saturation

Bryman (2012) stated in grounded theory that a researcher could go on collecting data through interviewing, observing, and reviewing documents until the point where he reaches data or theoretical saturation. This means that there is no new data that could be gathered relevant to the subject matter. Furthermore, Francis *et al*. (2010) in discussing data saturation stated that the term "theoretical saturation" is the process of gathering and analysing data until no more new insights can be seen. For the credibility of this research, data saturation is very important to demonstrate that the right sample is used for validity purposes. Francis et al. (2010) stated that data saturation will bring out whether the sample population will be good for the validity of this study. They suggested that data saturation occurs with 13 to 15 interviews while for Guest *et al*. (2006) 12 interviews would lead to saturation.
Interviews were carried out on more than 13 participants from the sample population which include store managers, deputy managers, security supervisors and security personnel. This could be enough to reach data saturation as these participants are involved in day-to-day managing of the three security solutions involved in this research.

For the quantitative data gathering, the saturation level reached was when out of 103 questionnaires sent out, 98 participants sent their responses back.

The online google form for the main questionnaire was opened on the 7th of June 2022 after consent has previously been given by the sample population. This was used to support the interviews by the participants. The online responses were closed on February 15th, 2023.

4.5 Experimental Research Design

Experimental research design is a method that is used to support hypotheses, this can also be used to test the efficacy of something that has not been tested before. Experimental research design gives the researcher the knowledge of cause-and-effect of variables that are being tested. It is used to show what happens when there is a movement in one variable or when one variable is manipulated against another variable. The goal of experimental research design varies depending on the research aims, and objectives. The experimental research design can be carried out applying scientific methods on two sets of variables or more to assert whether there is a causal relationship between them.

This is followed by a systematic and rigorous design that is used to test the hypothesis and a conclusion will be drawn on the possible relationship between the variables.

Experimental research design refers to the specific plan, procedures, methods, and the way the research will be carried out. It contains the overall structure of the research, what the participants will be doing and how many participants will participate in the research, data collection methods and statistical analysis techniques that will be used.

It is also the blueprint that outlines procedures, methods, and protocols for research.

Most research are planned well with research design which helps in the achievement of the research aims.

The design of a research can be complicated as crucial decisions have to be made by the researcher. According to Mitchell (2015), these decisions include which questions will be the focus of the research design, how the research design will provide guidance to how key questions will be answered, the sample population to be observed, the places that need to be visited, the participants that will take part and the data analytic techniques and tools to be utilised. These are to be included in the research design so as to achieve adequate statistical power and research aims can be achieved accurately (Mitchell, 2015)

The term 'Experimental Research Design' is concerned with research that is centred in constructing high internal validity. The internal validity can also be known as causal validity which concerns the accuracy of the findings regarding the cause and effects or the relationships

between the variables (Mitchell, 2015). For instance, it involves finding out if variable 1 causes variation in variable 2, or variable 2 causes variation in variable 3 and to determine the extent to which all the variables are connected or related.

4.5.1 The Criteria for Establishing Causal Inferences in the Variables

Mitchel (2015) inferred three main criteria for causal inferences between variables as postulated by the philosopher, John Stuart Mill. These are association (correlation), temporal order, and non-spuriousness. The criteria of associates requires that there should be a relationship between cause and effects among the variables. The temporal order requires that the variation between the variables must occur before the observation on the effects of the variables. The third which is non-spuriousness is the most difficult to achieve, which is that the variation must not occur because of omitted or unmeasured variables. (Mitchell, 2015).

4.5.2 Types of Experiments

Shadish, Cook, and Campbell, (2002) stated that experiment is a study intervention that is deliberately introduced to observe its effects. They went further to distinguish the two types of experiments*: randomised* experiments and *quasi* experiments.

The *randomised* experiment is the use of random variables or random sample population in an experimental condition. The researcher can achieve this through flipping of coins, selecting random numbers or using the computer to generate numbers.

Quasi experiment involves one or two groups. This involves comparison between the groups while controlling any observed differences before, during and after the experiment.

4.5.3 Applying Experimental Research Design

There are two sets of variables in this research, dependent and independent. The independent variables are the three security solutions: Physical, CCTV and Cyber securities. The dependent variables are the retail crimes which include shoplifting, online payment fraud, cybercrime, return fraud, employee theft, violence towards employees, warehouse theft and vandalism among others.

The arm of this research is to find out how these security solutions are utilised in the supermarkets to deter or prevent crime in these environments and what happens when one, two or the three are applied in the stores.

The hypothesis that will be tested is whether the understanding of the interconnectivity and effectiveness of security solutions can help reduce crimes in retail supermarkets or not. The

exploration is the cause-and-effect relationship between application of security solutions applied in stores and the state of retail crime.

Experimental design is carrying out research in an objective and controlled manner to maximise precision of the outcome and conclusion can be drawn from the hypothesis (Bell, 2009). The main purpose of this research design is to establish the effect an independent variable has on dependent variables.

This design is focusing on utilising the experimental design in order to test and validate the relationship between and among the variables.

4.5.4 Advantages and Disadvantages of Experimental Research Design

As much as this research is focused on utilising experimental research, there are advantages and disadvantages to using it. These factors have been carefully considered and have seen to aid the adoption of the design.

One of the advantages is that experimental research follows collocational research as it studies the relationship between two variables which is applicable to this research.

Another advantage of experimental research design is that it brings precision, and the researcher can analyse the relationship between and among the variables (Bell, 2009). It helps the researcher to avoid ambiguity and confusion (Bell, 2009).

During experimental research the data collected can help in hypothesis testing which means the data can either support or reject the hypothesis.

Using Experimental design has helped in portraying the overview of the whole research.

On the other hand, experimental research design has its limitations. One of these is that it has limited external validity. Experimental research takes place in a control setting in which the participants may not be free to participate but, in this study, the participants were interviewed separately, and efforts were made to see that they give accurate answers for the questions they are asked.

Another limitation has to do with ethical constraints. Some of the experimental research variables can be manipulated which can be potentially harmful to the participants but the strict guidelines through ethical considerations are there to ensure protection for the participants.

Another constraint is time and resource-intensity of the design. Experimental research requires lots of time for the collection, analysis, and interpretation of data. Some even require specialist equipment but this research has been well organised, and no specialist equipment was needed. Some experimental research can take too long to observe but setting a time limit for every experiment will eliminate this limitation.

Lastly, the characteristics of the participants can limit the impact of experimental research. The participants can change their behaviour or response to suit the situation but as the participants in this study are believed to be trustworthy because of their position in their organisations, this situation would not likely arise.

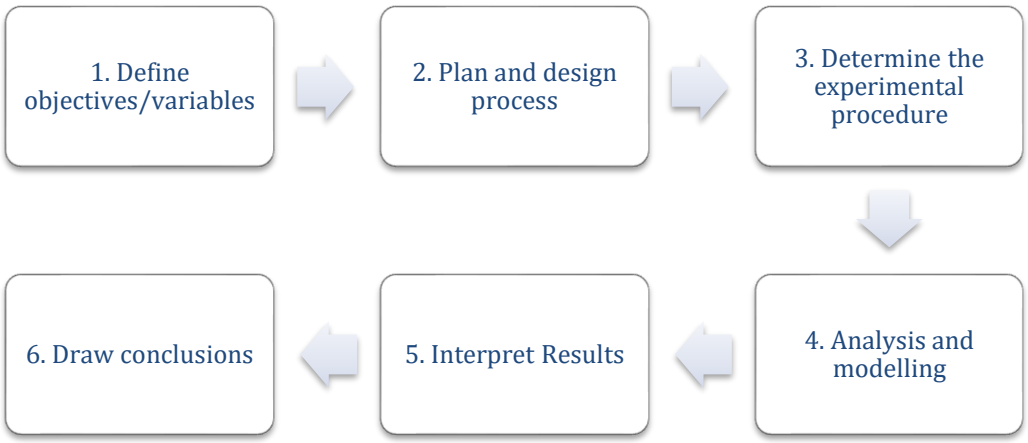
4.5.5 Steps in Experimental Research Design

There are important topics of experimental design that should be included in the hypothesis, experimental control, specifying independent and dependent variables, selections of sample or sample of participants, collection of data, and selection of valid statistical tests. These points will help the researcher to determine causal relationships and state causal conclusions.

There are steps to be taken when developing this design, the researcher must develop research questions, develop hypotheses that can be tested, determine how the validity will be controlled throughout the experimental process, the data that will be collected and the statistical approach that will be used to analyse the data that have been collected.

According to Hanrahan *et al* (2005) the following are steps in experimental research design as depicted in diagram below.

Figure 10 Steps in Experimental Research



The steps in the diagram are explained below.

Step 1: Defining objectives and variables

The first step in the design of experimental research is to define the objectives of the research. The objectives are defined based on what the research wants to achieve and the problems it wants to provide answers to. The areas of concentration here include establishing if the research questions are broad enough to encompass the benefits the research hopes to bring to the body of knowledge; the workability of the conceptual framework in discussing the problem identified and proper defining of the set of variables in the hypothesis to be tested.

Step 2: Planning and designing process

The second step involves the determination of the conceptual framework; conducting the literature review; deciding and assessing the research methods chosen; determining the sample population and providing justification for their choice; choosing organisations for case studies and justifying their selection; determining the interview process and assessing if the interviewees are enough for the research; designing survey questions, and ensuring the research follows the ethical route. It is important to assess the validity, reliability and accessibility of the research methods chosen.

Step 3: Determining the experimental procedure

Data collection, Field research was carried out using both the quantitative and qualitative methods of data gathering. Questionnaires and participants consent form were sent out, interviews were arranged and conducted with proper recording both electronically and on paper, collection of questionnaires. 103 participants were sent questionnaires, 98 completed and returned, 15 were interviewed.

Step 4: Analysis and modelling

This stage involves the analysis of data and the choice of data analytical tools. The research is mixed with quantitative data (questionnaire) and qualitative data (interviews), so the SPSS has been chosen to analyse the quantitative data for measurability purposes while the NVivo was chosen to analyse qualitative data for in-depth analysis. The important discussion here is the assessment of the

Step 5: Interpretation of results

Assessing results from charts, tables, and graphs, using chi-square, correlation, and regression to match research objectives, test hypotheses and validate the conceptual framework, applying necessary feedback and new knowledge to test and validate the framework.

Step 6: Conclusions

provide recommendations, pinpointing achievements and gaps filled in the research on security solutions and retail crime, establishing the final framework.

The table below shows the different states of the research process with fuller details.

Table 5: Phases in Experimental Research Process

Research steps	Design stages	Research activities
Step 1	Define objectives and Variables	Definition of research aims and objectives, designing research questions, development of hypotheses, and discussion of variables to be correlated.
Step 2	Planning and Designing process	Determining the conceptual framework, literature review, selecting the research methods and their justification, selecting sample population, choosing organisations for case studies, obtaining consent from participants, determining the interview process, planning the questionnaire route, designing survey questions, and ensuring the research follows the ethical route.
Step 3	Experimentation procedure	Data collection, Field research was carried out using both the quantitative and qualitative methods of data gathering. Questionnaires and participants consent form were sent out, interviews were arranged and conducted with proper recording both electronically and on paper, collection of questionnaires. 103 participants were sent questionnaires, 98 completed and returned, were interviewed
Step 4	Analysis and modelling	Data Analysis conducted through SPSS (on quantitative data) and NVivo (on qualitative data) and coding.
Step 5	Interpretation of results	Assessing results from charts, tables, and graphs, using chi-square, correlation, and

		regression to match research objectives, test hypotheses and validate the conceptual framework, applying necessary feedback and new knowledge to test and validate the framework.
Step 6	Conclusion	Providing recommendations, pinpointing achievements and gaps filled in the research on security solutions and retail crime and establishing the final framework.

4.6 Data Processing and Analysis

The analysis and processing of data collected in this research involve many actions which include organising, integrating, transforming, and testing of the hypothesis.

The data collected have been converted to produce information that answers research questions. This conversion includes analysing, editing, coding, arranging, and classifying. This facilitates the removal of irrelevant data while keeping the relevant ones.

4.6.1 Quantitative Data Analysis with SPSS

The quantitative data is usually analysed through the use of statistical methods which are classified into two categories namely *descriptive* and *inferential* statistical techniques. **Descriptive** statistical techniques are used to measure the central tendencies like average, gaps, and charts. **Inferential** statistical techniques help to analyse the data collected through t-test, chi-square, and correlation. The researcher made use of both the descriptive and inferential statistical techniques because of the need to relate with the data collected and to describe what is going on in data collected for the research. Descriptive statistics helps to simplify a huge amount of data that have been collected in a sensible way leading to a good presentation. Inferential statistics helps with the discovery and possible establishment of relationships between data leading to the achievement of research objectives and hypotheses.

The researcher made use of the Statistical Package for the Social Scientists (SPSS) which is a data management and statistical analysis tool that has the multipurpose capacity to process data competently. The researcher used IBM SPSS Statistics 22 that is available at University of

Wales. The SPSS data input was stored in a spreadsheet which is similar to Excel. SPSS has its limitations but still offers in-depth analysis that is suitable for this study (Bryman, 2016). This tool is used by the researcher to analyse the online questionnaires.

4.6.2 Qualitative Data Analysis with NVivo

NVivo is qualitative data analysis (QDA) software that is used by many researchers to analyse qualitative research data that has been collected. The software was produced by QSR and works very well with either small or larger collections of qualitative data. NVivo software is used to manage data and gives the researcher the opportunity to focus on examining the meaning of the data collected either by writing, audio recording or data that might not be analysed by SPSS. NVivo is also used to analyse data that are non-numeric, which means this can also be text or visual (Maxwell, 2013). Moreover, using NVivo to analyse qualitative data which is collected in this study helped the researcher to manage, query, report and visualise the data (Oluwakemi, 2017).

The latest QSR NVivo 11.3 version was used by the researcher which is available in University of Wales Trinity Saint David (UWTSD) library. Data analysis through coding is a major part of qualitative data analysis (Bryman 2016).

NVivo's main screen consists of the list view, navigation view and detail view.

On the navigation view we see components such as sources, nodes, and classification of projects available for the researcher to access. The list view provides the details of all imported folders which include interview transcripts and details of audio recording transcripts. Documents opened are shown on the detail view. The researcher can work on these transcripts by coding, examining, or linking the sequences of events (Maxwell, 2013).

4.6.3 Interview Design

The questions prepared for face-to-face interviews were in-depth with the intention to achieve research objectives. As security solutions are quite diverse, the interviews were semi-structures focusing on the three security solutions and subject to adaptations based on new discoveries from the responses of the interviewees (Davies, Francis and Jupp, 2011). All the interview questions were constructed clearly to be understood by the participants and not to mislead them (Gill, Stewart, Treasure, and Chadwick, 2008). Both the questions and the answers were digitally captured by a digital recorder which makes the interview very accurate (Hancock *et al*., 2007). The interviews were conducted in the stores with the timeframe of thirty minutes to

two hours as this was the accurate time for phenomenological studies (Leedy and Ormrod, 2013; Laforest, 2009). This timeframe would enable the interviewees to concentrate better (Heistinger,2007).

The time that was allocated for the interviews was enough for all the questions.

4.6.4 Qualitative Sample

Those that were identified to participate in the face-to-face interview were checked for eligibility, that is, their capability to provide accurate answers to the questions because of their peculiar positions in relation to security solutions. These include the Managers, Deputy managers, Supervisors and Security guards. These participants are either those that use the security solutions or were involved in making decisions relating to the sourcing and management of security in the supermarkets. The method applied here is done bearing the particular purpose of the research in mind (Leedy and Ormrod, 2013).

Approach to qualitative in-depth interviews varies with many scholars, Dworkin (2012) stated that the interviewees figures should be between 5 and 50 participants. Crewell, (2007) suggested 6 in a phenomenological study, while Kuzel (1999) recommends between 6 to 8, then Morse, (2000) between 6 to 10, and Leedy and Ormord, (2013) between 5 to 25 participants. 15 participants were chosen for this research in accordance with Dworkin (2012) and Leedy and Ormond (2013).

4.7 Summary and Conclusion of Data Analysis

This chapter has shown how the data were collected for this research, the reason for the organisations selected, the research design and data analysis. The data analysis has been done through the SPSS for quantitative data and NVivo for qualitative data. Employing both the quantitative and qualitative research techniques helped to offer an in-depth opportunity towards rich data collection. The combination of both approaches is essential as it gives a wider data needed to obtain expected results that will provide answers to both research questions and objectives of this research. Although, using qualitative and quantitative methods can be very time consuming and labour intensive but this has been very rewarding for this study.

In this chapter, the choice of two similar but diverse organisations for the case study has been justified as the researcher could not reach all the stores in the UK. The choice of data collection methods has also been justified with the description of chosen methods and the importance of the chosen data analytical tools. Explanations have been provided for the choice of semi-

structured interviews and the type of questions embedded in the questionnaire. Reasons have been provided as to the choice of SPSS for quantitative data analysis and NVivo for qualitative data analysis.

Security is a very important aspect of retail supermarkets as their owners cannot do without these solutions if they want to remain profitable.

Earlier the researcher mentioned the research that these approaches and techniques are used to analyse the data in these studies. The particular type of questions used in questionnaires and interviews were aimed at achieving the objectives of this research.

As with every research, it is impossible to guarantee a perfect sincerity or a fool-proof authenticity of the responses of the participants as the matters relating to security could be subjective at times even though the interviews were done in their workplace. However, since the number of interviewees were around 20 and were varied with different backgrounds and organisations, it is possible to infer justifiable conclusions from the responses gathered. The participants were also assured anonymity of their participation in this research, and this could help with sincerity of responses.

CHAPTER 5
DISCUSSION OF RESULTS AND FINDINGS

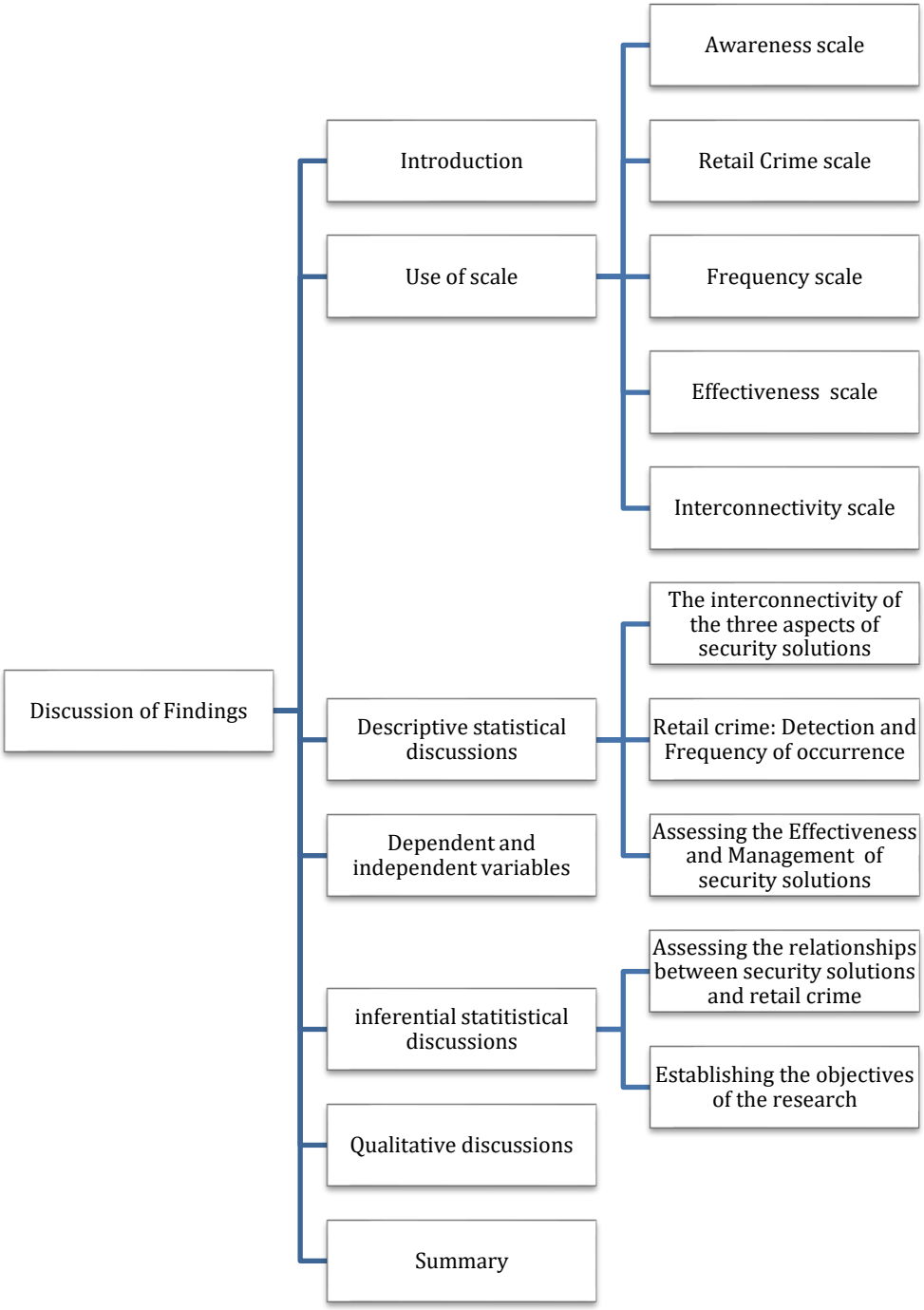
5.1 Introduction

This chapter contains the results and findings of the field research from the use of the SPSS statistical tool for quantitative analysis and the NVivo analytical tool for qualitative results. The discussion in this chapter is based on the experimental research design applied by this researcher.

The findings have been subdivided into different categories for a better understanding of the subject matter of this research. The initial discussion commences with the categorisation of scales used to explain the responses of participants to the security solutions and their effectiveness in reducing retail crime. As illustrated in the figure below, this chapter also include the interconnectivity of the three aspects of security solutions, the detection and frequency of occurrence of retail crime, assessment of the effectiveness and management of security solutions, assessment of the relationships between security solutions and retail crime with a view to determining the impact or non-impact of one on the other leading to the achievement of the objectives of this research. The chapter ends with the summary of findings.

Figure 11: Summary of Chapter 5

The diagram below shows the area of concentration in chapter five and the different tools that will be applied to the discussion of findings.



5.2 Use of Scale

The responses from participants were categorised with the use of scales for easy navigation and analysis of security solutions and their effectiveness in reducing retail crime. Scaling has been adopted for questions and responses from questionnaires so as to establish the reliability, validity and accuracy of the data collected for analysis. It fosters a better understanding of the results.

Below are the various categorisation of scales involving questions relating to security solutions and retail crimes.

5.2.1 Use of Awareness of Security Solutions Scale

This scale was developed to measure the level of awareness of security solutions by the respondents. Such questions involve straightforward answers like 'yes,' 'no' and 'can't say.' The overall goal is to determine the participants' awareness of different security measures put in place in their stores before their effectiveness could be ascertained. SSQ1 – SSQ11 contain awareness questions.

5.2.2 Use of Awareness of Retail Crime Scale

This research involves two variables, dependent and independent. This awareness scale was also created to determine the awareness of respondents of the dependent variable 'retail crime' before its connection to security solutions could be established. Retail crime is the reason for the adoption of security measures in stores, so the aim of this research is to determine if the security solutions employed are effective or not. Questions that involve answers such as 'yes,' no' and 'can't say' are spread out in the questionnaires from SSQ12 – SSQ36.

5.2.3 The Frequency Scale

The frequency scale was developed to assess the occurrence of crime in stores as one of the objectives of this research is to determine the effectiveness of security solutions in stores in relation to combating retail crime. The frequency scale will help us determine if the presence of security solutions in stores actually reduce or prevent crimes.

The frequency scale contains many questions in relation to each of the security solutions. They include answers such as 'never,' 'not often,' 'often,' 'very often,' 'everyday' and 'can't say' which is for those who are not sure of the answer.

5.2.4 The Effectiveness Scale

The effectiveness scale was developed to measure the perceived effectiveness of the security solutions under study. This scale would help to determine the extent to which security solutions met the needs of the retail stores, that is, the extent to which they helped prevent or reduce retail crimes as that is the main reason for their presence and adoption in retail stores. The scale involved two different aspects or answers expected from respondents. The first aspect actually asked questions on effectiveness providing answers such as 'ineffective' 'effective,' 'very effective' and 'can't say.' The other aspect involves questions on agreement with the effectiveness of security solutions and they entail answers like 'strongly disagree,' 'disagree,' 'partially agree,' 'agree' and 'strongly agree.'

5.2.5 The Interconnectivity Scale

The interconnectivity scale was developed in order to provide the basis for the testing of the hypothesis of this research which is understanding the interconnectivity and effectiveness of security solutions can help prevent or reduce crime in retail supermarkets. The questions posed involve a comparability analysis among different security measures put in place by supermarkets and respondents were asked to determine their effectiveness by choosing a combination of measures that work in certain situations in the stores. SSQ53 is an example of questions that are designed using the interconnectivity scale. Other questions designed with the interconnectivity scale include SSQ16, SSQ19, SSQ21, SSQ24, SSQ27, SSQ30, SSQ32, SSQ38, SSQ39 and SSQ40.

5.3 Descriptive Statistical Discussions

Descriptive statistical techniques are used in this section to measure the central tendencies like average, gaps, and charts. These statistical techniques have been applied because of the need to relate with the data collected and to describe what is going on in data collected for the research. This was motivated by the need to simplify a huge amount of data that has been collected in a sensible way leading to a good presentation. This section contains the use of charts, tables, and graphs.

All the tables contain the mean, mode, median, standard deviation, valid percentages, frequency, and cumulative percentages. The charts have been carefully chosen according to their suitability for the subject matter.

5.3.1 Demographic Findings

The first section of the questionnaire sent out contains the collection of demographic information from the respondents. The data collected include the participants' age, gender, organisation, current position, and years in current position. The collection of demographic information is important in this research because of the need to relate to some extent with the participants' background as their position in the organisation for instance, is paramount to the level of their knowledge of security solutions. Also, for instance, the number of years they have spent in their current position can also influence their level of experience of retail crimes and the effectiveness of security solutions in combating them.

1. **Age**

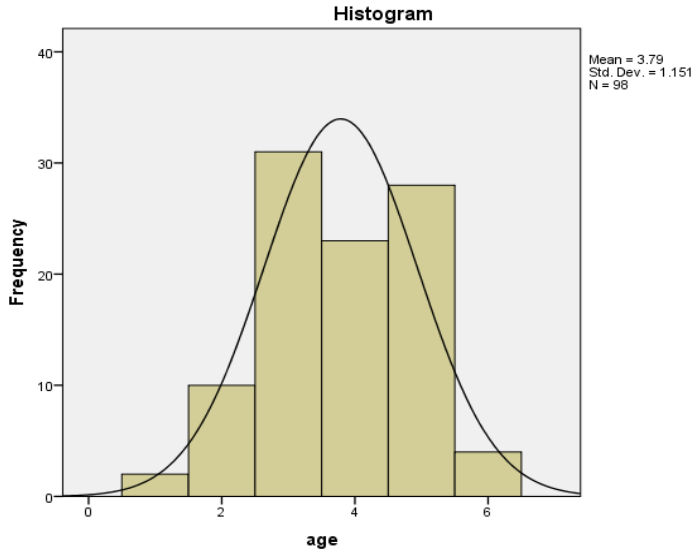
The participants were asked to indicate their age and the table below shows the age distribution.

Table 6: Age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0-25	2	2.0	2.0	2.0
	25-29	10	10.2	10.2	12.2
	30-39	31	31.6	31.6	43.9
	40-49	23	23.5	23.5	67.3
	50-59	28	28.6	28.6	95.9
	60 and above	4	4.1	4.1	100.0
	Total	98	100.0	100.0	

Out of the 103 questionnaires that were sent out to the sample population, 98 responses were collected. From the table above, a combined 83.7% of the respondents are between the ages of 30 to 59 which is usually the most common working age in the UK. This is followed by the age group 25-29 which is 10.2%. Those in the category of 60 years and above are 4.1% while the lowest category includes those who are less than 25 years. It could be seen that under 25 and over 60s are less likely to work in the security and retail sectors.

Figure 12: The graphical representation of age.



2. Gender

Gender plays an important role in the security industry and as such participants were asked their gender.

Table 7: Statistics

gender

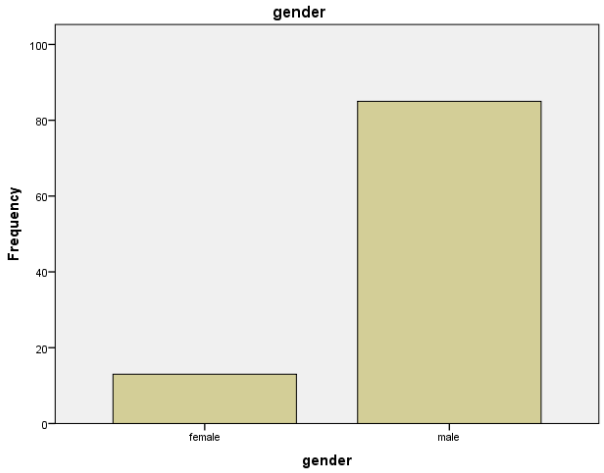
N	Valid	98
	Missing	0
Mean		1.87
Std. Error of Mean		.034
Median		2.00
Mode		2
Std. Deviation		.341
Variance		.116
Range		1
Minimum		1
Maximum		2

Table 8: Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	female	13	13.3	13.3	13.3
	male	85	86.7	86.7	100.0
	Total	98	100.0	100.0	

The respondents are made up of 13.3% female and 86.7% male. This is a reflection of the general workforce that have access to the three security systems in the two supermarkets under study. It is very important to note that the respondents are made up of managers of retail stores, supervisors both for the security personnel and the stores and security guards on the shopfloor.

Figure 13: The graphical representation of gender.



3. Categorisation of Organisation

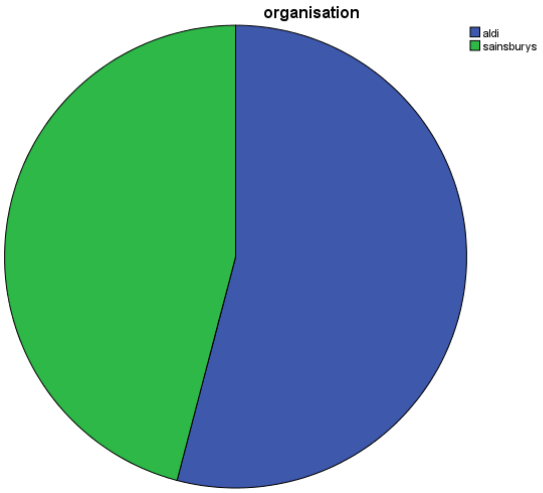
Participants were drawn from two major supermarkets in the UK. The table below shows the percentage of participants from each organisation.

Table 9: Categorisation of Organisation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Aldi	53	54.1	54.1	54.1
	Sainsbury's	45	45.9	45.9	100.0
	Total	98	100.0	100.0	

This study is focused on the retail sector with special emphasis on supermarkets that are operating in the UK. Two supermarkets were chosen as representative samples from the pool of retail supermarkets. Out of 98 completed questionnaires sent out, 54.1% came from Aldi while 45.9% came from Sainsburys.

Figure 14: The graphical representation of organisation



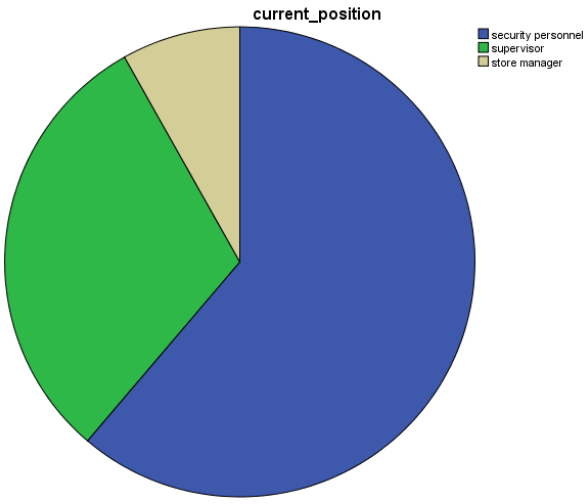
4. **Current position**

Table 10: Current position

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	security personnel	60	61.2	61.2	61.2
	supervisor	30	30.6	30.6	91.8
	store manager	8	8.2	8.2	100.0
	Total	98	100.0	100.0	

There are three categories of workers targeted as the research sample population because of their relationship with the subject matter which is the security solutions in the supermarkets. They were in the best position to comment on the validity and effectiveness of the security solutions in their respective organisation. Out of the 98 respondents 61. 2% were security personnel, 30.6% were supervisors and the managers were 8.2%.

Figure 15: The graphical representation of current position



5. Years in current position

The number of years that the current respondents have spent in their current position.

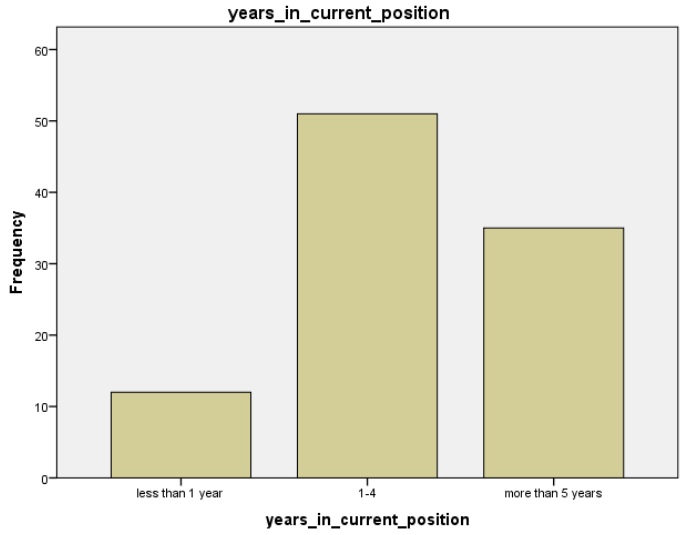
Table 11: Years in current position

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	less than 1 year	12	12.2	12.2	12.2
	1-4	51	52.0	52.0	64.3
	more than 5 years	35	35.7	35.7	100.0
	Total	98	100.0	100.0	

From the table above, the respondents who have spent 1-4 years in their current position constitute the large percentage of the total respondents with 52%, followed by those that have spent 5 years and above which is 35.7%. Those who are Less than one year constitute the least category which is 12.7% of the sample population. This might be because they just newly joined the company at the time of the research.

The categorisation of the current position is needed in this research because of the peculiarity of the respondents' experience which might determine the extent of their familiarity with the security solutions.

Figure16: The graphical representation of years in current position



5.3.2 Three Aspects of Security Solutions

This section has been sub-categorised into four areas; the first section contains the general questions on the awareness of security solutions, while the 2nd to the 4th contains questions on the three security solutions, Physical, CCTV and Cybersecurity.

The original questions from the questionnaire have been restructured or shortened to fit SPSS requirement for variable names so the disparity might be seen especially in long questions which have to be fitted into the variable name section in the SPSS.

The questions in this category have been assigned names for easy identification.

It starts with SSQ1 to SSQ11 (SSQ stands for security solution questions)

5.3.2.1 Awareness of Security Solutions

SSQ1: Which of the following security services are you aware of?

The respondents were asked if they were aware of the three aspects of security solutions namely, Physical Security, CCTV systems and Cyber security present in their respective organisation.

Their responses are analysed below;

Table 12: Awareness of security solutions

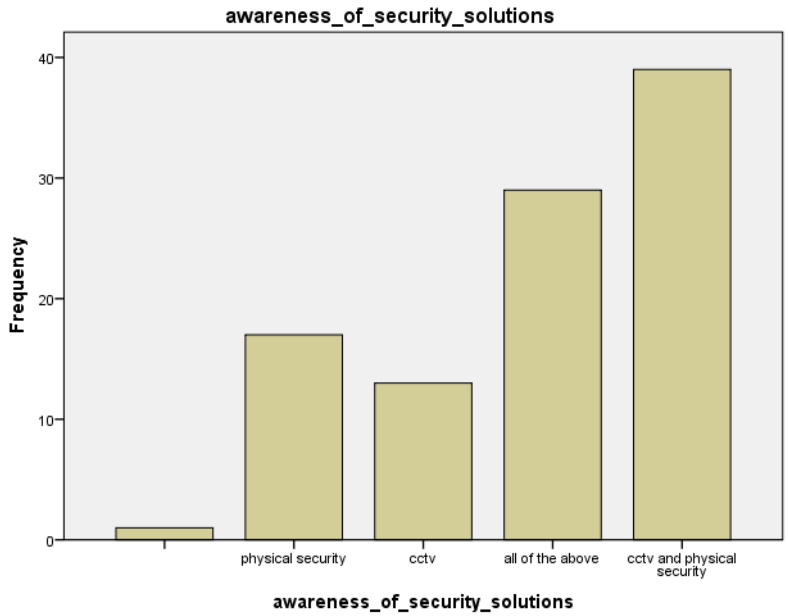
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid					
	physical security	17	17.2	17.2	18.2
	Cctv	13	13.1	13.1	31.3
	all of the above	29	29.3	29.3	60.6
	Cctv and physical security	39	39.4	39.4	100.0
	Total	98	100.0	100.0	

Cybersecurity did not show here because none of the respondents ticked the box allocated to it, however this does not indicate that they were unaware of cybersecurity because from

subsequent responses to questions relating to it, it has been established that they were aware of it.

CCTV and physical security seemed to be the most popular as 39.4% of the population indicated their awareness while 29.3% of the population were aware of all the security solutions. Individually, the awareness of physical security seemed to be more that CCTV with 17.2% and 13.1% respectively.

Figure 17: SSQ1 Graphical representation of the awareness of security solutions



SSQ2: Which of the following security services do you currently use in your company

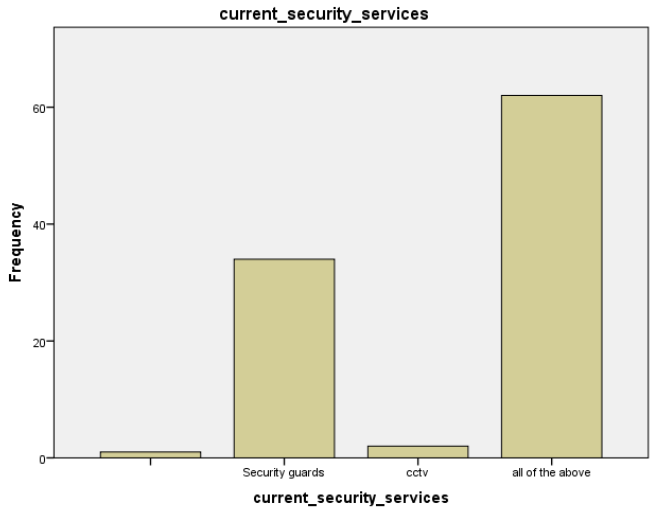
This is about the security solutions currently in use in these organisations.

Table 13: Current use of security services

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid					
	Security guards	34	34.3	34.3	35.4
	cctv	2	2.0	2.0	37.4
	all of the above	62	62.6	62.6	100.0
	Total	98	100.0	100.0	

The nature of the responses to this question was a multiple choice. This shows in the responses of participants to the questions as we see 34.3% indicating that they use security personnel while 2% use CCTV. Whereas from the analysis, we see 62.6% indicating that their organisations use both the security guards and CCTV. This shows the familiarity of the respondents to a particular security solution which does not mean that their organisation does not use the other security service.

Figure 18: SSQ2 Graphical representation of the current use of security services



5.3.2.2 Physical Security

There are different aspects of physical security which include security guards, keys, and alarms. But the responses are based on the security personnel present in stores.

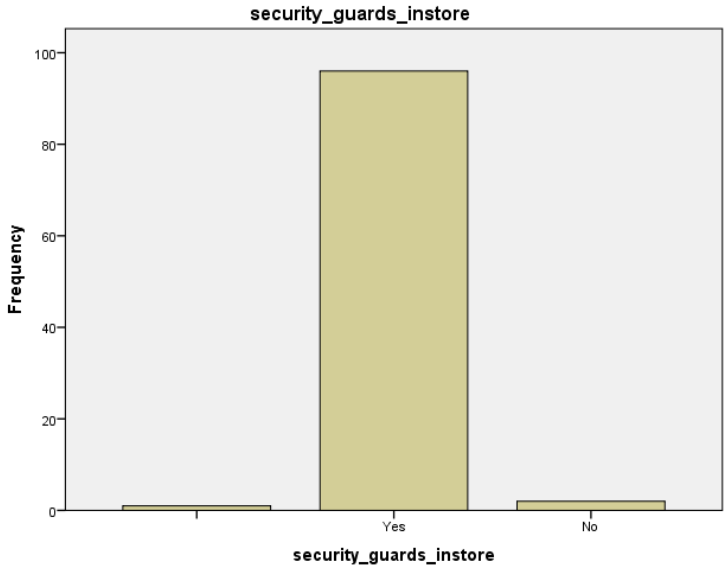
SSQ3: Do you have security guards in your store?

Table 14: Security guards in stores

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid					
	Yes	96	97.9	97.9	97.9
	No	2	2.1	2.1	100.0
	Total	98	100.0	100.0	

From the responses, 97.9% use security personnel which shows that most of the stores have security personnel on ground while only 2.1% do not have security guards in their stores.

Figure 19: SSQ3 Graphical representation of security guard in these stores



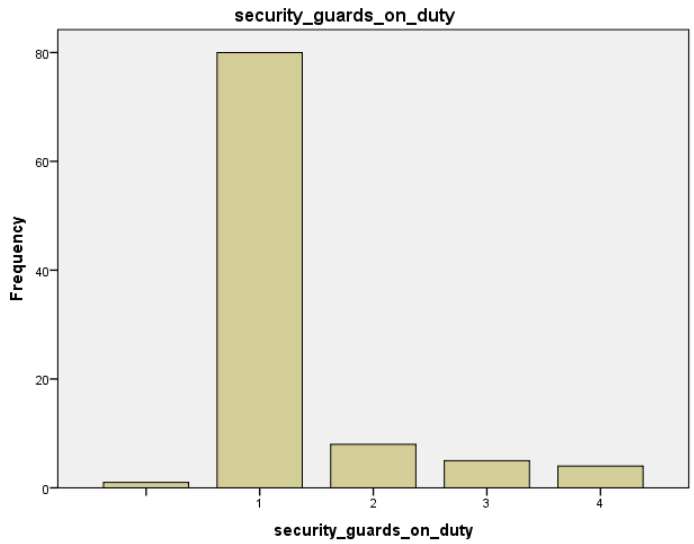
SSQ4: How many security guards are on duty at every shift?

Table 15: Security guards on duty

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid					
	1	80	82.4	82.4	82.4
	2	8	8.2	8.2	90.6
	3	5	5.1	5.2	95.8.
	4	4	4.1	4.1	100.0
	Total	97	99.0	100.0	
Missing	999	1	1.0		
Total		98	100.0		

The participants stated that between 1 to 4 security guards are present in a shift. Most of the respondents have one security guard in a shift which came to 82.4%, the stores that have 2 security guards in a shift constitute 8.2% while the stores that have 3 guards in an opening hour constitute 5.2% and the supermarkets that have 4 security guards in a shift constitute 4.1%. There is an error of 1% which was as a result of a wrong answer from one of the participants.

Figure 20: SSQ4 Graphical representation of Security guards on duty



5.3.2.3 CCTV

This section relates to CCTV systems.

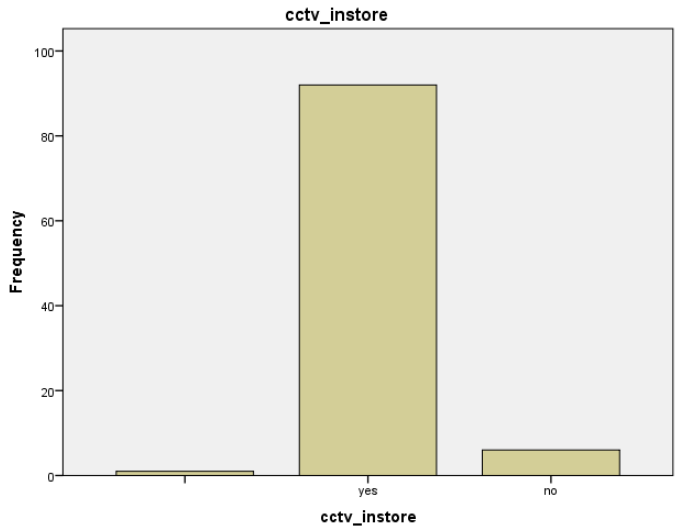
SSQ 5: Do you have CCTV installed in your store?

Table 16: CCTV installed in stores

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid					
	yes	92	93.9	93.9	93.9
	no	6	6.1	6.1	100.0
	Total	98	100.0	100.0	

The respondents were expected to answer "Yes" or "No" in their questionnaires. 93.9% of the supermarkets have CCTV in their stores while 6.1% responded that they do not have CCTV. This question relates to the absence of CCTV operators in their store rather than the presence of CCTV in stores. So, the response of 6.1% was not because they did not have CCTV installed in stores but that they did not require the work of CCTV operators as part of their security measures.

Figure 21: SSQ5 Graphical representation of the stores that have CCTV cameras



SSQ6: Does your store have CCTV operators monitoring the system?

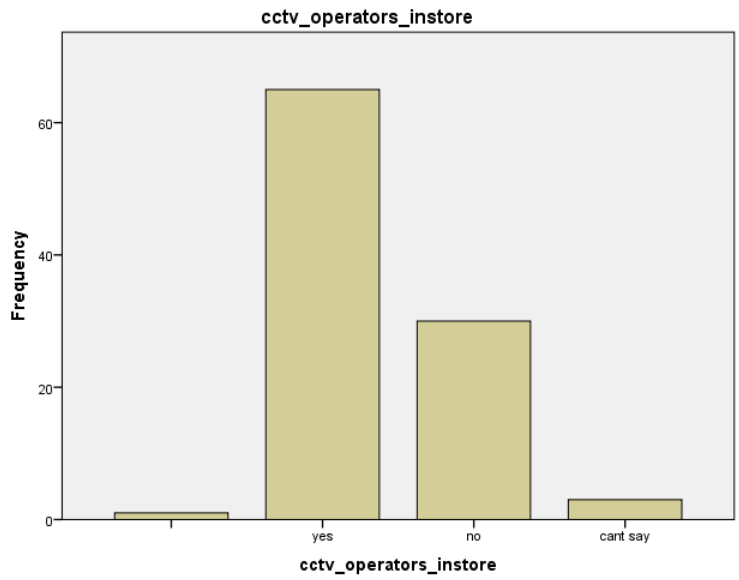
Stores that have CCTV operators.

Table 17: CCTV operators in stores

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid					
	yes	65	66.3	66.3	66.3
	no	30	30.6	30.6	97.0
	can't say	3	3.1	3.1	100.0
	Total	98	100.0	100.0	

The respondents have 3 options: "Yes", "No" and "Can't Say". 66.3% of the respondents have those monitoring the CCTV in the stores, 30.6% of the respondents do not have those monitoring the CCTV in their store. Only 3% responded that they can't say.

Figure 22: SSQ6 Graphical representation of stores that have CCTV operators



SSQ7: How often do you catch shoplifters or other criminals through the CCTV systems in your store?

This question was asked to determine how effective the CCTV systems are in combating crime in the stores.

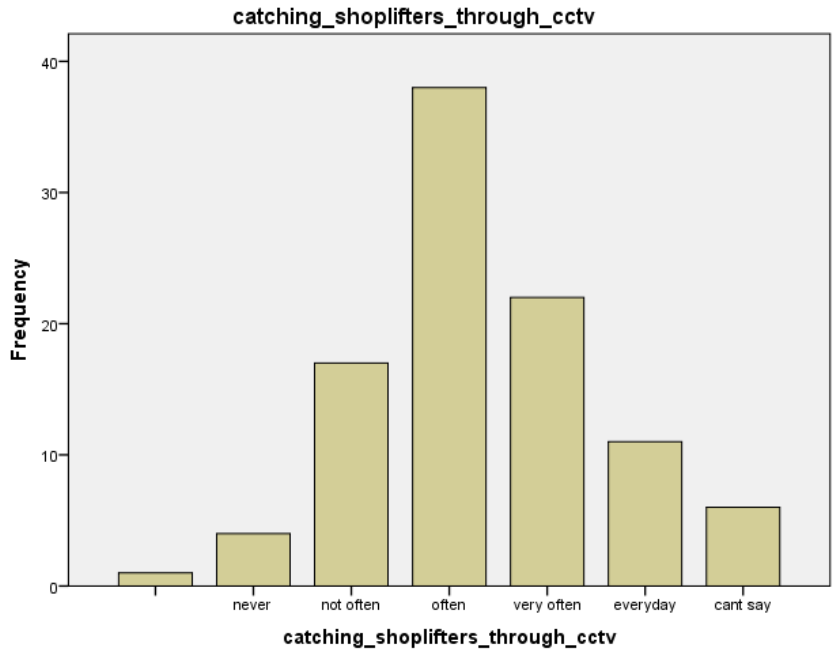
Analysis of catching shoplifters through CCTV.

Table 18: Catching shoplifters through CCTV

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid					
	never	4	4.1	4.1	4.1
	not often	17	17.3	17.4	21.5
	often	38	38.8	38.8	60.3
	very often	22	22.4	22.4	82.7
	everyday	11	11.2	11.2	93.9
	can't say	6	6.1	6.1	100.0
	Total	98	100.0	100.0	

This question is one of the numerous ones targeted at discovering the effectiveness of the security solutions employed in retail stores. They are set to know the frequency of CCTV effectiveness in catching shoplifters. The answers range from 'never' to ' everyday' while a column 'can't say' was dedicated to those who were not sure. A total number of 71 participants which form 72.4% of the 98 respondents believed that the CCTV was effective in catching shoplifters. These are made of those who responded 'often,' 'very often' and 'everyday' to the question. 17.4% of the respondents thought CCTV cameras did not catch shoplifters often, 4.1% believed it had never worked while 6.1% were not sure.

Figure 23: SSQ7 Graphical representation of catching shoplifters through CCTV



5.3.2.4 Cybersecurity

This section relates to e-commerce and cybersecurity.

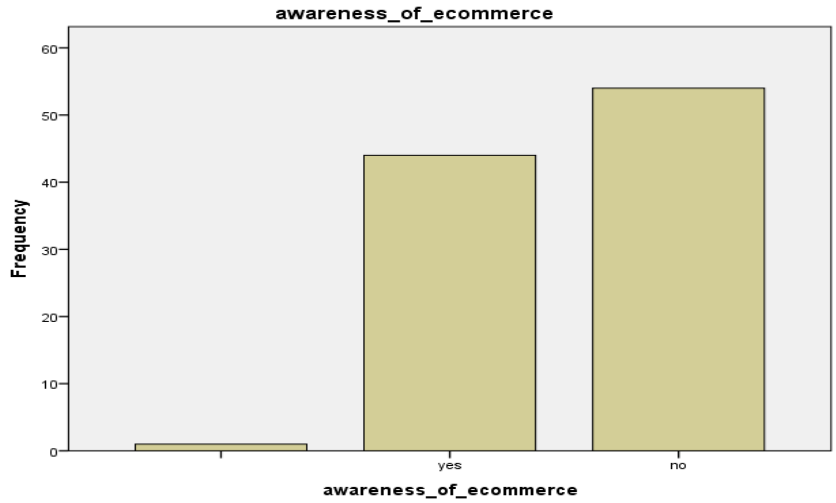
SSQ8: **Are you aware of E-commerce?**

Table 19: Awareness of e-commerce

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid					
	yes	44	44.9	44.9	44.9
	no	54	55.1	55.1	100.0
	Total	98	100.0	100.0	

The respondents that were not aware of E-commerce were 55.1% while 44.9% were aware of E-commerce. This shows that more than half of the population did not know much about e-commerce.

Figure 24: SSQ8 Graphical representation of the respondents that are aware of E-commerce.



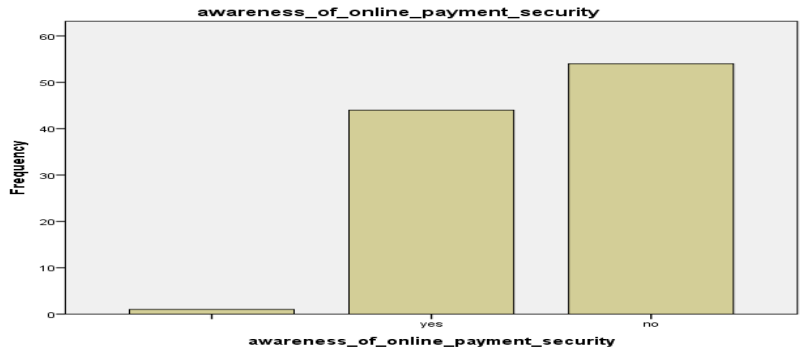
SSQ9: If Yes, are you aware of the online payment security put in place by your company?

Table 20: Awareness of online payment security

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid					
	yes	44	44.8	44.9	44.9
	no	54	55.1	55.1	100.0
	Total	98	100.0	100.0	

44.9% of the sample population were aware of online payment security while 55.1% were not. This aligns with the 44.9% who were aware of e-commerce in the previous question and the 55.1% who were not. It shows that the same number of respondents who were aware of e-commerce are also aware of cybersecurity measures put in place for online payment.

Figure 25: SSQ9 Graphical representation of awareness of online payment of security in the stores



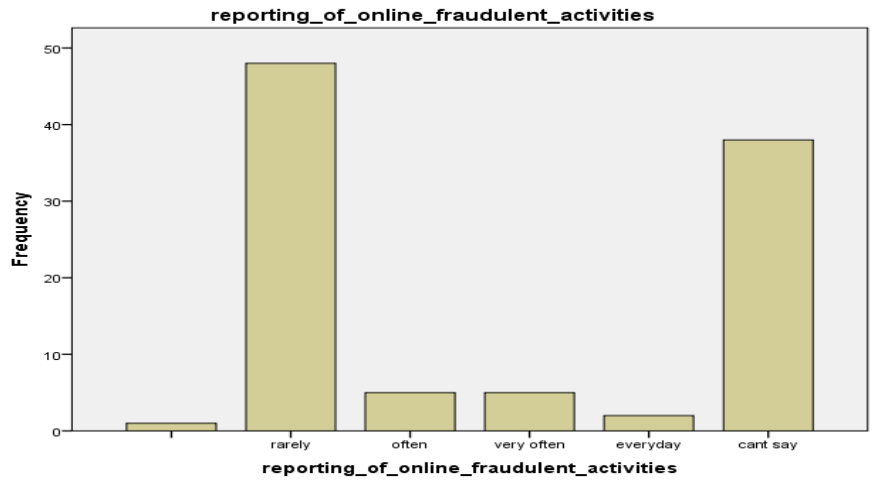
SSQ10: How often are fraudulent activities reported on your online payment structure?

Table 21: Reporting of online fraudulent activities

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid					
	rarely	48	48.9	48.9	49
	often	5	5.1	5.1	54.1
	very often	5	5.1	5.1	59.2
	everyday	2	2.0	2.0	61.2
	can't say	38	38.8	38.8	100.0
	Total	98	100.0	100.0	

The respondents had the option of "rarely," "often," "very often," "Every day," and "can't say." Majority of the total respondents (48.9%) said that online fraudulent activities in relation to online payments were rarely reported while 38.8% were not sure if they were reported or not. 12 out of 98 respondents were sure that fraudulent activities were reported. They form a very low 12.2% of the respondents with combined answers of 'often,' 'very often' and 'everyday'

Figure 26: SSQ10 Graphical representation of reporting online fraudulent activities



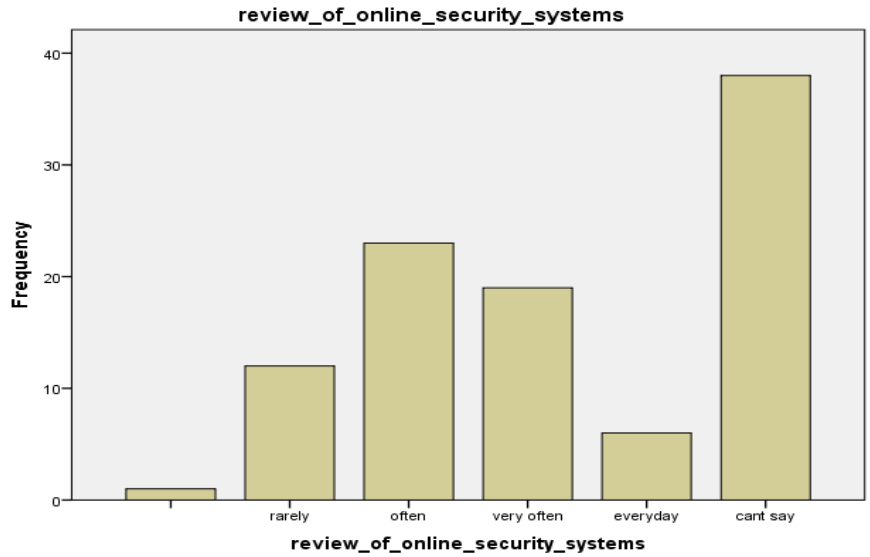
SSQ11: How often does your company review its online security systems?

Table 22: Review of online security systems

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid					
	rarely	12	12.2	12.2	12.2
	often	23	23.5	23.5	35.7
	very often	19	19.4	19.4	55.1
	everyday	6	6.1	6.1	61.2
	can't say	38	38.4	38.8	100.0
	Total	98	100.0	100.0	

This table shows whether the respondents review their online security solutions in their organisations. 38.4% of the respondents can't say, 23.2% often review their online security, 19.2% review their online security solution very often, 12.1% of those organisations rarely and 6.1% review their own security every day.

Figure 27: SSQ 11 Graphical representation of whether the organisations review their online security system



5.3.3 Analysis of Different Types of Retail Crime

This discussion here is about the awareness and experience of different retail crimes in stores.

We continue to assign SSQ numbers to each of the questions. It starts with SSQ12 to SSQ37.

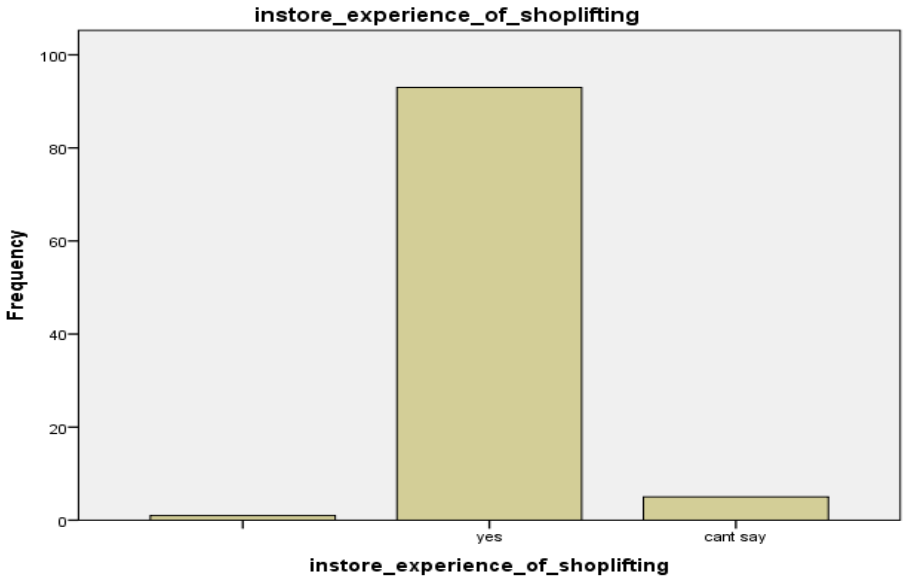
SSQ12: Does your store experience shoplifting

Table 23: Experience of shoplifting in stores

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid					
	yes	93	94.9	94.9	94.9
	can't say	5	5.1	5.1	100.0
	Total	98	100.0	100.0	

The respondents were asked if they experienced shoplifting in their organisations. 94.9% of the respondents in the two organisations said yes while 5.1% were not sure.

Figure 28: Graphical representation of the stores that experience shoplifting



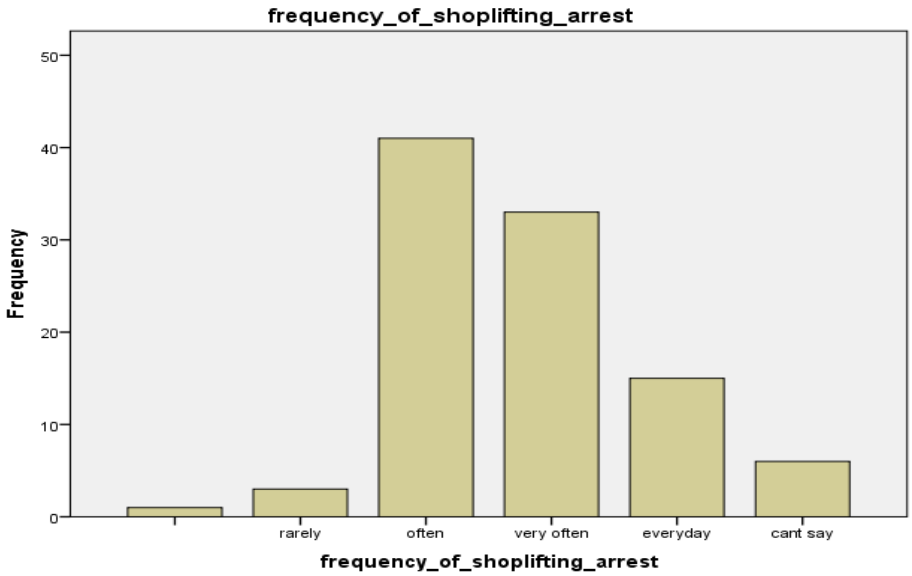
SSQ13 How often do security guards apprehend shoplifters in your store?

Table 24: Frequency of shoplifting arrest

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid					
	rarely	3	3.0	3.0	4.0
	often	41	41.8	41.8	45.8
	very often	33	33.7	33.7	79.5
	everyday	15	15.3	15.3	94.9
	can't say	6	6.1	6.1	100.0
	Total	98	100.0	100.0	

From the table above, 89 out of the total sample population which is like 90.9% said that the security guards on the shopfloor frequently apprehended shoplifters. 6.1% could not ascertain the frequency of apprehension while 3% said it rarely occurred.

Figure 29: SSQ13 Graphical representation of shoplifters arrested in the stores



SSQ14: How often does your store lose item or have shoplifting when they are displayed?

Table 25: Lost item displayed through shoplifting

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid					
	rarely	13	13.3	13.3	13.3
	often	37	37.8	37.8	51.1
	very often	29	29.6	29.6	80.7
	everyday	11	11.2	11.2	91.9
	can't say	8	8.1	8.1	100.0
	Total	98	100.0	100.0	

It is interesting to see that 13.3% said their stores rarely lose items to shoplifting which means that even if those items were shoplifted, the security guards would often apprehend them. On

the other hand 67.4% said that their stores lose items to shoplifters often or very often while 11.2% said it was an everyday affair in their own store. In total 78.6% agreed that their stores lose items to shoplifting although in comparison to SSQ 13 in which respondents said that their security guards often apprehend shoplifters, yet this shows that many shoplifters still escape leading to loss of items. However, 8.1% could not really establish the loss.

Figure 30: SSQ14 Graphical representation of items lost through shoplifting



SSQ15: How often do shoplifters escape when escorted by security guards?

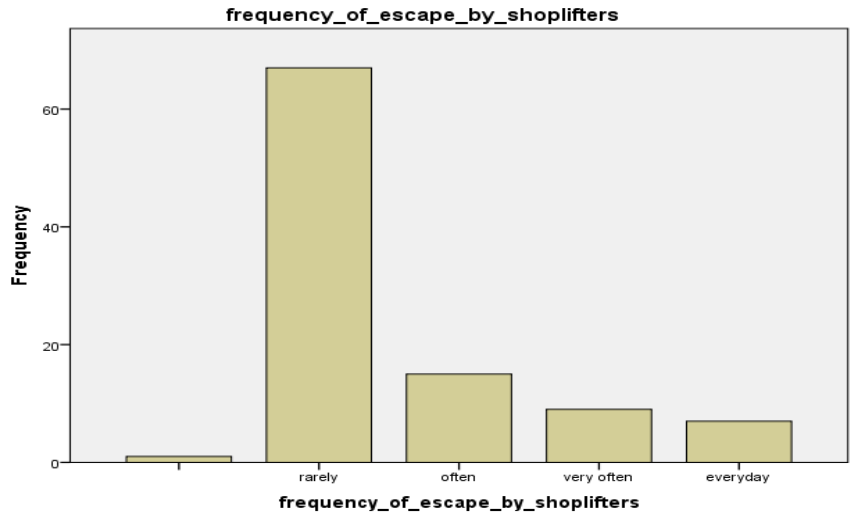
Table 26: Frequency of escape by shoplifters

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid					
	rarely	67	68.4	68.4	68.4
	often	15	15.3	15.3	83.7
	very often	9	9.2	9.2	92.9
	everyday	7	7.1	7.1	100.0
	Total	98	100.0	100.0	

This table shows the distribution of responses that determine how the organisations lose goods from the shoplifters when they are being escorted to by the security guards. Out of the 98-sample population, 68.4% said that shoplifters rarely escaped. 24.5% experienced the frequent escape of shoplifters while 7.1% saw it happen every day.

This shows the difference between the activities of the perpetrators and recovering the items from shoplifters which is the purpose of having the security guards in the stores.

Figure 31: SSQ15 Graphical representation of how often shoplifters escape



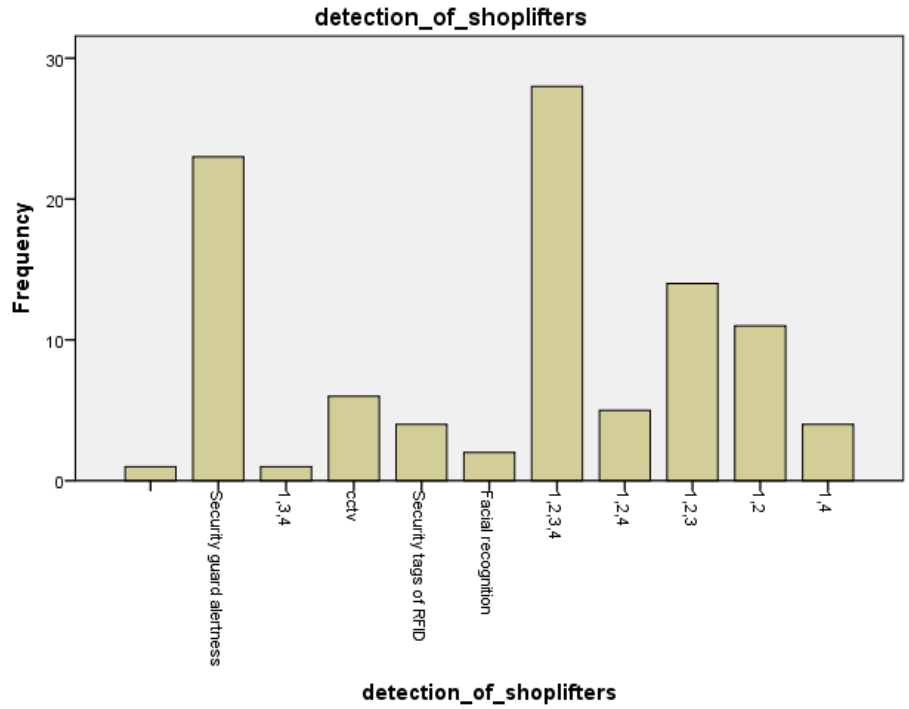
SSQ16: How are shoplifters detected and/or prevented?

Table 27: Detection of shoplifters

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid					
	1. Security guard alertness	23	23.5	23.5	23.5
	2. CCTV	6	6.1	6.1	29.6
	3. Security tags of RFID	4	4.1	4.1	33.7
	4. Facial recognition	2	2.0	2.0	35.7
	1,3,4	1	1.0	1.0	36.7
	1,2,3,4	28	28.6	28.6	65.3
	1,2,4	5	5.1	5.1	70.4
	1,2,3	14	14.3	14.3	84.7
	1,2	11	11.2	11.2	96.9
	1,4	4	4.1	4.1	100.0
	Total	98	100.0	100.0	

There are different security measures in this question, and they have been assigned different numbers for easy analysis and to make the discussion less cumbersome. The respondents were allowed to tick more than one answer. From the table above, 28.6% agreed that shoplifters were detected through the four security measures put in place. 23.5% said the detection was made possible through security guard alertness only, 6.1% agreed the CCTV did more, 4.1% chose the security tags or Radio Frequency Identification (RFID) while 2% agreed with facial recognition. Other responses are the combination of two or more security measures as shown in the table above.

Figure 32: SSQ 16 Graphical representation of how shoplifters are detected or prevented



SSQ17: Does your store experience employee theft?

Table 28: Occurrence of employee theft

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid					
	yes	53	54.1	54.1	54.1
	no	21	21.4	21.4	75.5
	can't say	24	24.5	24.5	100.0
	Total	98	100.0	100.0	

Employee theft is one of the retail crimes that is often overlooked. So when asked this question from the respondents, 54.1 % affirmed that employees do steal from their stores while 21.4% said no. 24.5% were not sure which might be because they have neither witnessed it nor have access to such information.

Figure 33: SSQ 17 Graphical representation of whether the stores experience employee theft?



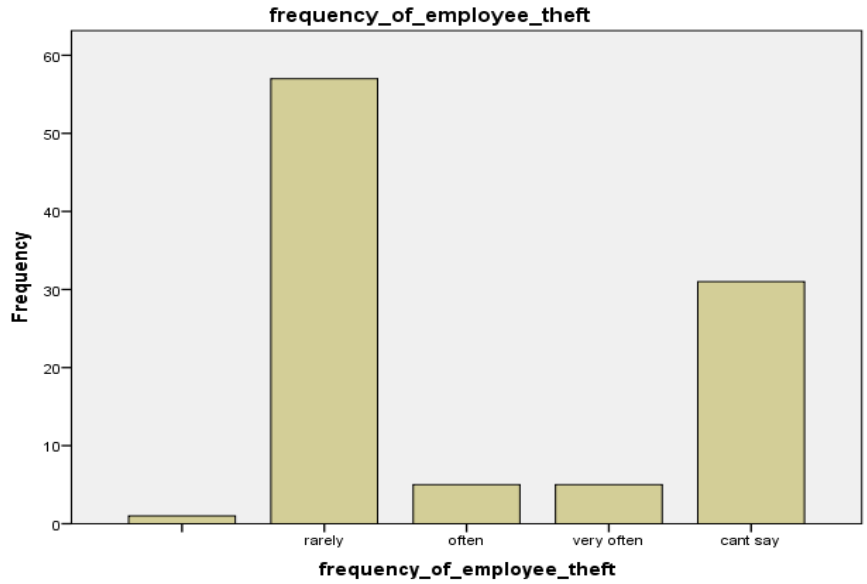
SSQ18: How often do employees steal goods

Table 29: Frequency of employee theft

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid					
	rarely	57	58.2	58.2	58.2
	often	5	5.1	5.1	63.3
	very often	5	5.1	5.1	68.4
	everyday	0	0.0	0.0	68.4
	can't say	31	31.6	31.6	100.0
	Total	98	100.0	100.0	

When asked about the frequency of employee theft, 58.2% said it rarely occurred in their store. A combined 10.2% often or very often experienced employee theft. None of the respondents saw it happen every day while the remaining 31.6% couldn't say.

Figure 34: SSQ18 Graphical representation of how often employees steal goods



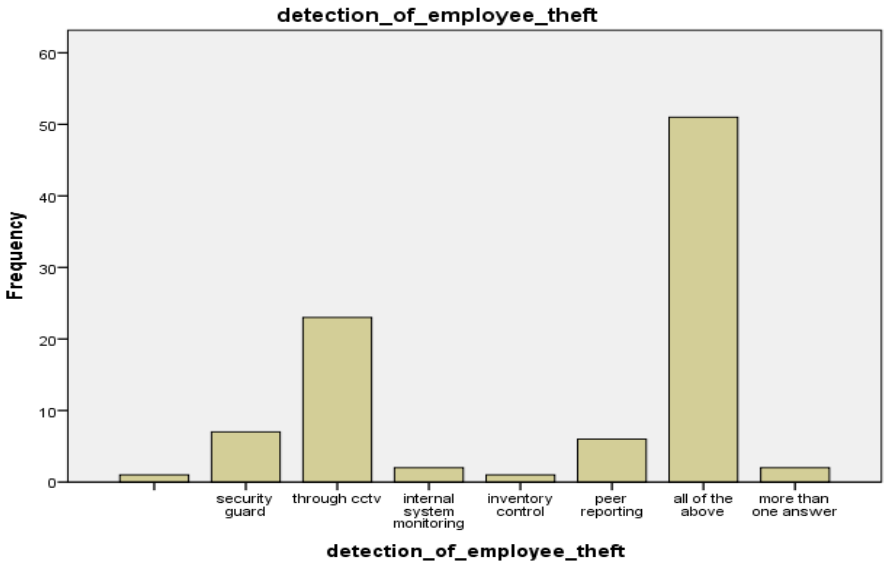
SSQ19: How is employee theft discovered

Table 30: Detection of employee theft

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid					
	security guard	7	7.1	7.1	7.14
	through CCTV	23	23.5	23.5	30.64
	internal system monitoring	2	2.04	2.04	32.68
	inventory control	1	1.0	1.02	33.7
	peer reporting	6	6.12	6.12	39.82
	all of the above	51	52.04	52.04	91.86
	more than one answer	2	2.04	2.04	93.9
	Total	93	93.9	100.0	
Missing	999	6	6.1		
Total		98	100.0		

This table shows different security means for detecting employee theft. The respondents could choose more than one answer. Out of the 98 respondents, 6 gave the wrong answers and error code 999 has been assigned to their responses. Out of the 92 who correctly answered the questions, 51 (about 52%) chose all the security systems as measures that help in the detection of employee theft. This is followed by 23 who chose the CCTV while 7 thought security guards were more helpful. 6 believed in the peer reporting system, 2 thought it was the internal monitoring system while only 1 chose the inventory control system. About 2% chose more than one security measure but not all.

Figure 35: SSQ19 Graphical representation of how often employee theft is discovered



SSQ20: Does your store experience warehouse or suppliers' theft?

Table 31: Occurrence of warehouse supplier theft

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid					
	yes	48	49	49	49
	no	22	22.4	22.4	71.4
	can't say	28	28.6	28.6	100.0
	Total	98	100.0	100.0	

The respondents were asked whether they experienced warehouse theft, 49% of the respondents said "yes" which is almost half of the sample population. 22.4% of the respondents did not experience warehouse theft as of the time of this study and 28.6% were not sure as they might have not been involved in dealing with warehouse goods.

Figure 36: SSQ 20 Graphical representation of stores warehouse/supplier theft



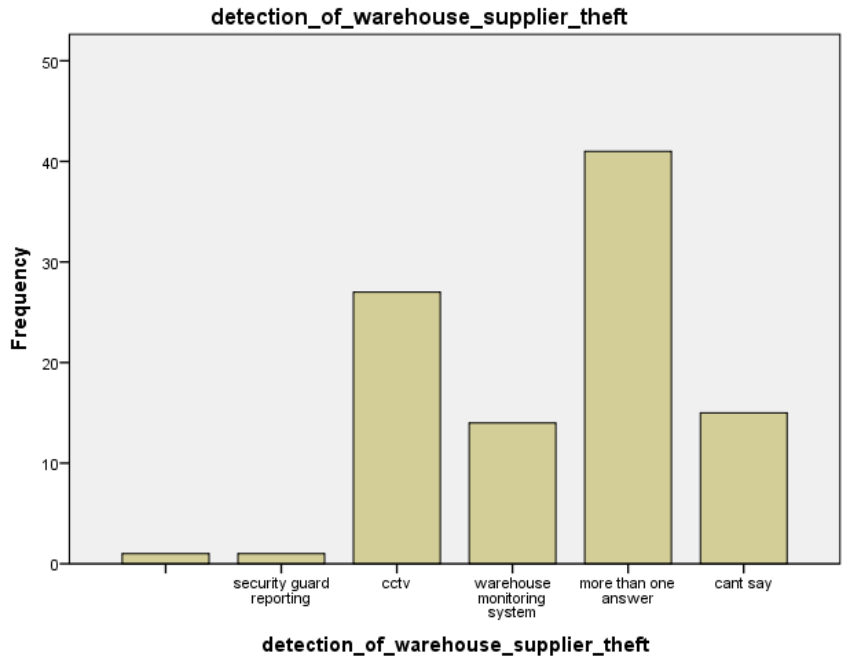
SSQ21: How is warehouse/supplier theft discovered?

Table 32: Detection of warehouse supplier theft

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid					.
	security guard reporting	1	1.0	1.0	1.0
	CCTV	27	27.6	27.6	28..6
	warehouse monitoring system	14	14.3	14.3	42..9
	more than one answer	41	41.8	41.8	84.7
	can't say	15	15.3	15.3	100.0
	Total	98	100.0	100.0	

Warehouse supplier theft can likely happen through internal employees or supplier employees. This theft can be reported through many ways which accounts for why 41.8% ticked more than one answer when asked to indicate how supplier theft could be detected. 27.6% could be seen through CCTV as nobody might be there when the crime is being committed. 15% of the respondents were not sure, maybe because of the sensitive nature of the crime. Some warehouses have monitoring systems that amounted to 14.3%. Security guards are always on the shopfloor and may not have access to the warehouse which accounted for the low 1% reporting.

Figure 37: SSQ21 Graphical representation of how warehouse/supplier theft are discovered



SSQ22: Does your store experience refund fraud?

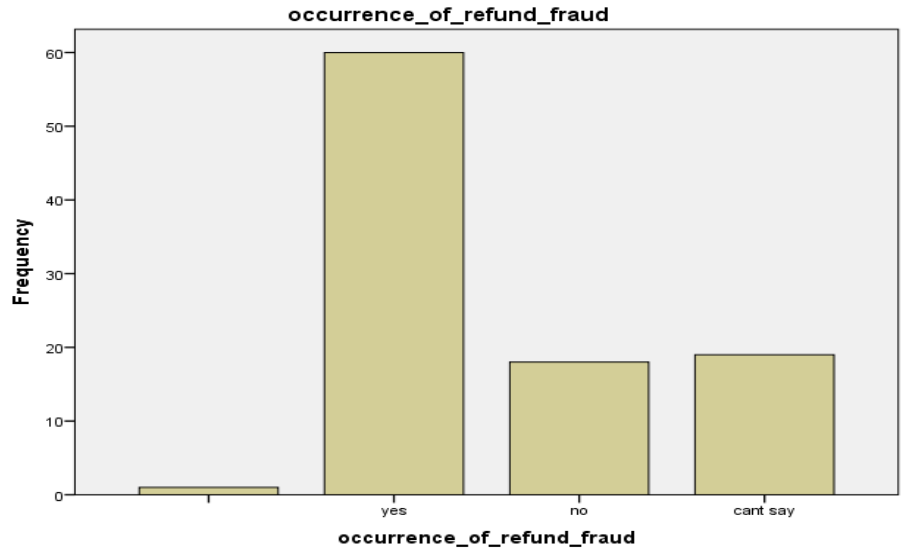
Table 33: Occurrence of refund fraud

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid					
	yes	60	61.2	61.2	61.2
	no	18	18.4	18.4	76.6
	can't say	19	19.4	19.4	99
	Total	98	99.0	99.0	
Missing	999	1	1.0		
Total		98	100.0		

From the table above, 61.2% affirmed that their store experienced refund fraud. For 18.4%, their store did not experience this type of retail crime while 19% could not confirm the

occurrence. There was one wrong answer which has been assigned 999 as a missing case making up 1% of the total population.

Figure 38: SSQ 22 Graphical representation whether those stores in the two organisations experience refund fraud.



SSQ23: How does refund fraud take place in your store

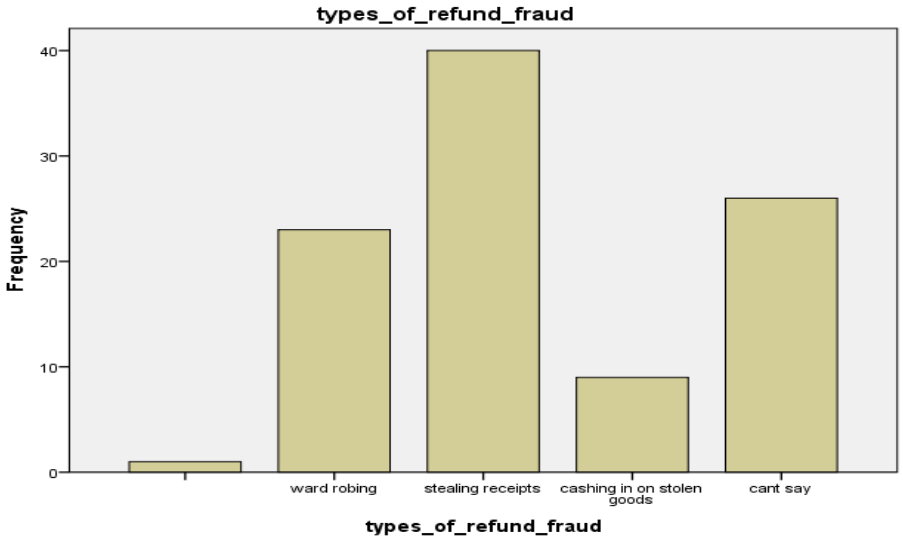
Table 34: Types of refund fraud

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid					
	ward robing	23	23.5	23.5	23.5
	stealing receipts	40	40.8	40.8	64.3
	cashing in on stolen goods	9	9.2	9.2	73.5
	can't say	26	26.5	26.5	100.0
	Total	98	100.0	100.0	

This question is about the different types of refund crime that takes place in stores. Retail criminals have devised several means of stealing from stores. From the respondents table above, 40.8% of the refund frauds were through stealing of receipts. Refund fraud through

Wardrobing was 23.5 while 9.2% occurred through cashing in on stolen goods. 26.5% were not sure or could not say which might be because their job schedule did not include accessing such data.

Figure 39: SSQ23 Graphical representation how refund fraud takes place in the stores.



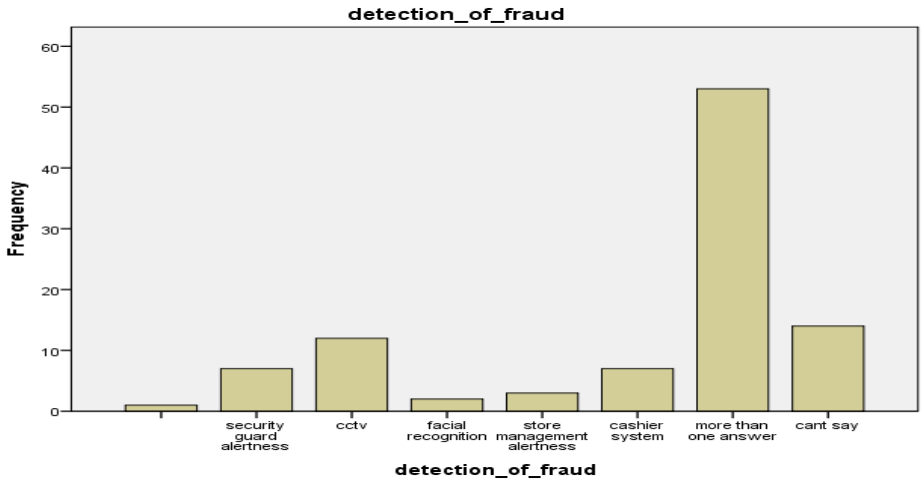
SSQ24: How is refund fraud detected?

Table 35: Detection of fraud

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid					
	security guard alertness	7	7.1	7.14	7.14
	cctv	12	12.2	12.24	19.38
	facial recognition	2	2.0	2.0	21.3
	store management alertness	3	3.1	3.1	24.4
	cashier system	7	7.1	7.14	31.62
	more than one answer	53	54.1	54.1	85.7
	can't say	14	14.3	14.3	100.0
	Total	98	100.0	100.0	

From the respondents table above, it is evident from the responses that 54.1%, 12.3% answered more than one answer as they are allowed to do so in this question. 12.1% of the correspondents ticked through CCTV, 7.1% through security alertness, 3% through store management alertness and 2.2% through facial recognition.

Figure 40: SSQ24 Graphical representation of how refund fraud is detected.



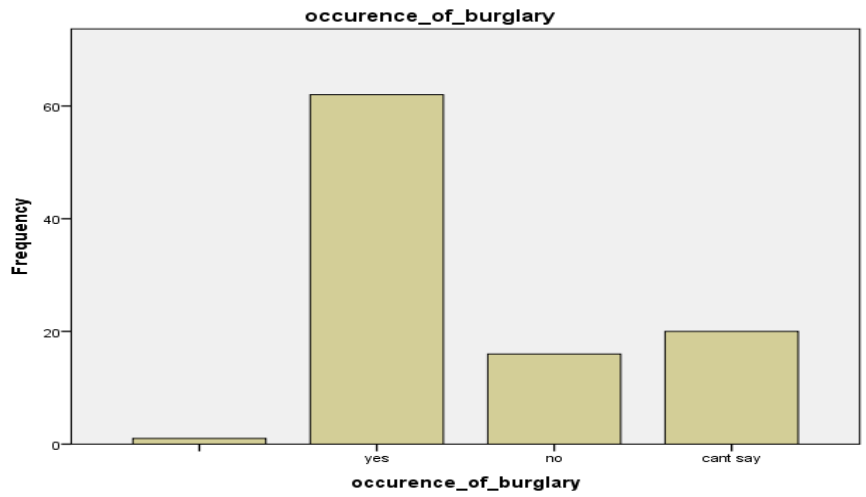
SSQ25: Does your store experience burglary?

Table 36: Occurrence of burglary

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid					
	yes	62	63.3	63.3	63.3
	no	16	16.3	16.3	79.6
	can't say	20	20.4	20.4	100.0
	Total	98	100.0	100.0	

From the table above, 63.3% of the respondents affirmed the occurrence of burglary in their store, 20.4% can't say while 16.3% responded that they do not have burglary in their stores.

Figure 41: SSQ 25 Graphical representation of the stores that experience burglary.



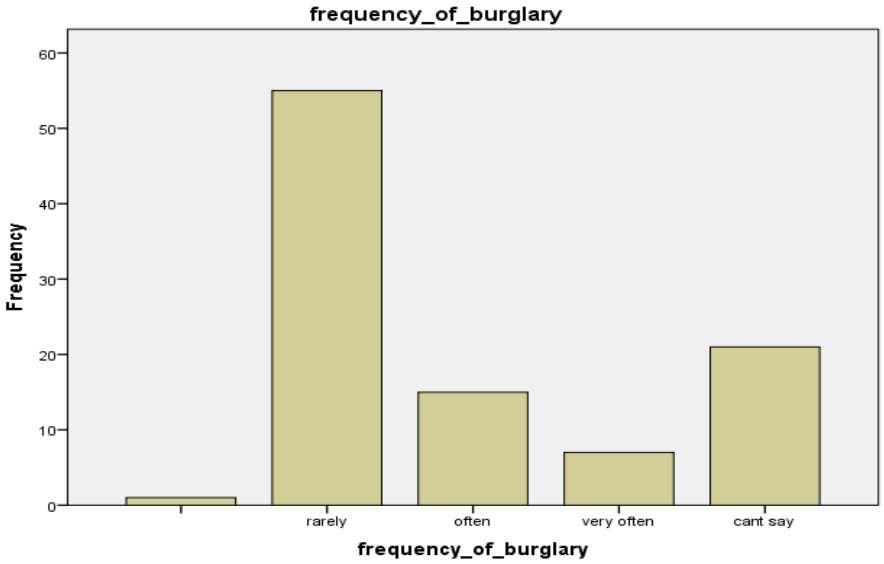
SSQ26: How often is your store burgled

Table 37: Frequency of burglary

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid					
	rarely	55	56.1	56.12	56.12
	often	15	15.3	15.3	71.44
	very often	7	7.1	7.14	78.58
	can't say	21	21.4	21.42	100.0
	Total	98	100.0	100.0	

Burglary is one of the crimes experienced by retail stores but from the respondents in the table above, it shows that this is not a frequent crime as 56.1% which is more than half of the sample population said it rarely occurred in their store. A combined 22.4% affirmed that burglary does occur in their store while 21.4% said they could not ascertain.

Figure 42: SSQ 26 Graphical representation of the frequency of burglary



SSQ27: How is burglary detected and/or prevented?

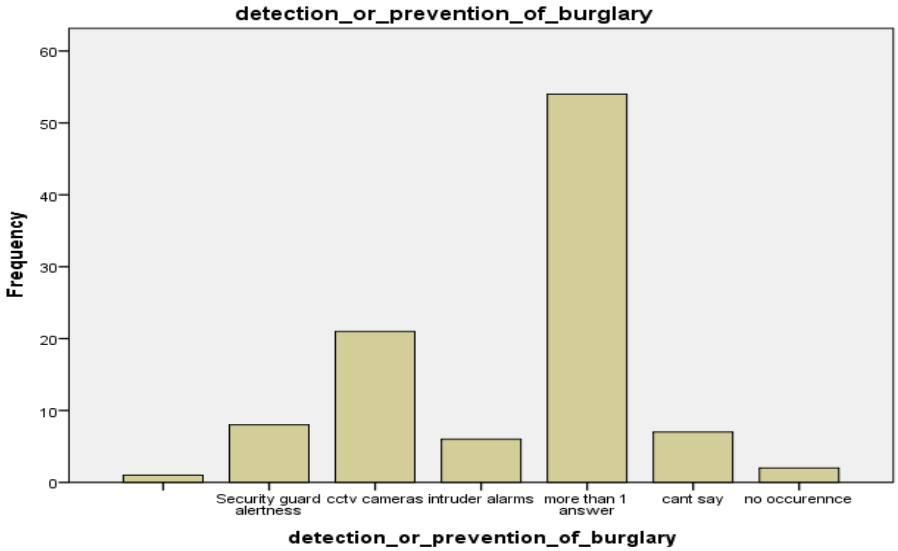
Table 38: Detection or prevention of burglary

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Security guard alertness	8	8.2	8.2	8.2
	cctv cameras	21	21.4	21.4	29.6
	intruder alarms	6	6.1	6.1	35.7
	more than 1 answer	54	55.1	55.1	90.8
	can't say	9	9.2	9.2	98.0
	Total	98	100.0	100.0	

To those who have experienced burglary either rarely or frequently, the question was asked as to the security means by which the store detects burglary. From the three security measures listed in the questionnaire, 55.1% chose more than one, which shows that stores can detect burglary by installing more than one security measure in their premises. CCTV cameras came second on the list with 21.4% of the respondents agreeing that the use of CCTV cameras helped

their store to detect burglary. This is followed by security guard alertness at 8.2%, 6.1% chose intruder alarms. Those who were not sure are around 9.2%.

Figure 43: SSQ 27 Graphical representation of how burglary is detected.



SSQ28: Do the employees in your store experience assault and violence from customers?

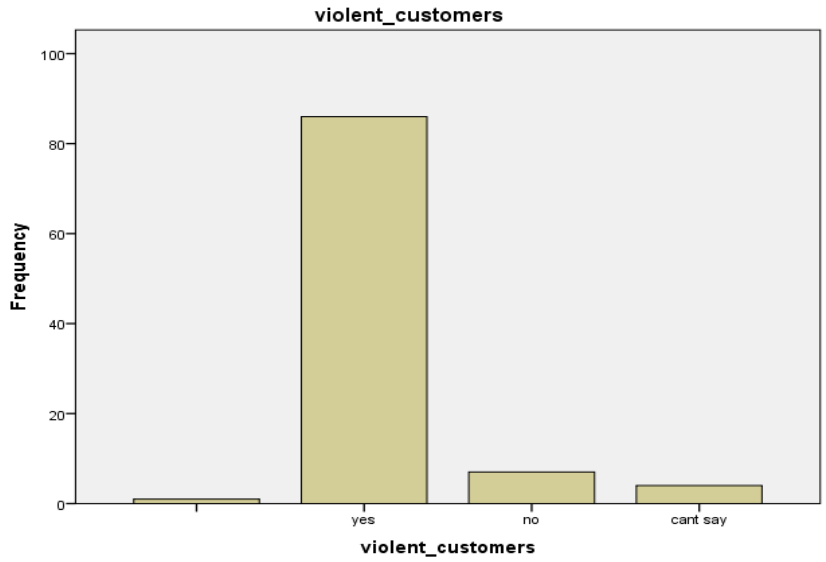
Table 39: Violent customers

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	86	87.8	87.8	87.8
	no	7	7.1	7.14	94.9
	can't say	4	4.1	4.1	99.0
	Total	97	99.0	100.0	
Missing	888	1	1.0		100.0
Total		98	100.0		

Many stores experience violent customers which can lead to criminal charges. This question was asked to determine the stores that have experienced violence from customers towards their employees. 87.8% of the respondents affirmed this occurrence meaning that this occurs in

almost every store. 7.1% do not experience violence from customers while 4.1% were not able to ascertain if their store experienced it or not.

Figure 44: SSQ28 Graphical representation of whether the employees of the two organisations experience assault and violence in the store from the customers.



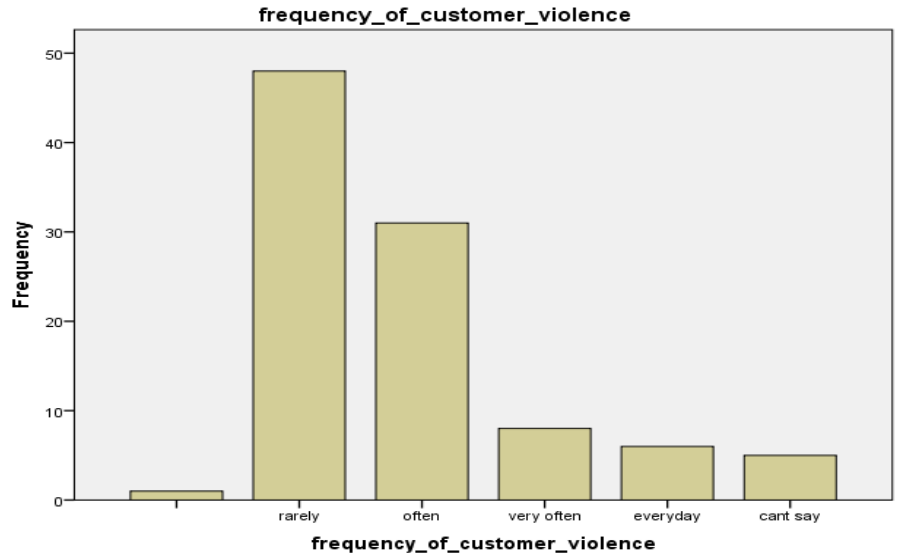
SSQ29: How often do employees experience assault and violence from customers?

Table 40: Frequency of customer violence

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	rarely	48	49.0	49.0	49.0
	often	31	31.6	31.6	80.6
	very often	8	8.2	8.2	88.8
	everyday	6	6.1	6.1	94.9
	can't say	5	5.1	5.1	100.0
	Total	98	100.0	100.0	

It is interesting to note from the previous table that although the majority of the respondents said that their stores experienced violence from customers, yet 49% said it rarely occurred. A combined 39.8% said it often or very often occurred in their stores while 6.1% said it was an everyday affair. 5.1% couldn't say if their store experienced violence from customers or not which means they have not witnessed it.

Figure 45: SSQ29 Graphical representation of how often employees experience assault and violence from the customers?



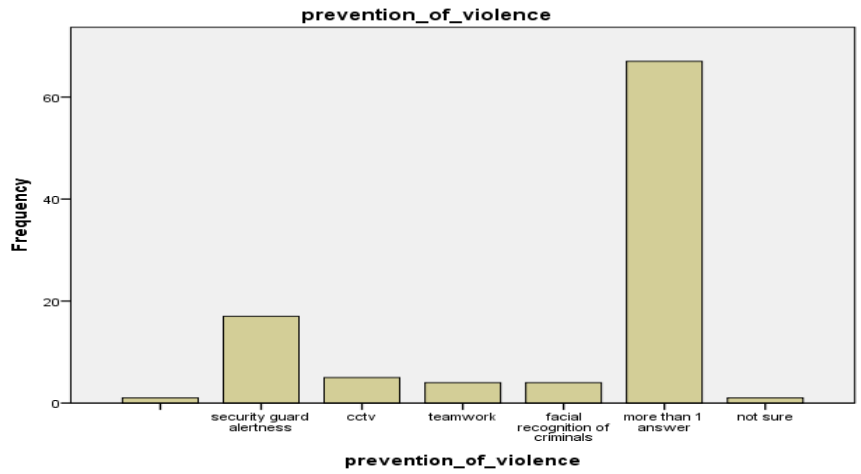
SSQ30: How is violence towards staff detected and/or prevented

Table 41: Prevention of violence

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	security guard alertness	17	17.3	17.34	17.3
	cctv	5	5.1	5.1	22.4
	teamwork	4	4.1	4.1	26.5
	facial recognition of criminals	4	4.1	4.1	30.6
	more than 1 answer	67	68.4	68.4	99.0
	not sure	1	1.0	1.0	100.0
	Total	98	100.0	100.0	

From the table above 68.4% of the respondents ticked more than one security prevention method which shows that combining several security measures could help in the prevention of violence from customers to staff. 17.3% thought the security guards' alertness served as prevention, 5.1% of the respondents chose the CCTV, 4.1% gave their recognition to teamwork by the employees while 4.1% picked facial recognition. Only 1% of the respondents were not sure of how their stores detect or prevent violence from customers.

Figure 46: SSQ30 Graphical representation of how violence towards staff is detected or prevented



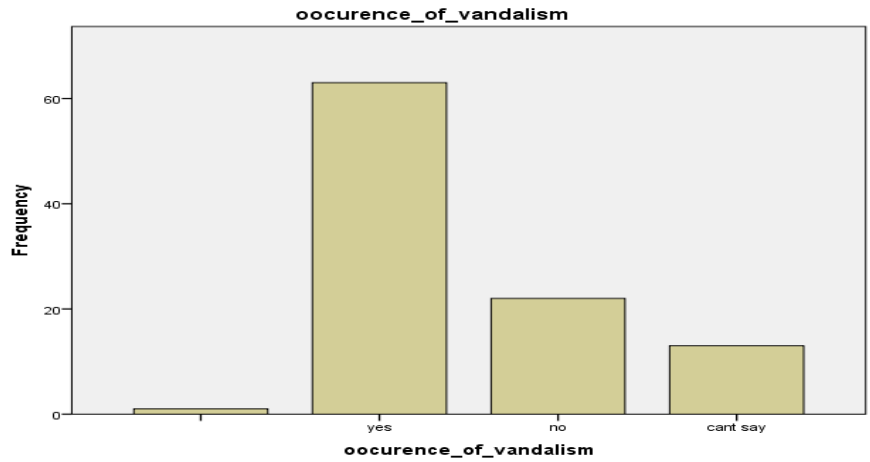
SSQ31: Does your store experience vandalism?

Table 42: Occurrence of vandalism

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	63	64.3	64.3	64.3
	no	22	22.4	22.4	86.7
	can't say	13	13.3	13.3	100.0
	Total	98	100.0	100.0	

The respondents were asked if their stores experienced vandalism or not. Vandalism is a crime experienced by retail stores that lead to damage of goods and premises. 64.3% affirmed which means it is a common occurrence in stores while 22.4% answered no. 13.3% were not sure.

Figure 47: SSQ31 Graphical representation of whether the stores experience vandalism



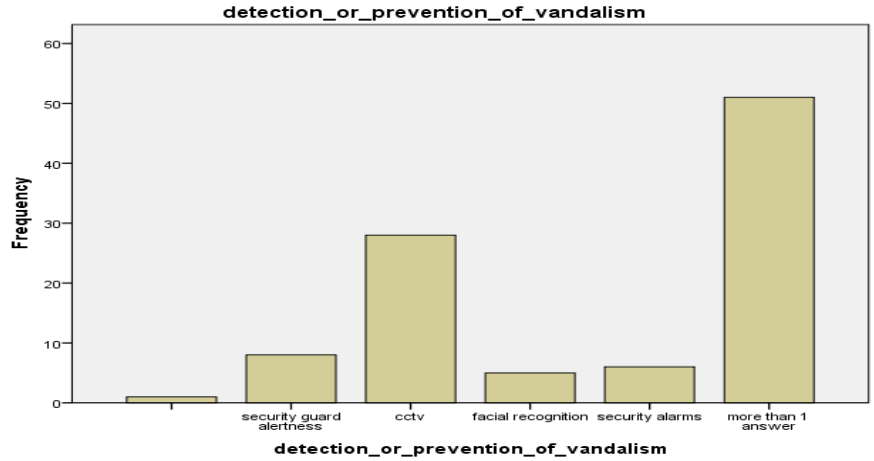
SSQ32: How are vandalisms detected and/or prevented

Table 43: Detection or prevention of vandalism

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	security guard alertness	8	8.2	8.2	8.2
	cctv	28	28.6	28.6	36.8
	facial recognition	5	5.1	5.1	41.9
	security alarms	6	6.1	6.1	48.0
	more than 1 answer	51	52.0	52.0	100.0
	Total	98	100.0	100.0	

Several security measures were listed in the detection or prevention of vandalism. 52% of the respondents were of the opinion that more than one security measure helped their store to detect or prevent this crime. Still a sizeable percentage of 28.6 believed the CCTV was enough as a detection measure while 8.2% believed the security guard alertness played a major role. 6.1% picked the security alarms while 5.1% facial recognition.

Figure 48: SSQ32 Graphical representation of how vandalisms are detected or prevented.



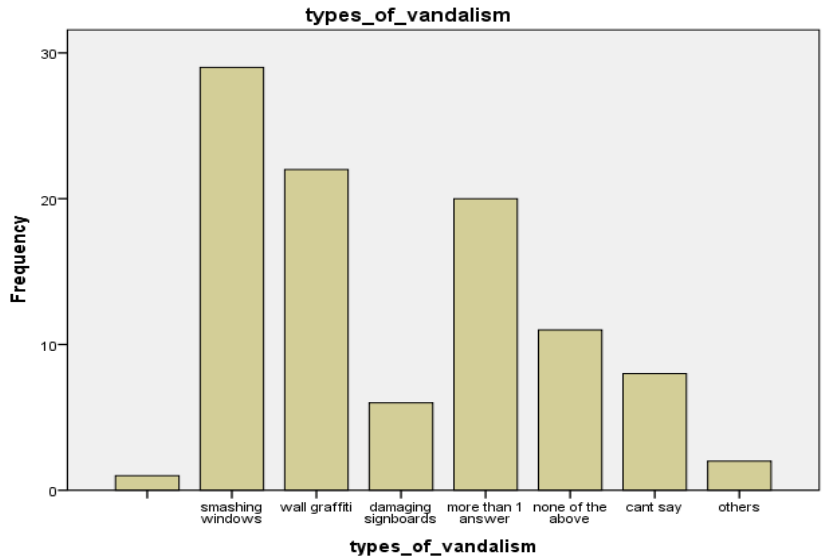
SSQ33: Which type of vandalism is carried out in your store

Table 44: Types of vandalism

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	smashing windows	29	29.6	29.6	29.6
	wall graffiti	22	22.4	22.4	52.0
	damaging signboards	6	6.1	6.1	58.2
	more than 1 answer	20	20.4	20.4	78.6
	none of the above	11	11.2	11.2	89.8
	can't say	8	8.2	8.2	98.0
	others	2	2.0	2.0	100.0
	Total	98	100.0	100.0	

From the table above, 20.4% of the respondent ticked more than one, 29.6% of the respondents believe that this occurs through smashing of windows, 6.1% through the sign board, 22.4% through wall graffiti, 8.2% couldn't say while 2% chose other means which are outside the listed areas.

Figure 49: SSQ33 Graphical Representation of Types of Vandalism



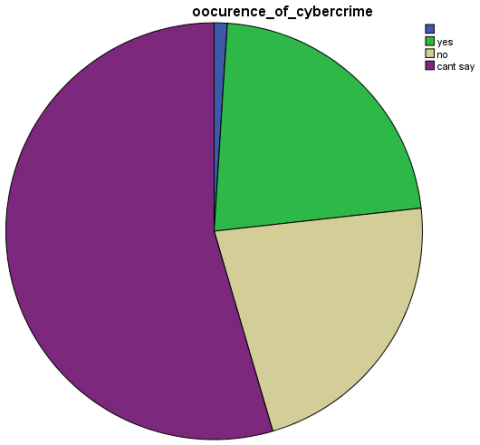
SSQ34: Does your store experience cyber-crimes?

Table 45: Occurrence of cybercrime

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	22	22.4	22.4	22.4
	no	22	22.4	22.4	44.9
	can't say	54	55.1	55.1	100.0
	Total	98	100.0	100.0	

From the respondents' table above, it is evident that the majority of the respondents (55.1%) were either not aware of cybercrime or just couldn't say. It is interesting to see that those who said yes, and no are of the same 22.4%. This shows that the majority are not aware of cybercrime in stores probably because they do not work in that area. A typical security guard on the shop floor might not know what is happening on the online store where cybercrimes take place.

Figure 50: SSQ34 Graphical representation of whether the stores selected do experience cybercrime.



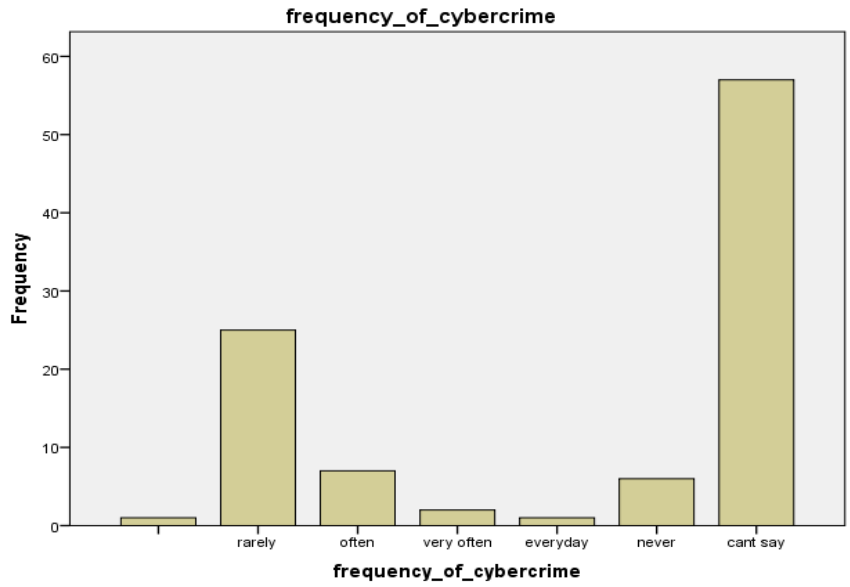
SSQ35: How often does your store experience cyber-crimes.

Table 46: Frequency of cybercrime

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	rarely	25	25.5	25.5	25.5
	often	7	7.1	7.1	32.7
	very often	2	2.0	2.0	34.7
	everyday	1	1.0	1.0	35.7
	never	6	6.1	6.1	41.8
	can't say	57	58.2	58.2	100.0
	Total	98	100.0	100.0	

Most of the cybercrimes are not known by the operatives on the shopfloor judging by the 58.2% of the total respondents who couldn't ascertain its frequency. 25.5% said they rarely experienced cybercrime, a combined 9.1% said it occurred very often or often, 1% said it happened everyday while 6.1 said it never occurred.

Figure 51: SSQ35 Graphical representation of how often the stores experience cyber crime



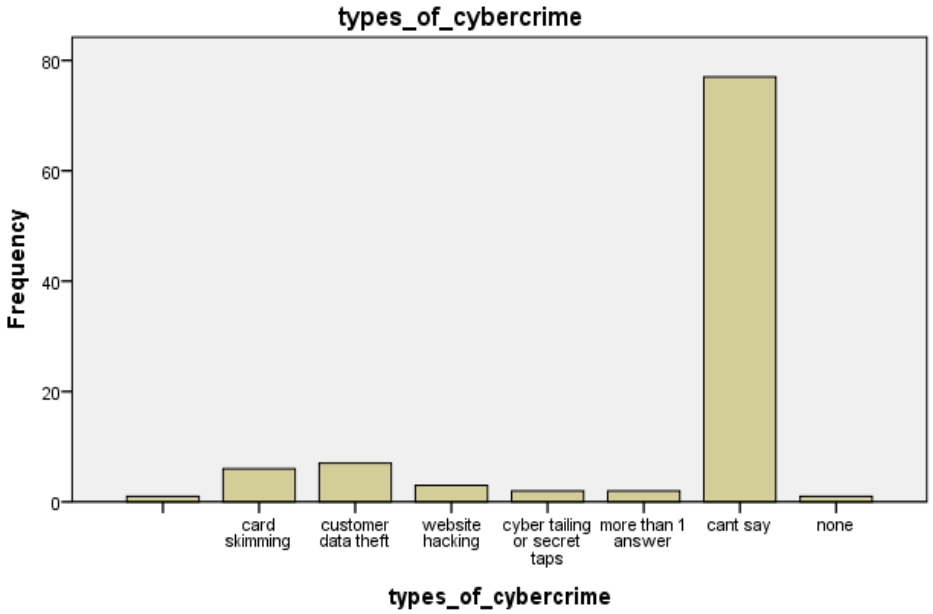
SSQ36: What type of cybercrimes happens in your store?

Table 47: Types of cybercrime

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	card skimming	6	6.1	6.1	6.1
	customer data theft	7	7.1	7.1	13.3
	website hacking	3	3.1	3.1	16.3
	cyber tailing or secret taps	2	2.0	2.0	18.4
	more than 1 answer	2	2.0	2.0	20.4
	can't say	77	78.6	78.6	99.0
	none	1	1.0	1.0	100.0
	Total	98	100.0	100.0	

Again, when asked to pick the different types of cybercrimes that occurred in their stores, 78.6% could not say which shows that the majority of the respondents did not know much about the occurrence of cybercrime in their stores. There many types of cybercrime mentioned in this studies but from the table above which the respondents are allowed to answer more than one questions, 7.1% picked customer data theft, 6.1% through card skimming, 3.1% through website hacking, 2% through cyber tailing or secrets taps while 2% picked more than one answer. 1% said none which means that they might either not be familiar with the crimes or none of the means above was evident in their stores.

Figure 52: SSQ36 Graphical representation of the types of Cybercrime that happens in the store



SSQ37: Which quarter of the year does the business lose money most to criminal activities?

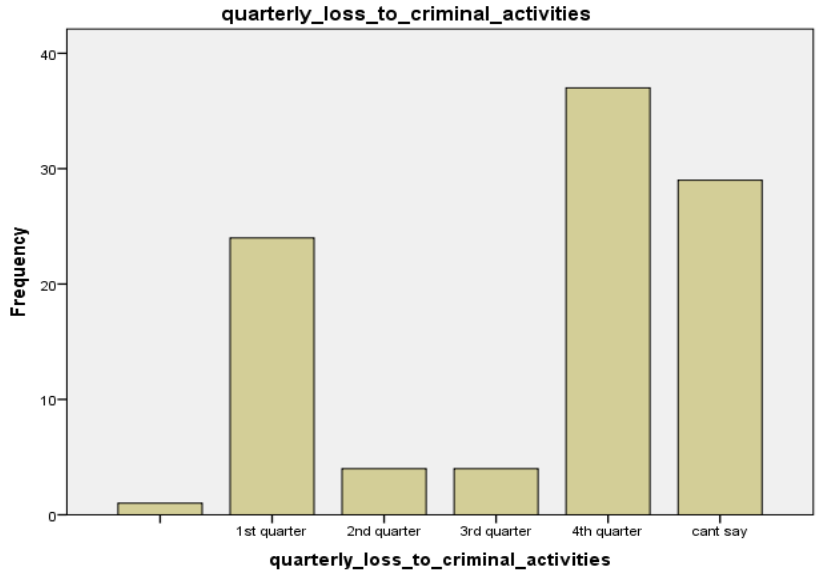
Table 48: Quarterly loss to criminal activities

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1st quarter	24	24.5	24.5	24.5
	2nd quarter	4	4.1	4.1	28.6
	3rd quarter	4	4.1	4.1	32.7
	4th quarter	37	37.8	37.8	70.4
	can't say	29	29.6	29.6	100.0
	Total	98	100.0	100.0	

In assessing the effectiveness of the security solutions with regards to physical security, cyber security and system security in these organisations, the respondents were asked the quarter of the year that the stores lose most to criminal activities. From 37.8% respondents, the fourth quarter of the year is significantly the time that their stores experience the most in criminal activities. This is followed by the first quarter of the year which stood at 24.5% while the 3rd

and the 4th quarter are similar (4.1% each) in the sense that criminal activities are low in these seasons. 29.6% couldn't say the exact time of the year for most losses to crime.

Figure 53: SSQ37 Graphical representation of the loss due to criminal activities experienced by the two business organisations per quarter



5.3.4 Assessing the Effectiveness of Security Solutions and their Management

Respondents were asked to assess the effectiveness of security solutions used in their stores. The question also included the effectiveness of the management of these solutions. Each of the security solutions (CCTV, security guarding and cybersecurity) was assessed. The aim of these questions was to determine if they thought it fit that these solutions should be used concurrently with other security solutions if retail crime was to be curtailed.

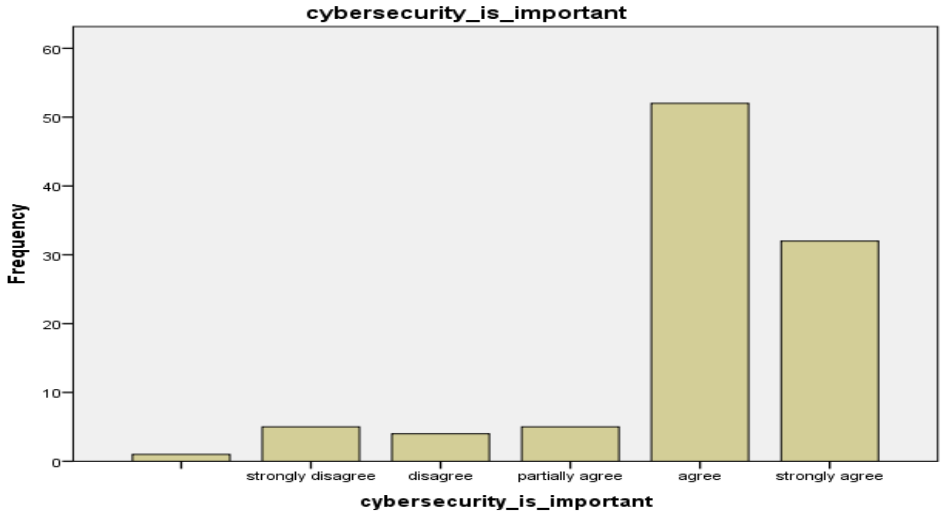
SSQ38: Cyber security is an important security measure which must be added to other security services in a retail setting

Table 49: Cybersecurity is important

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly disagree	5	5.1	5.1	5.1
	disagree	4	4.1	4.1	9.2
	partially agree	5	5.1	5.1	14.3
	agree	52	53.1	53.1	67.3
	strongly agree	32	32.7	32.7	100.0
	Total	98	100.0	100.0	

Despite the fact that most respondents were not conversant with cybercrimes taking place in their stores, yet almost all of them agree on the importance of cybersecurity judging by the combined percentages (90.9%) of those that partially agree to strongly agree that it should be added to other security measures in their organisation. 5.1% strongly disagreed while 4.1% disagreed.

Figure 54: SSQ38 Graphical representation of the number of respondents who think cybersecurity is important



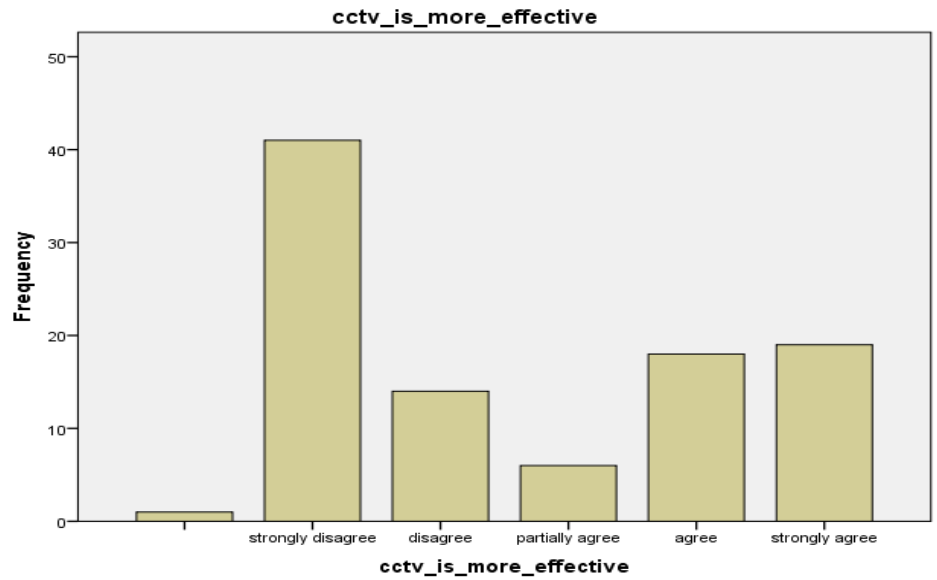
SSQ39: CCTV is more effective than other security solutions

Table 50: CCTV is more effective than other security solutions

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly disagree	41	41.8	41.8	41.8
	disagree	14	14.3	14.3	56.1
	partially agree	6	6.1	6.1	62.2
	agree	18	18.4	18.4	80.6
	strongly agree	19	19.4	19.4	100.0
	Total	98	100.0	100.0	

Irrespective that CCTV is very essential in the security of the stores, yet from the table above a combined 56.1% of the respondents disagreed that CCTV is not more effective than other security solutions. Those that agreed either partially or strongly were 43.9% which is still a sizable percentage.

Figure 55: SSQ39 Graphical representation of the number of respondents who think CCTV is more effective than security solutions



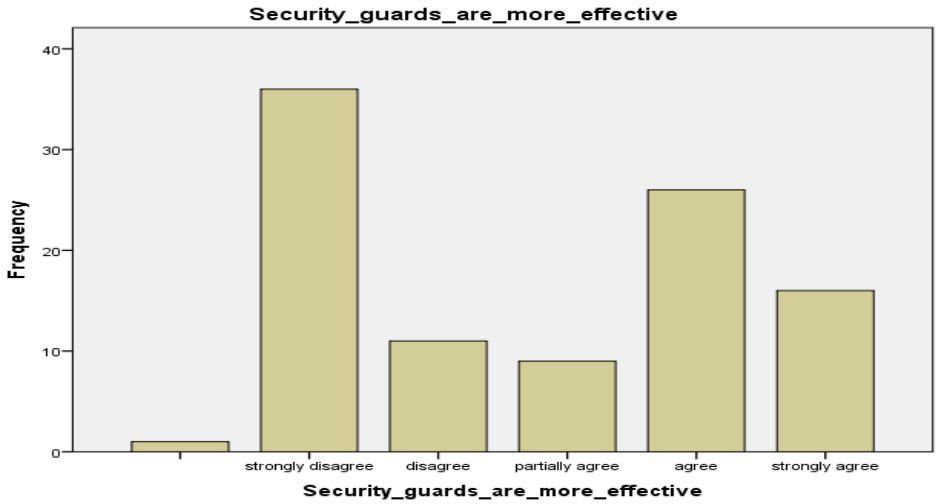
SSQ40: Using security guards is more important in relation to other security services

Table 51: Security guards are more important than other security solutions

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly disagree	36	36.7	36.7	36.7
	disagree	11	11.2	11.2	48.0
	partially agree	9	9.2	9.2	57.1
	agree	26	26.5	26.5	83.7
	strongly agree	16	16.3	16.3	100.0
	Total	98	100.0	100.0	

From the table above, a combined 52% of the sample populations (partially agree, agree, or strongly disagree) are of the view that security guards are an important aspect of security which must be added to the other two security solutions. While the remaining 48% thought the opposite. The higher disagreement showed that although the majority of the respondents were security personnel, they still did not think that security guarding is more important than other security measures in reducing or preventing crime.

Figure 56: SSQ40 Graphical representation of adding security guarding to other security solutions



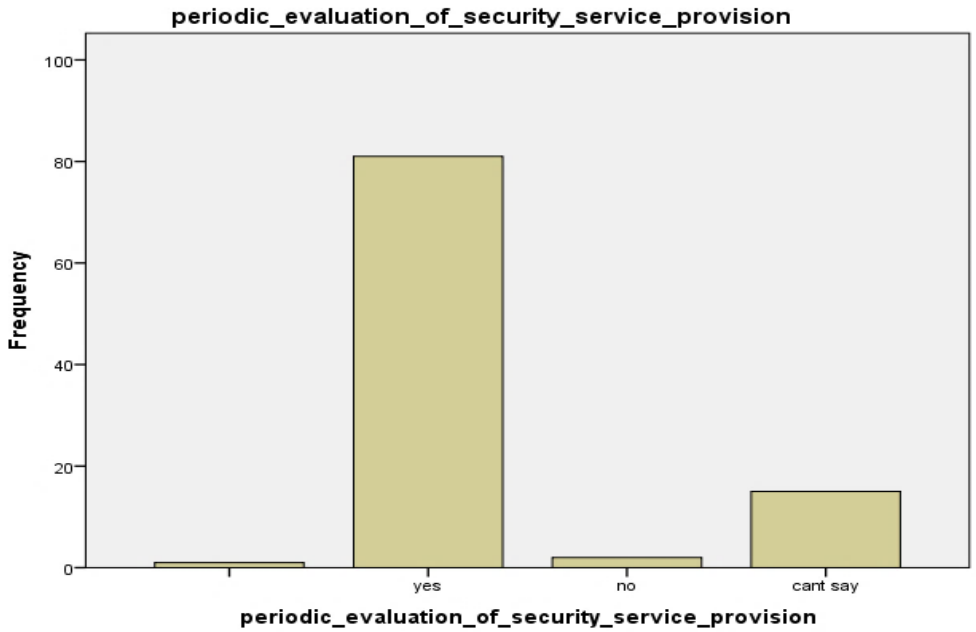
SSQ41: Do you or your company conduct periodic evaluation of security service provision in your organisation?

Table 52: periodic evaluation of security service provision

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	81	82.7	82.7	82.7
	no	2	2.0	2.0	84.7
	can't say	15	15.3	15.3	100.0
	Total	98	100.0	100.0	

Those that were selected as sample populations know the essence of security solutions and this reflected on periodic evaluation of security solutions as 82.7% of respondents affirmed 'yes' while 15.3% couldn't say anything and 2% responded no.

Figure 57: SSQ41 Graphical representation of whether the organisations conduct periodic evaluations of the security services they use in their stores.



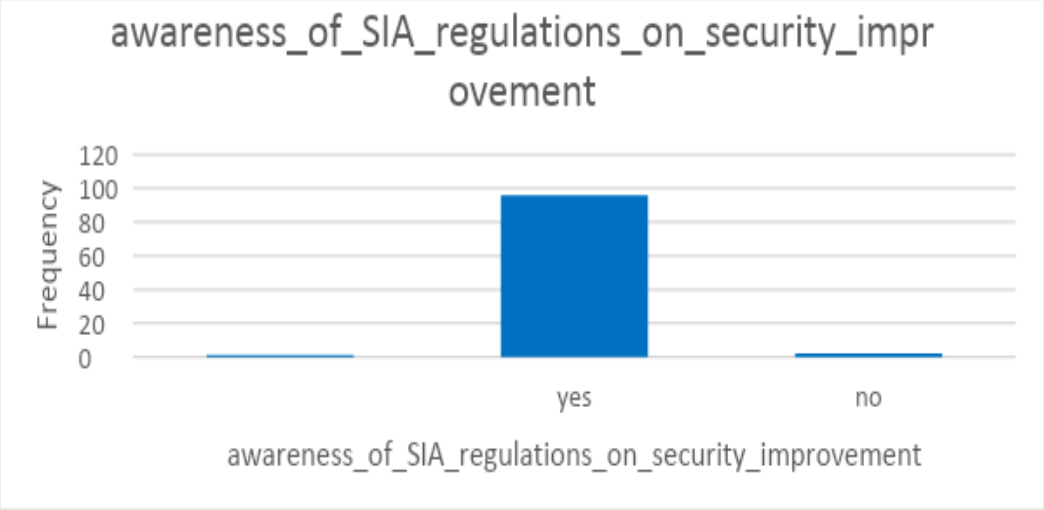
SSQ42: Are you aware of SIA regulations on security improvements?

Table 53: awareness of SIA regulations on security improvement

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	96	98.0	98.0	98.0
	no	2	2.0	2.0	100.0
	Total	98	100.0	100.0	

From the table above, all of the respondents except 2% were aware of SIA regulations. This is because it is prohibited for any organisation to employ security personnel without licence (security act 2001).

Figure 58: SSQ42 Graphical Representation of awareness of SIA regulations on security improvement



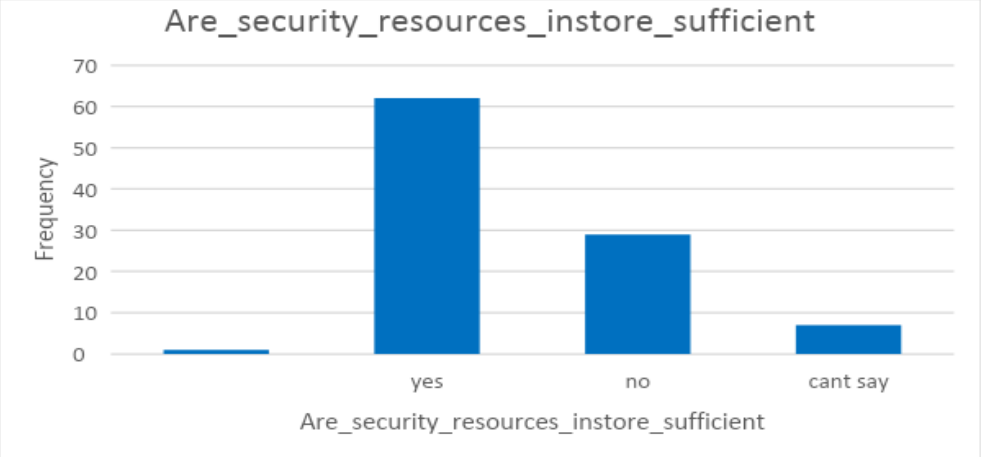
SSQ 43: Do you have enough security resources to cope with security demand in your company?

Table 54: Are security resources in stores sufficient

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	62	63.3	63.3	63.3
	no	29	29.6	29.6	92.9
	can't say	7	7.1	7.1	100.0
	Total	98	100.0	100.0	

It is important for stores to have enough resources to cope with security issues in stores. When asked if there were enough resources to cope with security issues in stores, 63% affirmed while 29.6% said they did not. 7.1% of the respondents couldn't say. The management of every store determines the allocation of resources so the type and experience of such can affect sufficiency of funds while other factors include the demography and location of the store.

Figure 59: SSQ43 Graphical representation analysing whether stores have enough security resources to cope with the demand from their stores.



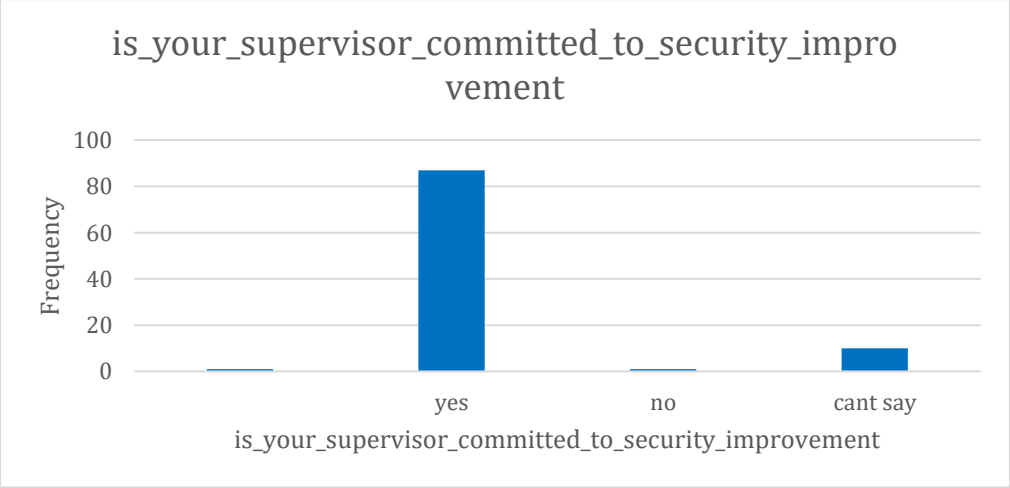
SSQ44: Is your supervisor committed to improving security measures?

Table 55: is your supervisor committed to security improvement

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	87	88.8	88.8	88.8
	no	1	1.0	1.0	89.8
	can't say	10	10.2	10.2	100.0
	Total	98	100.0	100.0	

The supervisors here were either from the security companies or the supermarkets. 88.8% of the respondents believed that the managers/supervisors are committed to improving security while 1% disagreed. 10.2 % were not sure. Improvement of security measures should be dynamic as security is not static, most organisations improve their security solutions, but this cannot be discussed out of the circle of those involved in security management, this led to the aggregate of 99% on the table for yes and can't say.

Figure 60: SSQ44 Graphical representation of whether the supervisors are committed to improving security.



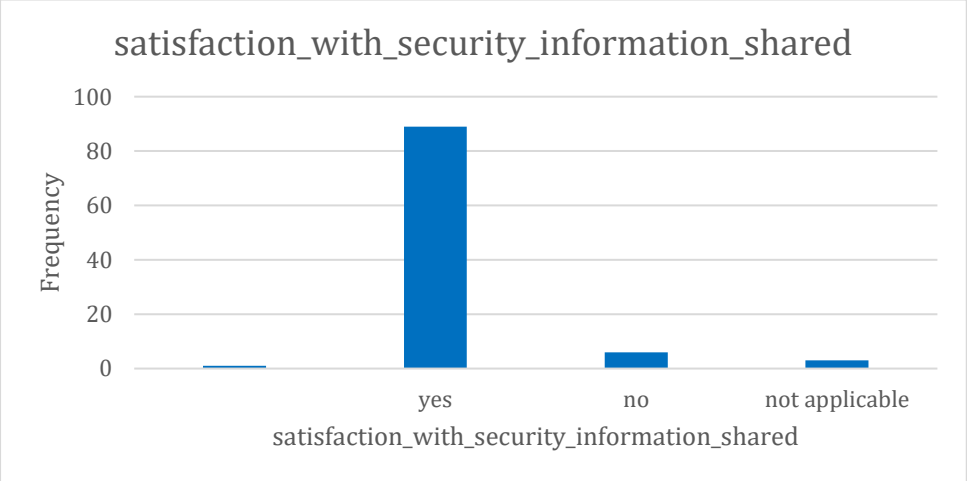
SSQ45: Are you satisfied with the information shared by the management on security improvements in your store?

Table 56: satisfaction with security information shared

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	89	90.8	90.8	90.8
	no	6	6.1	6.1	96.9
	not applicable	3	3.1	3.1	100.0
	Total	98	100.0	100.0	

From the table above, the 90.8 % of the respondents were satisfied with the information shared by the management on security improvement while 6.1% responded no. 3.1% of the aggregate % were not applicable as there might be situations where such responsibility is delegated and so might not be within the reach of the respondents.

Figure 61: SSQ45 Graphical representation of satisfaction with the security information shared



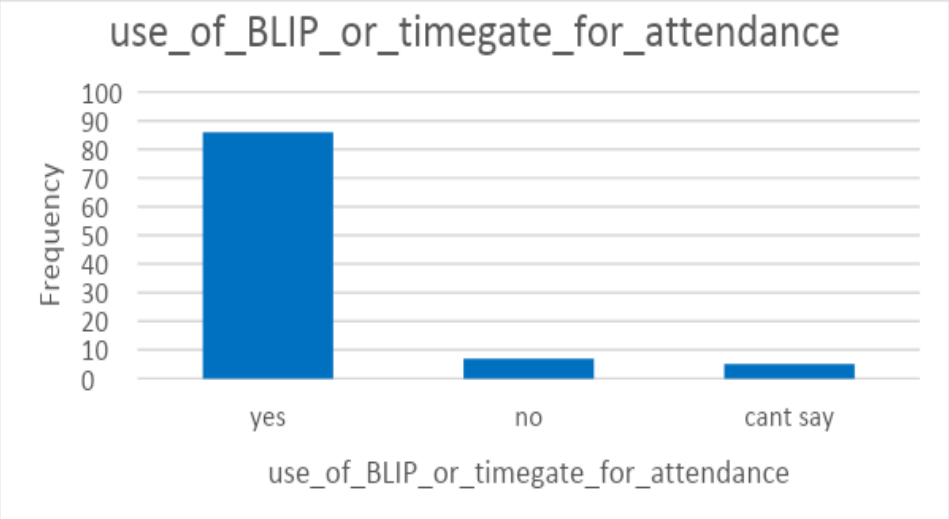
SSQ46: Does your security personnel use Blip or Timegate/ Blip in recording attendance?

Table 57: Use of BLIP or timegate for attendance

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	86	87.8	87.8	87.8
	no	7	7.1	7.1	94.9
	can't say	5	5.1	5.1	100.0
	Total	98	100.0	100.0	

Using Blip and Timegate to monitor employees is very essential as this can be used by retail stores to measure the KPI of security contractors. 87.8% of the respondents use Blip or Timegate while 7.1% do not use either of them. 5.1% were not sure. The respondents that said no were those that were new to the store, so they either have not registered with the software or were still trying to adjust to using them.

Figure 62 SSQ46 Graphical representation of whether the organisations use Blip/Timegate to record attendance



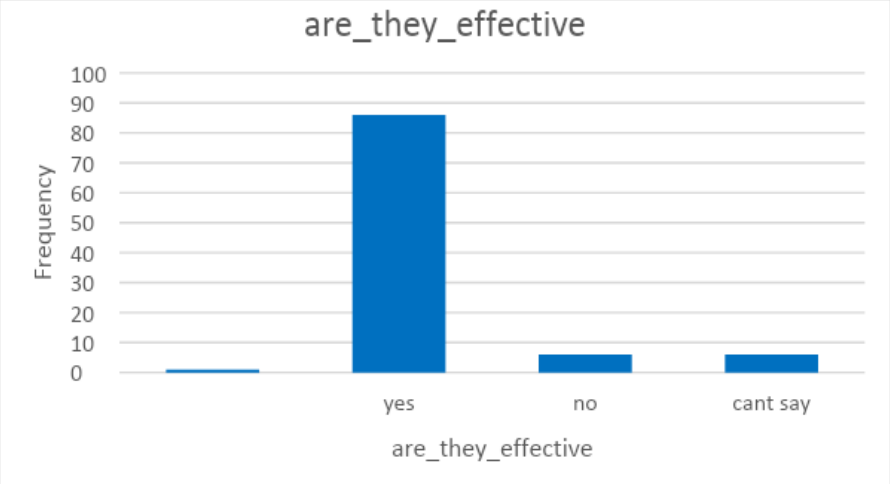
SSQ47: If yes, has it been effective in monitoring and improving the attendance of the security personnel?

Table 58: Are they (BLIP/Timegate) effective

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	86	87.8	87.8	87.8
	no	6	6.1	6.1	93.9
	can't say	6	6.1	6.1	100.0
	Total	98	100.0	100.0	

As Blip and Timegate software are essential parts of security solutions, 87.8% of the respondents affirmed that they are effective in monitoring and improving attendance of security personnel while 6.1% did not approve. 6.1% were not sure. Timegate is a security App used to pinpoint the exact location of a security personnel at any given time. This is an essential part of security as the attendance and location of guards have to be monitored because their absence means security risk for the retail company.

Figure 63: SSQ47 Graphical representation of whether respondents think Blip/Timegate are effective in the stores.



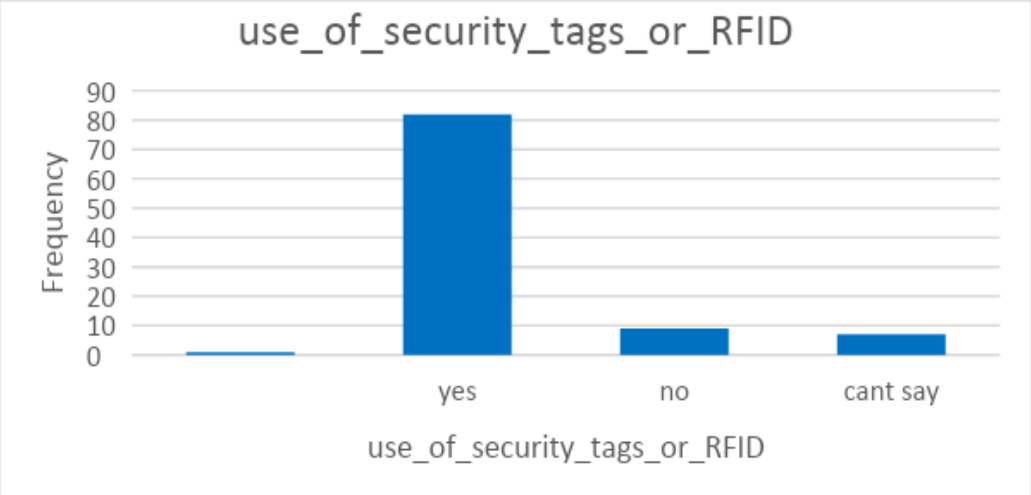
SSQ48: Does your company make use of Security tags or Radio Frequency (RFID) label on their products?

Table 59: Use of security tags or RFID

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	82	83.7	83.7	83.7
	no	9	9.2	9.2	92.9
	can't say	7	7.1	7.1	100.0
	Total	98	100.0	100.0	

Most supermarkets in the UK put security tags or RFID on their more expensive products to prevent theft. From the table above 83.7% of the respondents affirmed that their stores use either of the two, 9.2% said their stores did not while 7.1% were not sure.

Figure 64: SSQ48 Graphical representation of whether the stores use security tag or Radio Frequency (RFID)



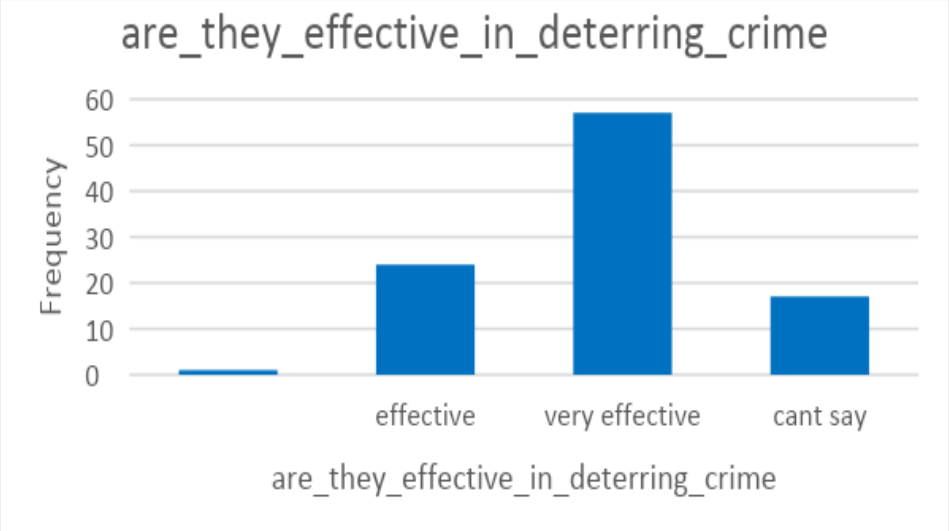
SSQ49: If yes, how effective is the RFID in deterring criminals

Table 60: Are security tags and RFID effective in deterring criminals

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	81	82.7	82.7	82.7
	No	1	1.0	1.0	83.7
	can't say	16	16.3	16.3	100.0
	Total	98	100.0	100.0	

In assessing the use of Radio Frequency Identification and security tags, 82.7% respondents affirmed their effectiveness while 1% said no. 16.3% were not sure. It is evident from the table above that the majority of the respondents are in support of the effectiveness of the RFID in their stores because of its ability to secure products from retail theft.

Figure 65: SSQ49 Graphical representation of how effective the RFID or security tags in the stores are



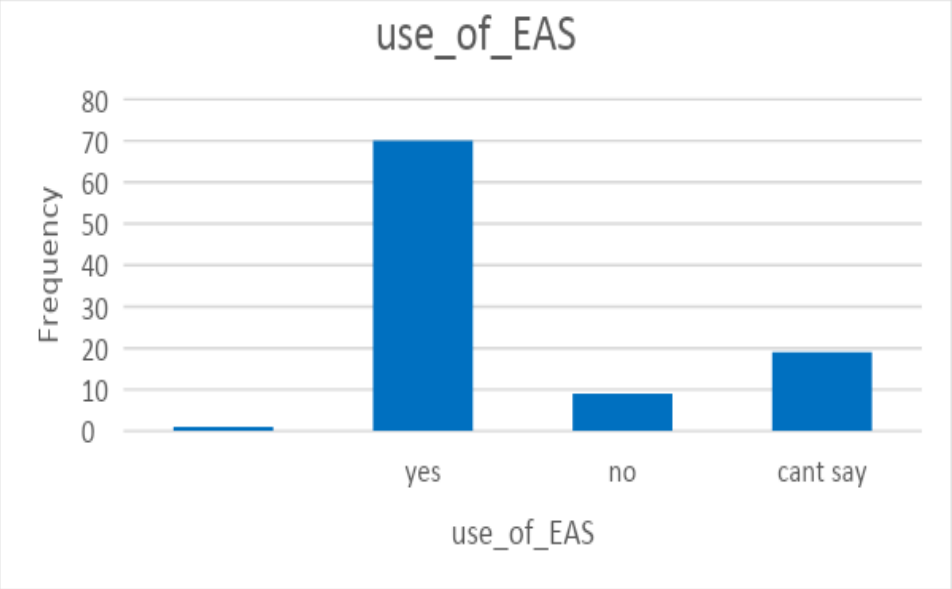
SSQ50: Does your company make use of electronic article surveillance (EAS)?

Table 61: Use of electronic article surveillance (EAS)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	70	71.4	71.4	71.4
	no	9	9.2	9.2	80.6
	can't say	19	19.4	19.4	100.0
	Total	98	100.0	100.0	

When asked if their organisation made use of EAS, 71.4% of the respondents affirmed while 9.2% said no. 19.4% could not ascertain. Most stores make use of EAS to secure their expensive or most stolen products which led to 71.4% affirming the use of EAS. Those that ticked no might be new in the business or not aware of those items that carry the EAS. 19.4% were not sure if the articles in their stores had the EAS on them or not.

Figure 66: SSQ50 Graphical representation of the stores that make use of EAS



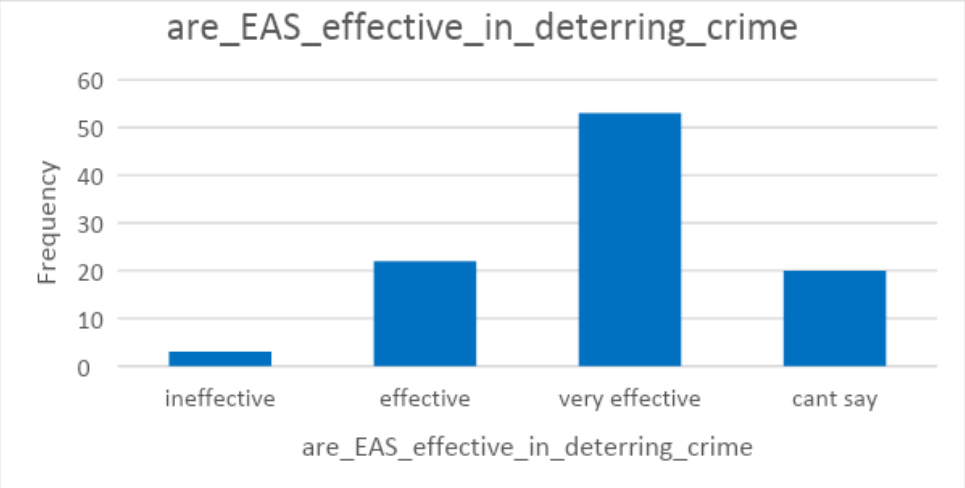
SSQ51: If Yes, how effective is the EAS in deterring retail criminals

Table 62: Are EAS effective in deterring crime

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	ineffective	3	3.1	3.1	3.1
	effective	22	22.4	22.4	25.5
	very effective	53	54.1	54.1	79.6
	can't say	20	20.4	20.4	100.0
	Total	98	100.0	100.0	

Assessing the effectiveness of the EAS in deterring crime is essential as it helps to determine the extent of savings this particular security apparatus brings to those stores. As most of the stores use EAS, 76.5% affirmed their effectiveness in deterring crime. A small percentage 3.1 did not believe in their effectiveness while 20.4% said they were not sure.

Figure 67: SSQ51 Graphical representation of how many respondents think EAS is effective in deterring retail criminals



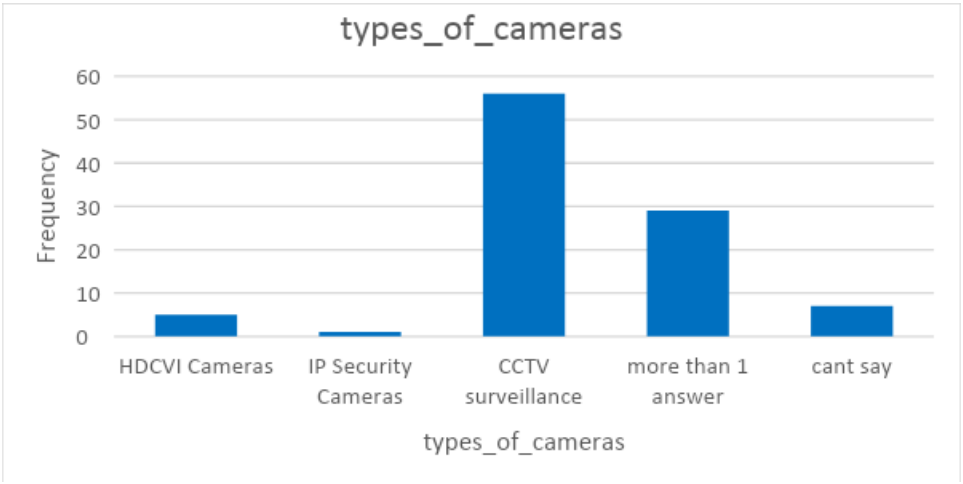
SSQ52: Which of these cameras is presently installed in your store?

Table 63: Types of cameras

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	HDCVI Cameras	5	5.1	5.1	5.1
	IP Security Cameras	1	1.0	1.0	6.1
	CCTV surveillance	56	57.1	57.1	63.3
	more than 1 answer	29	29.6	29.6	92.9
	can't say	7	7.1	7.1	100.0
	Total	98	100.0	100.0	

There are many types of cameras but three of them were included in the questionnaires. The respondents were asked to indicate which of those cameras were present in their stores. CCTV surveillance cameras topped the list at 57.1%, 5.1% for HDCVI cameras, while 1% were IP Security Cameras. 29.6% of the respondents said their stores installed more than one and 7.1% were not sure of the type of camera installed.

Figure 68: SSQ 52 Graphical representation of the cameras presently installed in the store.



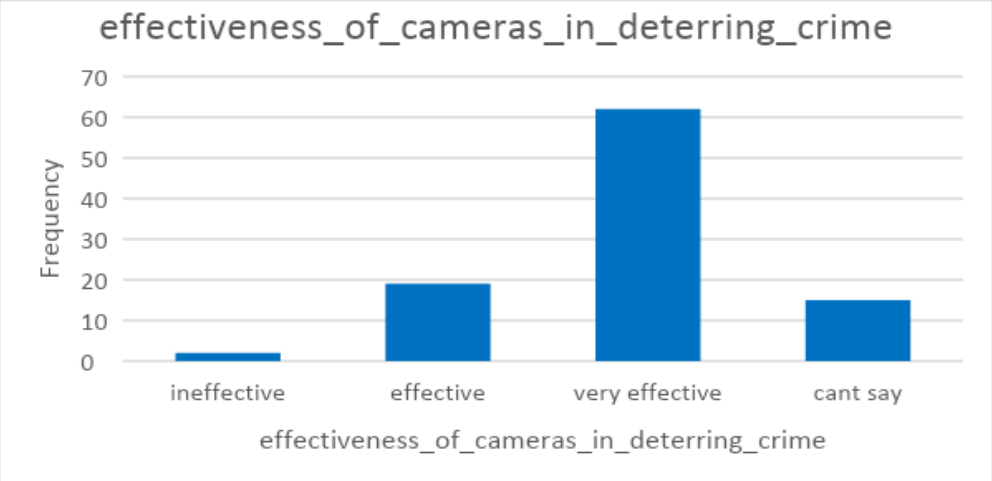
SSQ53: How effective is any of these cameras in deterring internal and external theft in your store?

Table 64: Effectiveness of cameras in deterring crime

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	ineffective	2	2.0	2.0	2.0
	effective	19	19.4	19.4	21.4
	very effective	62	63.3	63.3	84.7
	can't say	15	15.3	15.3	100.0
	Total	98	100.0	100.0	

When asked if these cameras had been effective in deterring crime or not, a combined 82.4% of the respondents were in support while 2.0% said it had not been effective. 15.3% were not sure as they might not be in a position to affirm their effectiveness. The table above shows that the use of CCTV cameras is important in deterring retail crime.

Figure 69: SSQ53 Graphical representation of the effectiveness of these cameras in deterring internal and external crime in the store



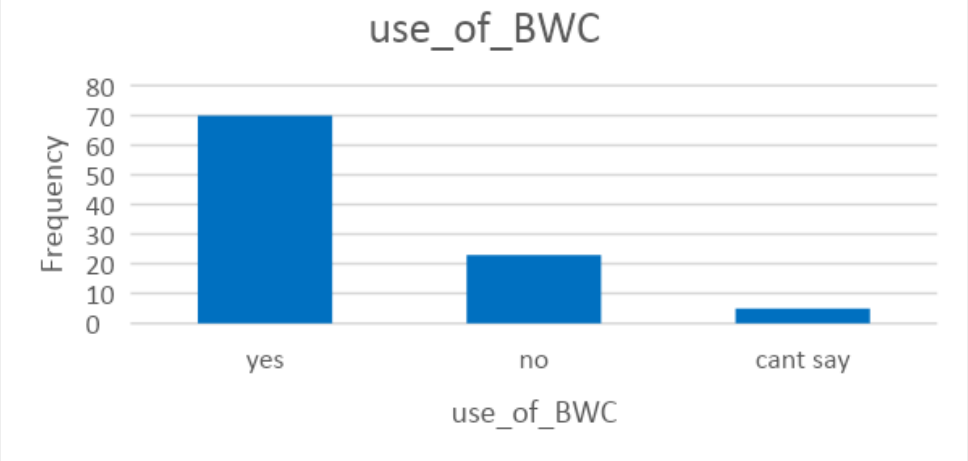
SSQ54: Do your security guards make use of Bodily Worn Cameras (BWC)?

Table 65: Use_of_Body Worn Cameras (BWC)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	70	71.4	71.4	71.4
	no	23	23.5	23.5	94.9
	can't say	5	5.1	5.1	100.0
	Total	98	100.0	100.0	

From the respondents' table above, it is evident that 71.4% of the respondents either wore or knew that their security guards used BWC. 23.5% said their security guards did not, while 5.1% were not sure of the use of BWC. BWCs are to record real time occurrences in the businesses. The visibility of these cameras can also deter crimes in these stores. Some of the stores that do not provide BWC for their security guards according to the 23.5% negative response might be because of the cost involved in purchasing or maintaining them.

Figure 70: SSQ54 Graphical representation of whether the security guards wear Body Worn Cameras.



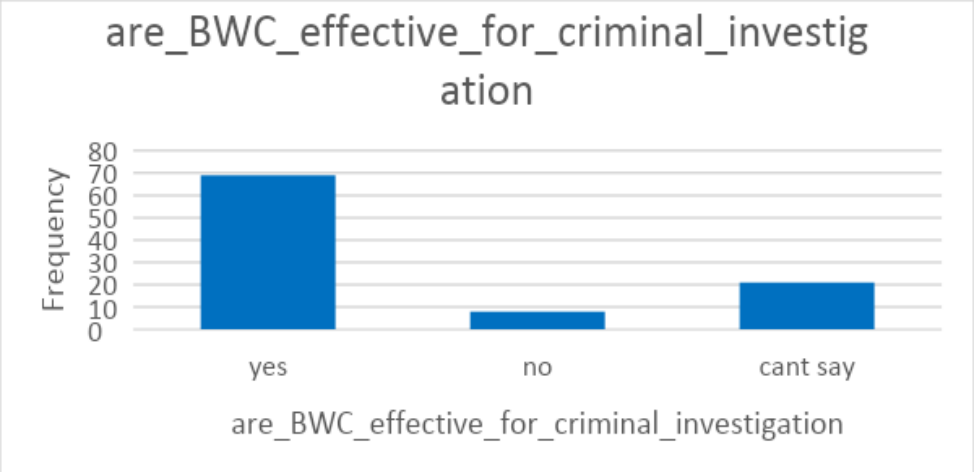
SSQ55: If yes, has it been effective in assisting criminal investigation?

Table 66: are BWC effective for criminal investigation?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	69	70.4	70.4	70.4
	no	8	8.2	8.2	78.6
	can't say	21	21.4	21.4	100.0
	Total	98	100.0	100.0	

In assessing the effectiveness of BWC to assist in investigating criminality in the stores, 70.4% of the respondents believed in its effectiveness, 8.2% were not in support while 21.4% were not sure.

Figure 71: SSQ55 Graphical representation of whether BWC has been effective in assisting in criminal investigations



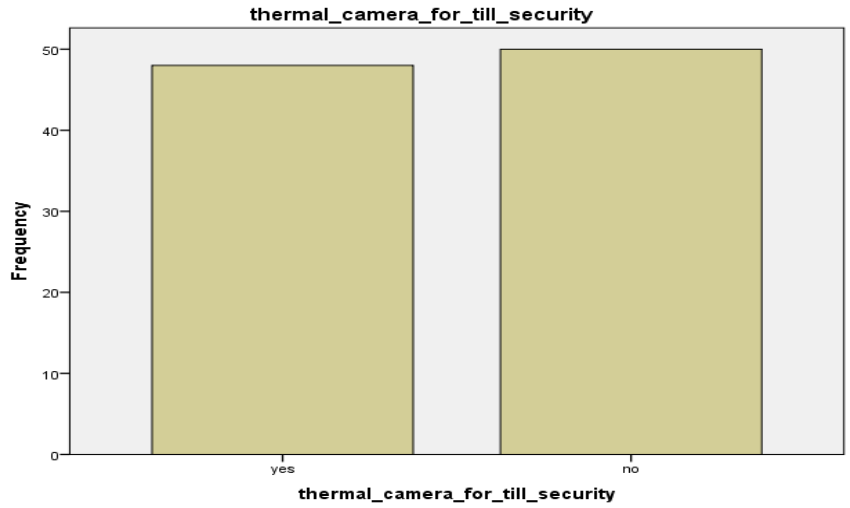
SSQ56: Are you aware of Thermal Cameras (TC) for security?

Table 67: Thermal camera for security

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	48	49.0	49.0	49.0
	no	50	51.0	51.0	100.0
	Total	98	100.0	100.0	

The table above shows that more than half of the respondents were not aware of thermal cameras while 49% knew about their existence at the time. One explanation for this might be because the majority of the respondents do not work around the till so they might not be aware of the cameras or not know what they are called. The thermal cameras for the till are mainly used to detect internal theft and the management usually hide this from the junior staff except where they have been long in the business.

Figure 72: SSQ 56 Graphical representation of whether the correspondents are aware of Thermal Cameras?



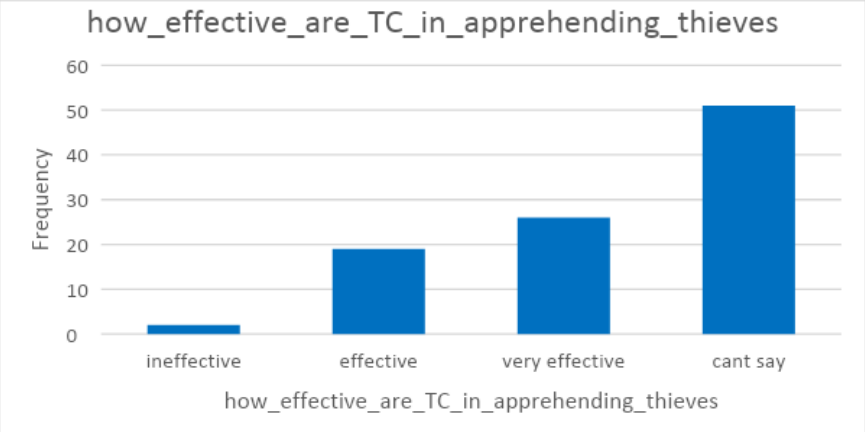
SSQ57: If yes, how effective is this in helping cashiers apprehend thieves?

Table 68: How effective are TCs in apprehending thieves?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	ineffective	2	2.0	2.0	2.0
	effective	19	19.4	19.4	21.4
	very effective	26	26.5	26.5	48.0
	can't say	51	52.0	52.0	100.0
	Total	98	100.0	100.0	

When asked about the effectiveness of thermal cameras, 52% of the respondents were not sure. 2% thought they were ineffective probably because of occasions where some shoplifters have escaped them while the rest 45.9% affirmed their effectiveness.

Figure 73: SSQ57 Graphical representation of effectiveness of these cameras in apprehending thieves?



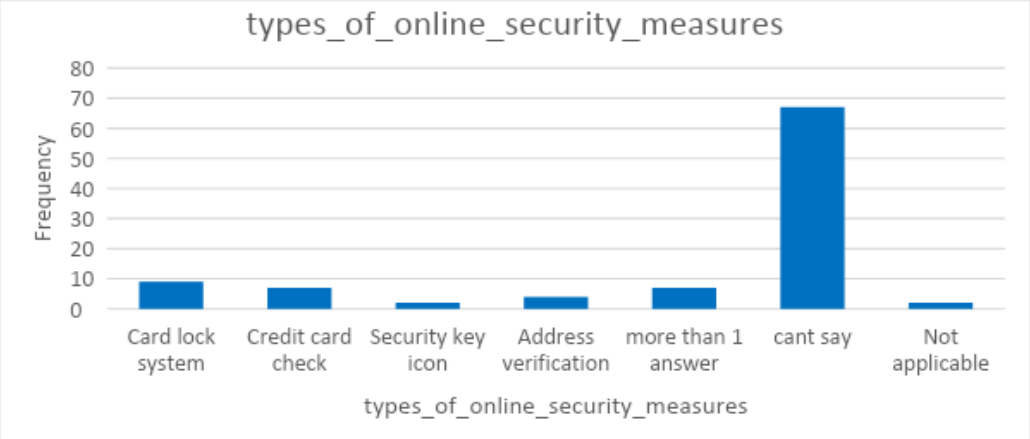
SSQ58: Which of these online security measures does your company have on their online payment checkouts?

Table 69: Types of online security measures

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Card lock system	9	9.2	9.2	9.2
	Credit card check	7	7.1	7.1	16.3
	Security key icon	2	2.0	2.0	18.4
	Address verification	4	4.1	4.1	22.4
	more than 1 answer	7	7.1	7.1	29.6
	can't say	67	68.4	68.4	98.0
	Not applicable	2	2.0	2.0	100.0
	Total	98	100.0	100.0	

The respondents could tick more than one security measure on the list. 68.4% were either not sure or did not know of their existence which corroborates the findings from SSQ9 and SSQ10 on lower awareness of cybersecurity. Of those who knew the types, 9.2% picked card lock system, 7.1% credit card check, 2% security key icon, 4.1% address verification while 7.1% indicated that their organisation used multiple security measures.

Figure 74: SSQ58 Graphical representation of the security measures that the two organisations have on their checkout with online payments



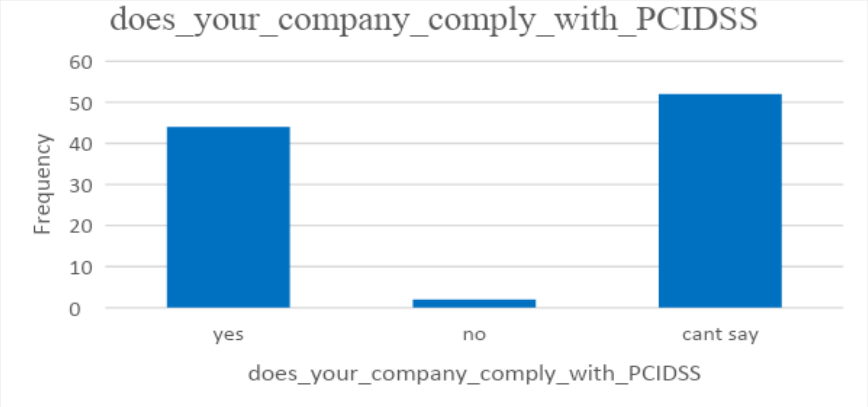
SSQ59: Does your company comply with payment card industry data security standards (PCI DSS)?

Table 70: Does your company comply with payment card industry data security standards (PCIDSS)?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	44	44.9	44.9	44.9
	no	2	2.0	2.0	46.9
	can't say	52	53.1	53.1	100.0
	Total	98	100.0	100.0	

From the table above, 44.9% of the respondents affirmed their company's compliance while 2% said they do not comply. A larger percentage (53.1%) were not sure of compliance probably due to the fact that most of the compliance duties are carried out in their head office so they might not be privy to what goes on in that area.

Figure 75: SSQ59 Graphical representation of whether the two organisations comply with card industry security standards.



5.4 Hypothesis Testing and Realising Research Objectives

There are two major analyses in this research that led to hypothesis testing and the achievement of set objectives. These are the inferential statistical analysis from the SPSS (correlation and regression and chi-square) and the NVivo analysis of qualitative data.

5.4.1 Inferential Statistical Discussions

The inferential statistical discussion is targeted at testing the set hypotheses (H1 and H2) and meeting the research objectives.

H1: Use of interconnected security solutions can increase their effectiveness in relation to crime reduction in retail supermarkets.

H2: Adopting a crime prevention framework can help reduce retail crime in supermarkets.

Hypothesis 1 is set to test the relationship between two variables which are security solutions and retail crime.

Hypothesis 2 is a continuation of the first hypothesis, but this is assessing the impact of crime prevention framework on retail crime.

5.4.1.1 Categorising Variables

The numerical values that are measurable in this quantitative research are the number of respondents that participated. Their responses form the variables that have been categorised into two major areas. There are categorical variables and continuous variables.

Categorical variables discretely represent the values and the categories of the sample population. These variables include nominal and ordinal variables.

Nominal variables are variables that do not have an inherent order. Examples of these include responses on gender categorisation into male or female; case study organisations categorised into Aldi or Sainsbury and security solutions categorised into CCTV, security guard and cyber security.

Ordinal Variables are variables which have natural orderly categories or ranking. Some of the ordinal variables included responses regarding current positions of respondents which follow a particular order of security guards, supervisors, and managers. They also include responses on the application of security solutions which are categorised into rarely, often, very often and every day.

The categorical variables played a significant role in statistically analysing the data collected, the relationship, pattern and the differences that are found through the Chi-square.

5.4.1.2 Continuous Variables

This research also contains continuous variables which have assumed the infinite number of real values within a given interval. With continuous variables, the researcher was able to measure the points of two possible values.

Examples of these include responses about age, the length of service, the knowledge of security solutions and the deterrent of crime in the retail sector.

Continuous variables are analysed through Chi-square and using the frequency of mean, median, mode, regression analysis and correlation analysis.

Continuous variables are visualised through histograms, line charts and scatter plots which have been used to explore distribution, the pattern, and the relationships within the data. This will reflect when there are weak or strong values. The observation through correlation will show a statistically significant difference when the *p* value is below .05 and no difference when it is .05 or above it.

5.4.1.3 Dependent Variable

The dependent variable in this study that is being observed and measured is the retail crime using Aldi and Sainsbury as case studies from where the sample population was chosen. The outcome is dependent on the effects and impact of the application of independent variables which are the security solutions.

The security solutions are observed and controlled to see how they can affect the dependent variables through the questions asked and subsequently comparing the answers. The changes will help to determine the significant differences in the variables.

On quantitative dependent variables, the number of answers are calculated and the years in current positions are measured against the experience in the security solutions.

The qualitative dependent variables accrue from measuring the number of responses from questions that need two-way answers such as yes or no, Aldi or Sainsbury.

5.4.1.4 Independent Variable

Independent variables are the security solutions such as cybersecurity, systems, and physical security.

These security solutions are hypothesised to have effect on the dependent variable which is retail crime, and this is the focus of this study. In most research the independent variable is often known as “X”

There are many types of independent variables in these studies.

1. The manipulation of the variable where the questions are changed to observe the impact or the effects on the dependent variable.
2. Selected independent variable occurring when the effects of less security solutions are tested on the dependent variable which is the retail crime.
3. The continuous independent variable occurring from the analysis of age and years in current position.
4. Categorical independent variables occurring from the analysis of the number of men and women.

In this study, the independent variable is manipulated to observe its influence on the dependent variable. This plays a vital role in relation to the outcome of the results.

5.4.1.5 Correlation and Regression

Correlation and regression has been used to assess the relationship between two variables in the results. The bivariate correlation is applied to determine the relationship between two variables while analysing their strength and direction.

The first four analyses are done to determine the underlying relationship between certain variables which will serve a foundation for the establishment of relationships between the independent and dependent variables under study. each correlation has been assigned names beginning with a C (correlation).

The Chi-square at the later stage of this analysis will help to establish the correlation between the selected dependent and independent variables in order to test the hypothesis.

C1: Correlations between age and years in current position

Age and number of years in current position are analysed to see if there is any correlation between them. The proposition is to find out if the respondents' years in current position are determined by their age or not.

Table 71: Correlations between age and years in current position

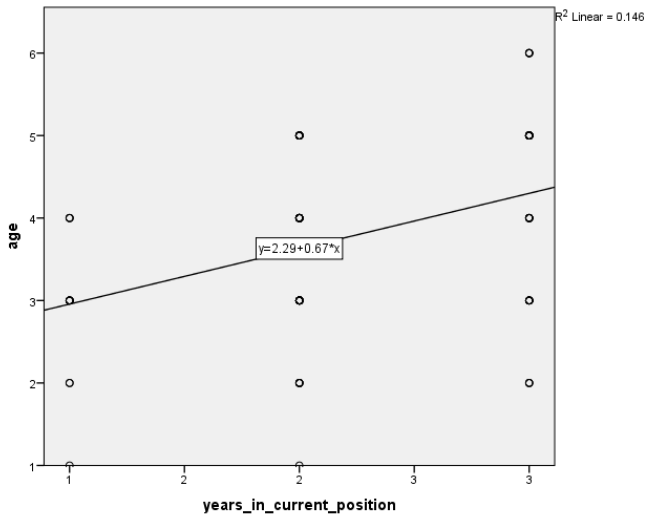
		Age	years_in_current_position
age	Pearson Correlation	1	.382**
	Sig. (2-tailed)		.000
	N	98	98
years_in_current_position	Pearson Correlation	.382**	1
	Sig. (2-tailed)	.000	
	N	98	98

**. Correlation is significant at the 0.01 level (2-tailed).

The correlation between age and years in current position is positive as r = + 0.382 which means they move in the same direction. This shows that the higher the age of respondents, the higher the number of their years in their current position.

However the correlation is weak as r = 0.382 which is less than 0.5 This means that age does not have much effect on the years respondents have spent in the position they currently hold in a retail supermarket.

Figure 76: Graphical representation of age and years in current position



C2: Correlations between age and current position

The next information is to see if the respondent's current position is according to their age. This is an analysis of one continuous variable and a categorical variable.

Table 72: Correlations between age and current position

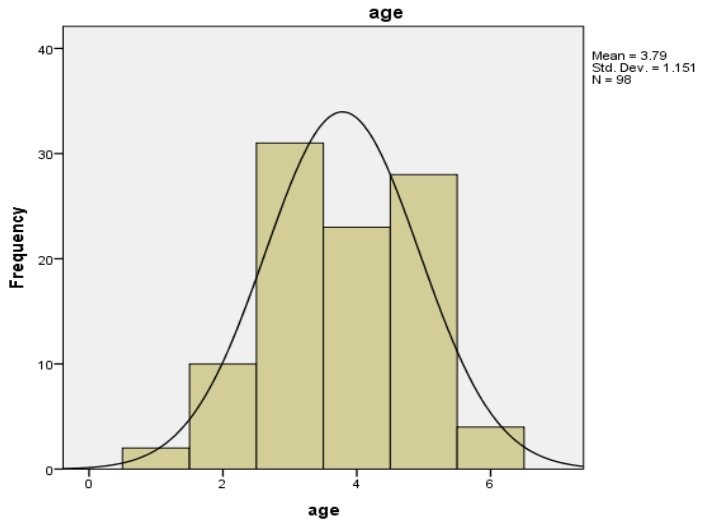
		Age	current position
age	Pearson Correlation	1	.456**
	Sig. (2-tailed)		.000
	N	98	98
current position	Pearson Correlation	.456**	1
	Sig. (2-tailed)	.000	
	N	98	98

**. Correlation is significant at the 0.01 level (2-tailed).

The table above shows a low correlation between age and current position.

The correlation between age and current position is positive as r = + 0.456 which shows that they are moving in the same direction. This shows that the age of the participants affects their current positions. A positive correlation shows that the higher the age, the higher their current position. For instance, a manager can be older than a supervisor or a supervisor older than the security personnel as age is seen to determine position. However the correlation is weak as r = 0.456 which is less than 0.5. This shows the weaker relationship between the age of participants and their current which means that the strength of age in their current position is not as strong as it could be.

Figure 77: Graphical representation of age and current position



C3: Correlations between years in current position and awareness of security solutions

The next information is the relationship between the number of years the respondents have spent in their current positions and the awareness of security solutions. This is to determine whether those who have spent more in their position would know more about security solutions thus determining their impact on the dependent variable.

Table 73: Correlations between years in current position and awareness of security solutions

Correlations

			awareness_of_security_solutions	years_in_current_position
Spearman's rho	awareness_of_security_solutions	Correlation Coefficient	1.000	.401**
		Sig. (2-tailed)	.	.000
		N	98	98
	years_in_current_position	Correlation Coefficient	.401**	1.000
		Sig. (2-tailed)	.000	.
		N	98	98

**. Correlation is significant at the 0.01 level (2-tailed).

In analysing the correlation between awareness of security solutions and years in current positions, the correlation is positive as r = + 0.401 which means that they are moving in the same direction. There is a statistically significant difference between years in current positions and the awareness of the security solutions. This shows that the more years the respondents spend in their current positions, the more aware they are of the security solutions.

However, the correlation is weak as r = +.401 which is less than .5 which is needed for a strong link. This shows that although the more years the respondents spend in their current position can impact their knowledge of security solutions, yet some of them might not have the requisite knowledge as a result of the years they have spent while some who have spent less time can have more knowledge of the security solutions that those that have spent more. Nevertheless, the statistical difference is significant.

C4: Correlations between current position and awareness of security solutions

This information determines the relationship between participants' current position and the awareness of security solutions. It is to establish if participants' current position plays a significant role in their knowledge or awareness of security solutions in use in their stores.

Table 74: Correlations between current position and awareness of security solutions

Correlations

			current position	awareness_of_security_solutions
Spearman's rho	current position	Correlation Coefficient	1.000	.275**
		Sig. (2-tailed)	.	.006
		N	98	98
	awareness_of_security_solutions	Correlation Coefficient	.275**	1.000
		Sig. (2-tailed)	.006	.
		N	98	98

**. Correlation is significant at the 0.01 level (2-tailed).

There is a statistically significant difference between current position and awareness of security position as r = + .275 which is a positive correlation meaning that they are moving in the same direction. This shows that the higher the current position the more aware they are of security solutions.

However, the correlation is weak as r = 0.275 which is less than 0.5. This means that the current positions of participants do not have statistically significant differences on the awareness of security solutions as the correlation is significantly low. Some of the respondents in a higher

position might not have much knowledge of the security solutions as they ought to despite the positive relationship that should be between their position and their level of awareness.

5.4.1.6 Chi-square Results

The Chi-square is used to show the relationship between categorical variables which cannot be analysed by regression methods.

It helps in determining the relationship between independent and dependent variables in the first hypothesis. A dependent variable from responses relating to retail crime will be paired with an independent variable relating to a security solution.

The results have also been numbered as Cs (Chi-square) which is a continuation of the previous analyses.

C5: Awareness of security solutions and the detection of shoplifters

The first case is the determination of the relationship between awareness of security solutions (independent variable) and detection of shoplifters (dependent variable).

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
awareness_of_security_solutions * detection_of_shoplifters	98	100.0%	0	0.0%	98	100.0%

Table 75: Awareness of security solutions * detection of shoplifters Cross-tabulation

		detection_of_shoplifters										
		Security guard alertness	1,3,4	cctv	Security tags of RFID	Facial recognition	1,2,3,4	1,2,4	1,2,3	1,2	1,4	Total
awareness_of_security_solutions	physical security	17	0	0	0	0	0	0	0	0	0	17
	cctv	5	0	6	2	0	0	0	0	0	0	13
	all of the above	0	0	0	2	2	25	0	0	0	0	29
	cctv and physical security	1	1	0	0	0	3	5	14	11	4	39
Total		23	1	6	4	2	28	5	14	11	4	98

Chi-Square Tests

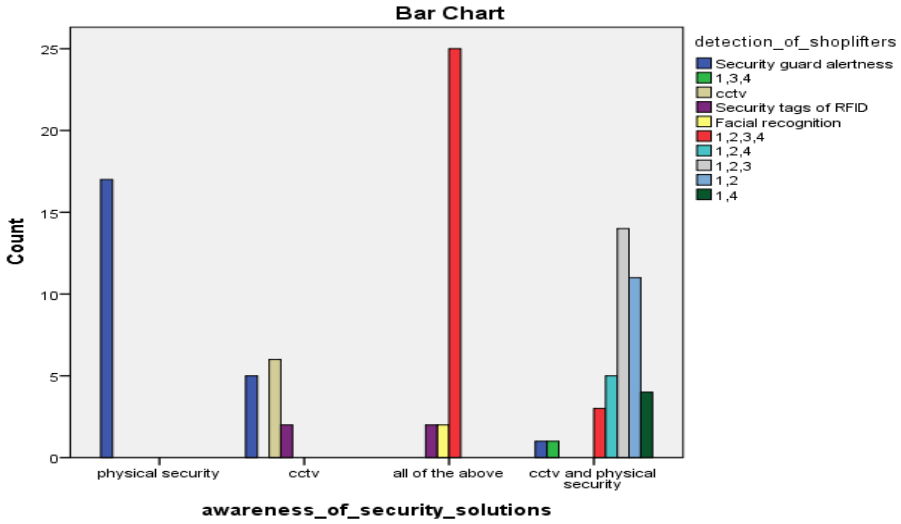
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	209.833[a]	27	.000
Likelihood Ratio	198.152	27	.000
N of Valid Cases	98		

35 cells (87.5%) have expected count less than .5. The minimum expected count is .13.

The Chi-square produced a *p* value of .000 which is less than the specified .05 *a* level. This indicates that there is a statistically significant difference between the respondents' awareness of security solutions and the detection of shoplifters. This establishes a correlation between the awareness of security solutions and detection of shoplifters, that is, the more the awareness of security solutions, the more criminals are being detected in retail stores.

The result from this analysis helps in exploring the 2nd research objective which is to explore the extent to which UK retail supermarkets understand the importance of the security solutions they employ in their businesses. If the retail staff and security personnel employed are not fully aware of the different security solutions available in their stores, this might minimise their ability to prevent or reduce retail crime. This result shows the importance of the extent of the awareness of security solutions and what they are being used for in a retail setting. Retail crime prevention and reduction start with the level of knowledge that retail employees have concerning the solutions available to them in stores.

Figure 78: Graphical representation of awareness of security solutions and detection of shoplifters



C6: Awareness of security solutions and catching shoplifters through CCTV

Another set of variables analysed are the independent variable which is awareness of security solution and the dependent variable which is catching shoplifters through CCTV. One of the security solutions in this study is the CCTV which is present in almost all the stores under study. This analysis is to find out how the awareness of security solutions affect the use of CCTV to catch shoplifters.

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
awareness_of_security_solutions * catching_shoplifters_through_cctv	98	100.0%	0	0.0%	98	100.0%

Table 76: Awareness of security solutions * catching shoplifters through cctv Cross-tabulation

Count

		catching_shoplifters_through_cctv						
		never	not often	often	very often	everyday	can't say	Total
awareness_of_security_solutions	physical security	4	13	0	0	0	0	17
	Cctv	0	4	9	0	0	0	13
	all of the above	0	0	29	0	0	0	29
	cctv and physical security	0	0	0	22	11	6	39
Total		4	17	38	22	11	6	98

Chi-Square Tests

	Value	Df	Asymptotic Significance (2-sided)
Pearson Chi-Square	178.320[a]	15	.000
Likelihood Ratio	194.421	15	.000
N of Valid Cases	98		

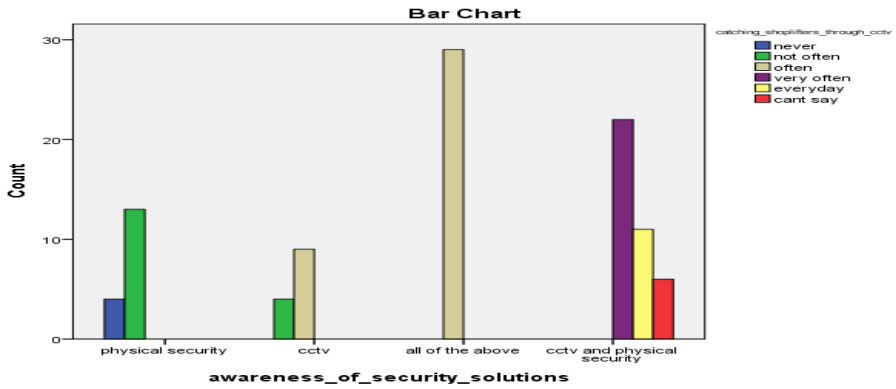
a. 16 cells (66.7%) have expected count less than 5. The minimum expected count is .53.

The p value of .000 was produced through Chi-square which is less than .05 *a* level. This shows that there is a relationship between awareness of security solutions and catching shoplifters through CCTV which is one of the security solutions in this study.

The result from this analysis helps in exploring the fourth research objective which is to propose a strategic framework from the comparative study using security solutions that will help reduce crime in retail supermarkets in the UK.

The result shows that the more aware the respondents are of the CCTV, the more criminals will be caught through CCTV. The respondents have shown from their responses that CCTV is a vital security tool in reducing or preventing retail crimes.

Figure 79: Graphical representation of awareness of security solutions and catching shoplifters through CCTV



C7: Security guards on duty and frequency of shoplifting arrest

This discussion is centred on the presence of security guards on duty and the frequency of shoplifting arrests. The analysis is to establish the impact of the independent variable (security guards) on the dependent variable (retail crime: shoplifting).

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
security_guards_on_duty * frequency_of_shoplifting_arrest	97	99.0%	1	1.0%	98	100.0%

Table 77: security guards on duty and frequency of shoplifting arrest Cross-tabulation

Count

		frequency_of_shoplifting_arrest					
		rarely	often	very often	everyday	can't say	Total
security_guards_on_duty	1	2	39	33	5	1	80
	2	0	0	0	8	0	8
	3	0	0	0	2	3	5
	4	0	2	0	0	2	4
Total		2	41	33	15	6	97

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	97.180[a]	12	.000
Likelihood Ratio	68.691	12	.000
N of Valid Cases	97		

a. 17 cells (85.0%) have expected count less than 5. The minimum expected count is .08.

Explanation

The result that the above Chi-square produced is a *p* value of 0.000 which is below specified 0.05 *a* level. This indicates that there is a statistically significant difference between the security guards being on duty and the frequency of arrest that are made. In essence, the independent variable has a significant impact on the dependent variable. This establishes a correlation between the security guards in the store and the frequency of arrest.

H1: Use of interconnected security solutions can increase their effectiveness in relation to crime reduction in retail supermarkets.

H2: Adopting a crime prevention framework can help reduce retail crime in supermarkets.

The result from this analysis also helps in meeting the fourth research objective which is to propose a strategic framework from the comparative study using security solutions that will help reduce crime in retail supermarkets in the UK.

This result shows that the presence of security personnel in the stores increases the frequency of arrest of the criminals. When there are no security guards in the store, shoplifters will be able to steal and get away with the stolen goods as there will be no one to arrest, ban or deter them, leading to loss for the store and insecurity for customers and employees. This shows that it is paramount to have security guards in the store for the safety of everyone and protection of goods.

C8: Review of online security systems and frequency of cybercrime

The analysis of this result is to examine the impact of the review of online security systems on frequency of cybercrime. The review is the sole responsibility of the management of UK retail supermarkets, and it will help in establishing the second objective of their research which is to explore the extent to which UK retail supermarkets understand the importance of the security solutions they employ in their businesses as this will enable them to combat retail crime better.

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
review_of_online_security_systems * frequency_of_cybercrime	98	100.0%	0	0.0%	98	100.0%

Table 78: Review of online security systems of frequency of cybercrime Cross-tabulation

Count

		frequency_of_cybercrime						
		rarely	often	very often	everyday	never	can't say	Total
review_of_online_security_systems	rarely	12	0	0	0	0	0	12
	often	13	7	2	1	0	0	23
	very often	0	0	0	0	6	13	19
	everyday	0	0	0	0	0	6	6
	can't say	0	0	0	0	0	38	38
Total		25	7	2	1	6	57	98

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	142.341[a]	20	.000
Likelihood Ratio	154.058	20	.000
N of Valid Cases	98		

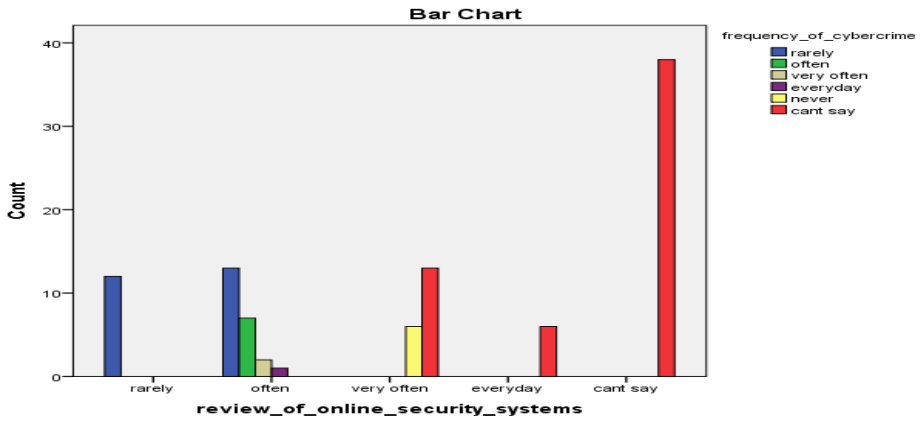
a. 24 cells (80.0%) have expected count less than 5. The minimum expected count is .06.

Explanation

The Chi-square produced a *p* value of 0.00 which is less than the specified 0.05 *a* level. This shows that there is statistically significant difference between the review of online systems and frequency of cybercrimes. This establishes the correlation coexistence between the

supermarket reviewing of their online security systems and frequency of cybercrimes, which means that the more supermarkets review their online security systems, the more cybercrime is dealt with. This also meets the second objective of this research which is to explore the extent to which UK retail supermarkets understand the importance of the security solutions they employ in their businesses. As the world moves more in the direction of technology including e-commerce, it is vital that supermarkets frequently review their online security system which will limit the frequency of cyber-attack that affects online payments and customers' details. As e-commerce affords customers greater convenience in shopping, many buy or order goods online, so it is paramount that their details are well protected which will boost their confidence in these supermarkets.

Figure 80: Graphical representation of review of online security systems and frequency of cybercrime



C9: CCTV in stores and catching shoplifters through CCTV

This analysis is to further establish the fourth objective of this study which is to propose a strategic framework from the comparative study using security solutions that will help reduce crime in retail supermarkets in the UK. Again, an independent variable (security solution: CCTV) is paired with a dependent variable (retail crime: shoplifting) to establish the set objective.

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
cctv_in stores * catching_shoplifters_through_cctv	98	100.0%	0	0.0%	98	100.0%

Table 79: CCTV in stores and catching shoplifters through Cctv Cross-tabulation

Count

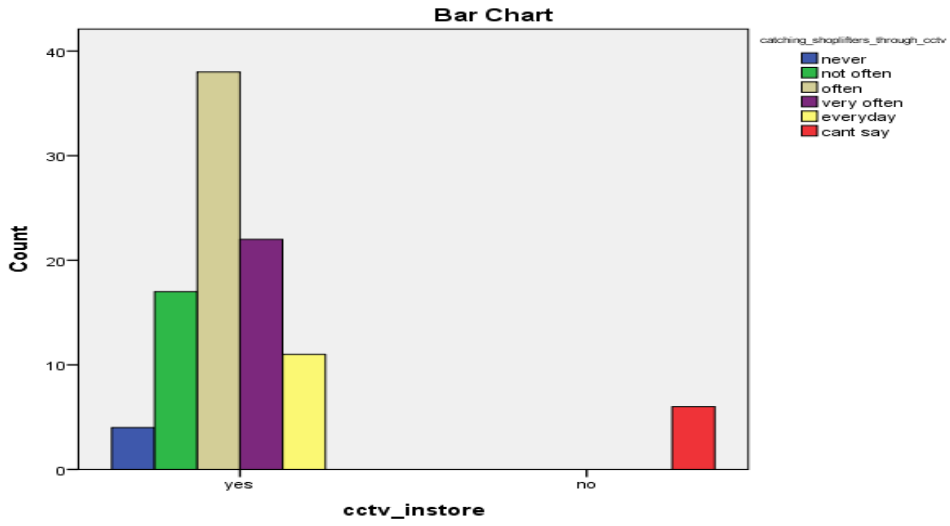
		catching_shoplifters_through_cctv						
		never	not often	often	very often	everyday	can't say	Total
cctv_in stores	yes	4	17	38	22	11	0	92
	no	0	0	0	0	0	6	6
Total		4	17	38	22	11	6	98

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	98.000[a]	5	.000
Likelihood Ratio	45.143	5	.000
N of Valid Cases	98		

a. 7 cells (58.3%) are expected to count less than 5. The minimum expected count is .24.

Figure 81: Graphical representation of cross-tabulation of CCTV in stores and catching shoplifters through CCTV



C10: Review of online security systems and reporting of online fraudulent activities

This case is matching the review of online security systems (an independent variable) with reporting of online fraudulent activities. It is set to examine if there was any relationship between periodic review of online security systems and spotting of fraudulent activities with reporting.

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
review_of_online_security_systems * reporting_of_online_fraudulent_activities	98	100.0%	0	0.0%	98	100.0%

Table 80: Review of online security systems * reporting of online fraudulent activities Cross-tabulation

Count

		reporting_of_online_fraudulent_activities					
		rarely	often	very often	everyday	can't say	Total
review_of_online_security_systems	rarely	12	0	0	0	0	12
	often	23	0	0	0	0	23
	very often	13	5	1	0	0	19
	everyday	0	0	4	2	0	6
	can't say	0	0	0	0	38	38
Total		48	5	5	2	38	98

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	201.373[a]	16	.000
Likelihood Ratio	178.857	16	.000
N of Valid Cases	98		

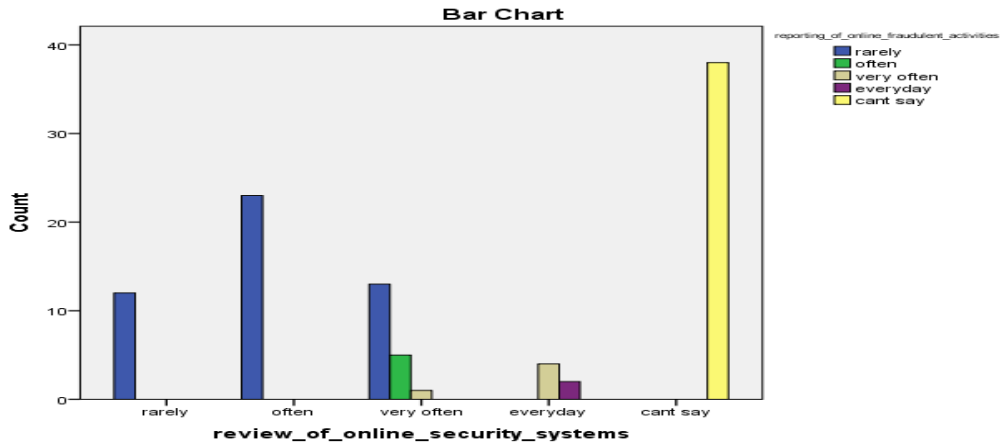
a. 18 cells (72.0%) have expected count less than 5. The minimum expected count is .12.

Explanation

The Chi-square above produces a *p* value of 0.000 which is less than specified 0.05 a level. This indicates that there is a statistically significant difference between the respondents reviewing the online security systems in the stores and reporting of online fraudulent activities. The result shows that the more online activities are reviewed by the management, the more fraudulent activities are being detected and reported with the aim of reducing their occurrence. This analysis helps in achieving the second objective which is to explore the extent to which UK retail supermarkets understand the importance of the security solutions they employ in their businesses. The management that constantly or periodically reviews its cybersecurity systems shows a higher level of understanding of security solutions because reviewing online security systems will ensure the timely detection and prevention of fraudulent activities. Lack of periodical evaluation or review of security solutions shows a lack of understanding on the part of the management and failure to understand the importance of the security solutions.

It is very vital for the supermarket operatives to frequently review their online operations so that any fraudulent activities will be detected and reported quickly before they become problematic and cause damages to the reputation of the business. This result answers the second research question which is 'Are there areas of improvements in existing security solutions in relation to combating retail crimes? It also meets the third objective which is 'To identify and explore areas of improvements in existing security solutions in relation to combating retail crimes'.

Figure 82: Graphical representation of cross-tabulation of review of online security systems and reporting of online fraudulent activities



C11: Awareness of security solutions and detection of warehouse supplier theft

Warehouse/supplier theft is one of the many instances of retail crime which has not really been the centre of focus for retail supermarkets as much as shoplifting which is a daily occurrence. This analysis is to establish how awareness of security solutions can help retail supermarkets to detect warehouse/supplier theft.

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
awareness_of_security_solutions * detection_of_warehouse_supplier_theft	98	100.0%	0	0.0%	98	100.0%

Table 81: Awareness of security solutions * detection of warehouse supplier theft Cross-tabulation

Count

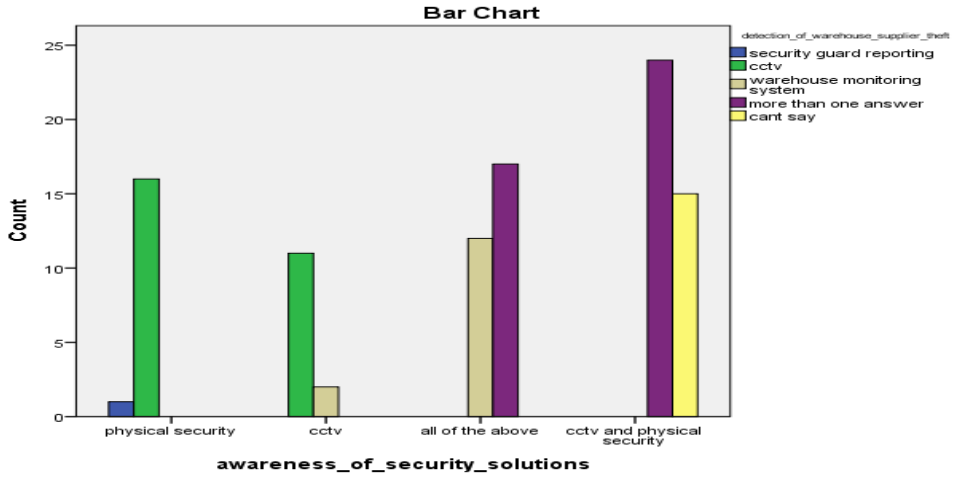
		detection_of_warehouse_supplier_theft					
		security guard reporting	cctv	warehouse monitoring system	more than one answer	can't say	Total
awareness_of_security_solutions	physical security	1	16	0	0	0	17
	Cctv	0	11	2	0	0	13
	all of the above	0	0	12	17	0	29
	cctv and physical security	0	0	0	24	15	39
Total		1	27	14	41	15	98

Explanation

It is shown above that the Chi-square produces a *p* value of 0.000 which is less than the specified 0.05 a level. This result shows a correlation between the awareness of security solutions and detection of warehouse theft. This means that the more aware the participants are about security solutions, the more warehouse theft will be detected. The warehouse theft can come from internal and external thieves, for instance, employees working in the stores,

subcontractors, shoplifters trying to go through the fire exit at the back and delivery drivers. If the retail staff and security personnel employed are not fully aware of the different security solutions available in their stores which can help in the detection of warehouse theft, it could seriously affect their ability to prevent and deter this crime.

Figure 83: Graphical Representation of awareness of security solutions and detection of warehouse supplier theft Crosstabulation



5.4.1.7 Testing the Hypothesis

H1: Use of interconnected security solutions can increase their effectiveness in relation to crime reduction in retail supermarkets.

H2: Adopting a crime prevention framework can help reduce retail crime in supermarkets.

The Hypotheses were proven with the correlation and regression coupled with the chi-square results.

The combination of the results from C5, C6, C7, C8, C9, C10 and C11 showed the proof of H1 which is the establishment of the fact that when security solutions are used interconnectedly, their effectiveness would be increased leading to a reduction in retail crime.

In C5, participants awareness of security solutions (CCTV, Physical and Cyber securities) and the detection of shoplifters were paired, and a correlation was seen to be significant which means the more aware participants are of security solutions, the more they are able to detect shoplifters thus deterring or reducing their criminal activities against the store. The use of interconnected security solutions means the use of more than one security solution at the

same time for the purpose of crime detection and reduction. This is corroborated by C6 which is the pairing of the participants' awareness of security solutions and catching shoplifters through CCTV which is one of the security solutions. Which means the more CCTV is being used in stores, the more shoplifters would be caught. This is also supported by C7 which is the correlation between the presence of security guards on duty and frequency of shoplifting arrest which means the more security guards are on duty, the more shoplifters are arrested and deterred. And lastly C8 which is concerned with cybersecurity, that is the correlation was established between the review of online security systems and frequency of cybercrime. This means that the more the management reviews their online security, the more they are able to deal with online crime. Other analyses such as C9, C10 and C11 were used to support the hypothesis testing. The use of CCTV, security guarding and cybersecurity interconnectedly would bring a reduction in retail crime. This provides answers to the first research questions 'What is the role of interconnected security solutions in relation to crime prevention and reduction in a retail supermarket'. It also helps to meet the first research objective which is 'To explore the concept of and interconnectivity between the three aspects of security solutions: physical, system and cyber securities.

Each of the security solutions has been found to be an effective deterrent to retail crime and their interconnected use offer a greater solution.

5.4.2 Analysis of Qualitative Results: Testing the Hypotheses, Meeting Research Objectives, and Answering Research Questions.

This research is exploring the role of interconnected security solutions in reducing retail crime. A mixed method (quantitative and qualitative) was used for primary data gathering. Questionnaires have been analysed by SPSS and the responses from the interview will be discussed here.

The outcome of the interview has provided valuable insights into the challenges and importance of security in retail supermarkets.

A total number of fifteen participants were interviewed and their responses were recorded and analysed using the NVivo. There was a lot of discussion around the interconnectedness of security solutions and their effectiveness in preventing or reducing crime. From the various responses, inferences have been made which will form the basis for discussion and recommendations on this research. Each of the research objectives has also been met from these results and they will be addressed one after the other. The result from the qualitative

analysis will also be used to test both hypotheses. H1 was initially set out to be tested while H2 was generated during this study.

5.4.2.1 Meeting the 1st and the 2nd Research Objective

Obj 1: Establishing the Role of Interconnected Security Solutions in Relation to Crime Prevention and Reduction in Retail Supermarkets.

Obj 2: Exploring the extent to which UK retail supermarkets understand the importance of the security solutions they employ in their businesses.

The participants' responses were carefully sorted and analysed, and the following are the results from the analysis which point to the achievement of the first research objective. Each conclusion has been categorised as N (NVivo) for identification starting with N1.

N1: Awareness of security solutions

From the analysis of the findings, all the participants are aware of the security solutions that are currently in use in their stores as each of the security solutions serves a different but interconnected purpose in the supermarket.

N2: Security Solutions are interconnectedly used in stores.

The use of security solutions (security guards, CCTV and Cybersecurity) was a recurrent answer among the participants. Most of the fifteen participants representing the two retailers use Physical security and CCTV while a certain number of them are not aware of the usage of Cyber security in the store as this is managed by their head offices. It can safely be concluded that the interconnectedness of the security solutions that the participants are aware of is between the security guarding (physical security) and CCTV which are mostly in use or visible most of the time in the stores.

Their responses affirm that the interconnectedness between the security solutions gives the supermarket more protection when they are working together in the store. Duhails *et al* (2018), while studying the concertizing smart hospitality enterprise of the future proposed a smarter ecosystem that could benefit the stakeholders. When this is related to this study, the identified interconnectivity of security solutions from the outcome of this research could benefit the security operators and the retail owners as they work together to combat retail crime. All the participants agreed that when security solutions work together, they can reduce retail crime.

N3: Assessing the effectiveness of each of the existing security solutions: Testing H1 and meeting objective 2.

H1: Use of interconnected security solutions can increase their effectiveness in relation to crime reduction in retail supermarkets.

Obj 2: To explore the extent to which UK retail supermarkets understand the importance of the security solutions they employ in their businesses.

In establishing the effectiveness of the interconnectivity of security solutions in relation to reducing crime, each of the existing solutions was assessed individually. The responses showed the effectiveness of each of the security solutions from which the effectiveness of the three had been deduced.

a. Security guarding is very effective.

Security guarding is one of the areas of physical security and it is the most prominent which is why it is the sole subject of physical security in this research. Participants agreed that security guarding is necessary and very effective in their stores. Security guards serve as a deterrent as they are at hand to respond to emergency calls within the shop. They apply citizen's arrest to shoplifters or criminals before police arrive. When the guards are well trained, they deliver good service, and their clients can rely on them. An effective security guard will help in prosecution of the criminals that are caught in the store.

b. CCTV is effective.

All the participants agreed that CCTV as a security solution cannot be underestimated. CCTVs are used to deter retail crime by looking into the past recordings which could be rewound to ascertain what has happened from what has been stored in the memory of the system. The responses showed that CCTV cameras are being monitored in different locations; in some stores the control room is in the managers' offices while in others it is on the shop floor. The reason for the installation of the CCTV is to carry out surveillance activities on all customers with the intention of detecting criminals like shoplifters. Citing Cathryn & Andrew, (2014), Kibacia et al (2017) established that CCTV cameras are used in the detection and deterrence of internal and external thieves. Through CCTV the security personnel can observe deviant behaviours or criminality taking place which include theft of goods (Cathryn & Andrew, 2014).

c. Cybersecurity is effective.

For the participants that are conversant with the use of cybersecurity, their responses identified the effectiveness of cybersecurity which is to protect customers details. This protection includes the use of their payment cards in stores instead of paying by cash and safety for customers buying online. Participants agreed on the necessity of cybersecurity as this gives

customers the assurance that their transactions are safe, and no unauthorised money will be taken from their accounts. Cybercriminals use phishing techniques to attack customers thus stealing their valuable information such as usernames, card information and passwords (Andreado *et al*., 2020). The internet criminals look for ways to attack shoppers as most of them are very vulnerable. So, the use of cybersecurity gives their customers more confidence to shop online.

N4: Interconnectivity of operations between security guarding and CCTV

All the participants are of the opinion that the CCTV operator and security guards work together to apprehend shoplifters.

CCTV operators have been trained to monitor live occurrences especially for criminal activities and they could see how the operators relate their findings to the security guards who are on the shop floor. For them the two security solutions working together help to ensure more accuracy in catching shoplifters. The participants have seen how the CCTV operators work with the conventional security who are the security personnel by directing them to where the crimes are being committed. Two of the security personnel who are using the security apparatus stated that the cameras in their stores are focused on broader places where the security personnel might not be able to reach or see. Nevertheless, they all agreed that CCTVs are focused for safety, economical and ideological benefits depending on the demographic status of customers and the location of individual stores.

Some of their responses are documented below.

Employees feel safer with the three solutions in use. The participants stated that when the three security solutions are used, they feel safer, the customers feel confident to shop while the employees also feel safe in the environment where they are working.

Employees could work in a good working environment. The participants stated that working in a secure environment makes them more productive and helps them look forward to coming to work, not jumping from one job to another. The security solutions help the participants to perform their duties to the best of their abilities as they feel protected.

Existing security solutions are effective. The existing security solutions are very effective, in some of the stores the participants stated that the CCTVs need upgrading and the guards need more training to upskill their credentials in retail especially in Aldi and Sainsbury which can lead to better performance.

Security guards deter, and CCTV is used to detect criminals. The security personnel and CCTV

act as a deterrent to the offenders who are the perpetrators of many crimes in these supermarkets. Many of these criminals will come in and walk away as soon as they see the security guard, while some will be deterred with the warning that the CCTVs are in operation in the stores.

Security service providers are effective. The participants work in two different entities (Aldi & Sainsbury Stores). They are happy with their providers but mentioned that improvement could be made on training, punctuality, dressing, always staying on the parking bench behind the till and using their phones on the shop floor.

These responses have established the first hypothesis that the use of interconnected security solutions can increase their effectiveness in relation to crime reduction in retail supermarkets.

They have also helped in the achievement of the first research objective which is to explore the concept of and interconnectivity between the three aspects of security solutions: physical, system and cyber securities.

This analysis has also answered the first research question 'what is the role of interconnected security solutions in relation to crime prevention and reduction in a retail supermarket?

The various responses have shown the role of interconnected security solutions in relation to crime prevention and reduction in retail supermarkets.

5.4.2.2 The Possibility of a Crime Prevention Framework

One of the major areas of this research is the exploration of the possibility of a crime prevention framework that can be used in retail supermarkets in the UK.

Having analysed the responses of the participants, the results have shown the achievement of the fourth research objective and provide answers to the third research question. They have also been used to test or generate the second hypothesis.

Research question 3: Is it possible to develop a crime prevention framework that will be suitable for the retail supermarkets in the United Kingdom as compared to the other developed countries?

Research objective 4: To propose a strategic crime prevention framework that will help reduce crime in retail supermarkets in the UK.

H2: Adopting a crime prevention framework can help reduce retail crime in supermarkets.

The results from the analysis of participants' responses are below. They are assigned N as

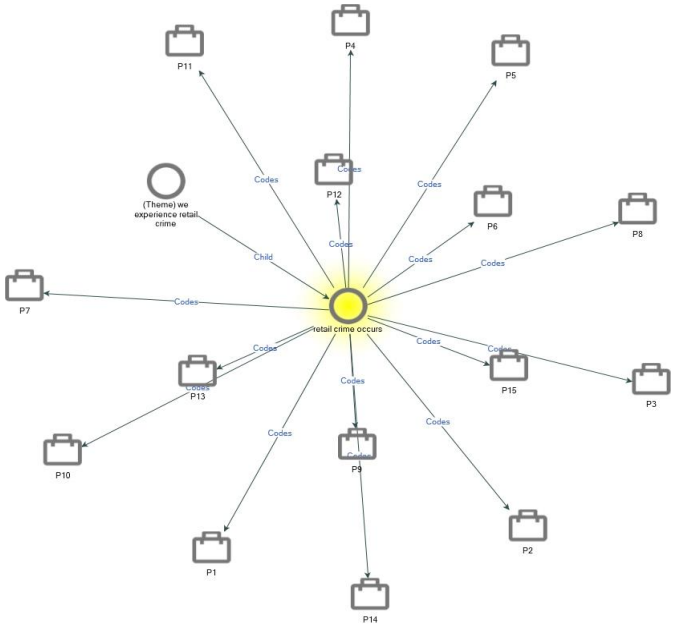
previously for identification.

N5: Experience of retail crime.

Before the establishment of a crime prevention framework, it is pertinent to establish the occurrence of crimes. The participants were asked if retail crimes occurred in their stores. They all agreed that their stores experience retail crimes from time to time.

The diagram below shows the number of participants that agreed with the occurrence of retail crimes in their stores. Each participant has been assigned numbers from P1 to P15.

Figure 84 : Diagrammatic representation of participants' experience of retail crime



At the centre of the diagram is the case inferred from one of the major themes allocated to the third research objective during coding in NVivo.

Participants are of the opinion that retail crimes occur as people are finding it hard to pay for goods sold in the stores, there are also drug users who would come in to steal stuff to fund their habits and there are also those that steal to re-sell for financial gain.

N6: Rates of retail crime

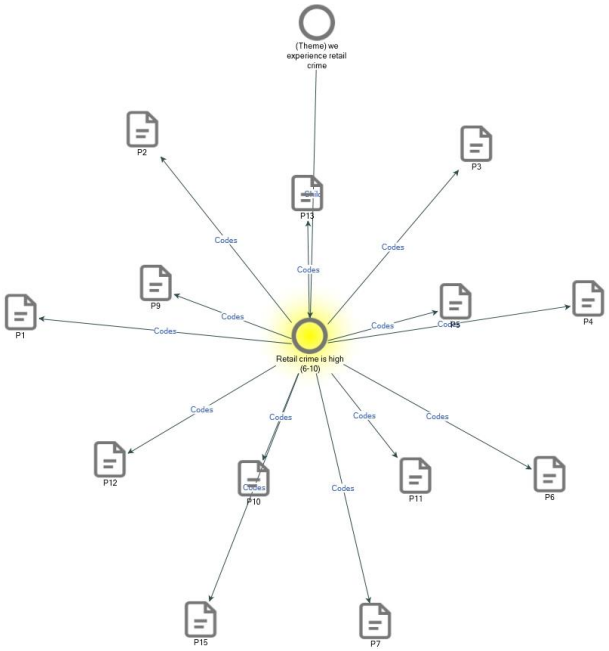
The experiences of participants in retail crime were categorised into two; high and low. High retail crime was categorised as 6-10 while low retail crime was categorised as 1-5

Retail crime is high (6-10).

Most of the participants that were interviewed came under this category. The stores that were

part of the case study were those with continuous presence of security guards and CCTVs and they are high crime targeted areas. The demography and the location of stores are factors that can lead to high retail crime.

Figure 85: Diagrammatic representation of high rate of retail crime

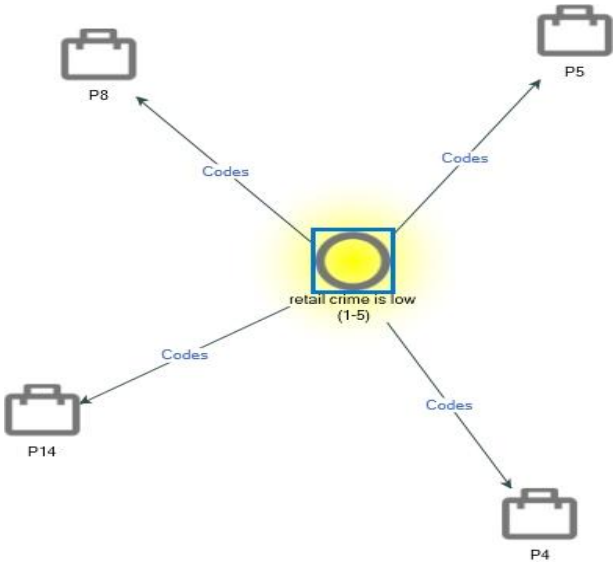


This diagram shows the number of participants whose stores experience high retail crime.

Retail crime is low (1-5).

There are few stores that came under this radar of 1-5, the criminalities that occur in these stores are sporadic, they are not consistent like other stores. Security solutions in these stores are there mainly for the safety of the employees and customers.

Figure 86: Diagrammatic representation of low rate of retail crime



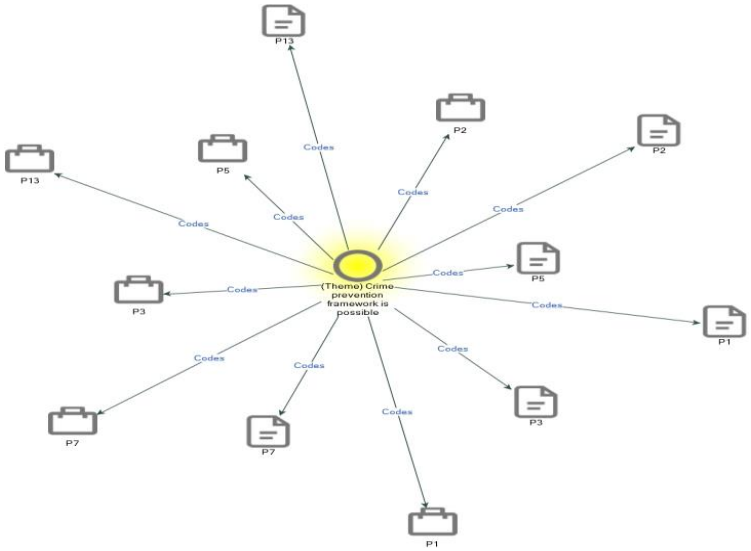
This diagram shows the number of participants whose stores experienced a low crime rate.

N7: Crime prevention framework is possible

Majority of the participants believed in the possibility of crime prevention framework.

The diagram below shows the thoughts of most of the participants on the possibility of a crime prevention framework.

Figure 87: Diagrammatic representation of the possibility of crime prevention framework

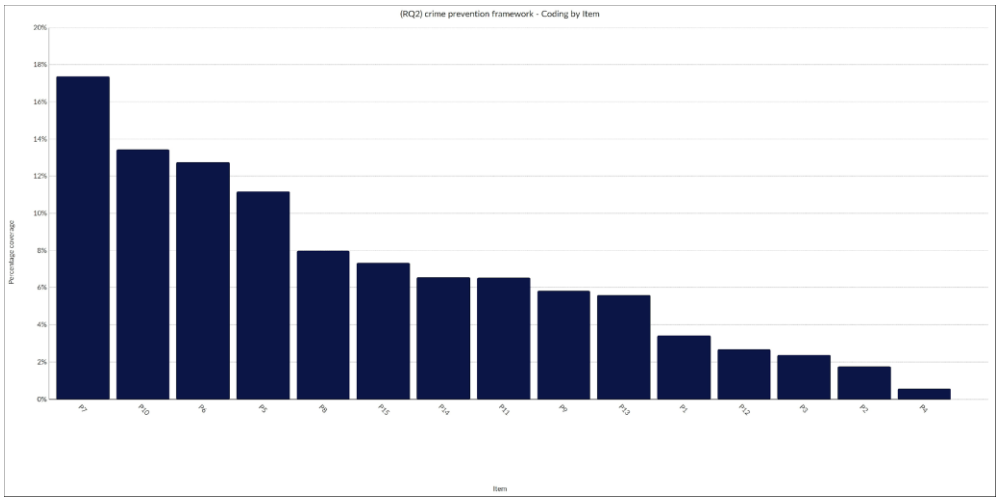


From the diagram above, more than half of the participants believed in the possibility and benefits of a crime prevention framework.

N8: Adoption of Crime Prevention Framework (CPF)

Although not every participant agreed on the possibility of a crime prevention framework for retail supermarkets in the UK, yet almost all of them wanted its adoption.

Figure 88: Adoption of Crime Prevention Framework



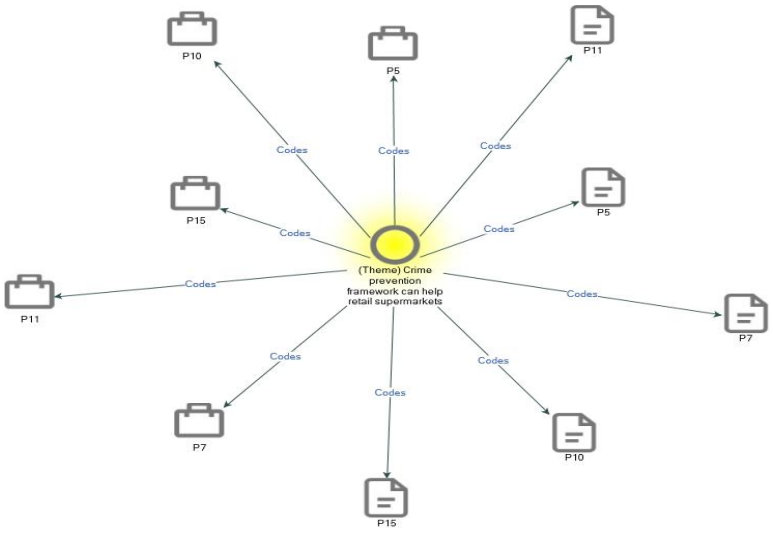
The diagram above shows the readiness of participants in retail security to adopt or encourage their management to adopt a crime [prevention framework.

N9: Benefits of a crime prevention framework

The participants are of the opinion that a crime prevention framework would be helpful in many ways.

One of the most recurring answers is that a standardised crime prevention strategy would ensure that all retail companies are equipped with effective security measures.

Figure 89: diagram showing the number of participants agreeing to the possibility of a Crime prevention framework



Identified benefits of CPF

The participants' thoughts have been identified below as advantages of having a crime prevention framework.

1. It would provide a sense of security to both employees and customers, knowing that there are consistent protocols in place to prevent crime.
2. It would also help in sharing best practices and learnings among different stores. If a particular strategy or security measure proves to be successful in one store, it can be implemented in others as well. This collective approach would enhance overall security in the retail sector.
3. By sharing knowledge and experiences, retail companies can collectively strengthen their security practices and stay ahead of potential threats. It would create a more unified and proactive approach towards crime prevention.
4. It's important to stay proactive because criminals are always finding new ways to exploit vulnerabilities. A standardised crime prevention strategy would ensure that retailers are constantly updating and improving their security measures to keep up with evolving threats.

Their perspective as people working on the front lines of retail security is valuable. It highlights the importance of a comprehensive and standardised approach to crime prevention in the UK retail industry.
To them, It is crucial to prioritise security in retail, and as such efforts towards a standardised crime prevention strategy must continue to progress.

The participants' responses on the crime prevention framework have provided answers to Research question 3. It has been established that it is possible to develop a crime prevention framework that will be suitable for the retail supermarkets in the United Kingdom.

Also, the fourth research objective has been met which is to propose a strategic crime prevention framework to be used in retail supermarkets in the UK.
The results have thus established the second hypothesis that adopting a crime prevention framework can help reduce retail crime in supermarkets.

5.5 Summary and Conclusion of Results

One hundred and three questionnaires were sent out and only 98 responded. The chi-square was used as a tool to assess the statistically significant difference in the security solutions (independent variables) and some retail crimes (dependent variables). These variables were cross tabulated in order to assess the impact of one on the other. The outcome helped in the achievement of set research objectives. The researcher used Chi-square to analyse those that could not be collated. More of the outcomes will be discussed in the next chapter which will help shape the recommendations and conclusions

CHAPTER SIX

CONCLUSION AND RECOMMENDATIONS

6.1 Introduction

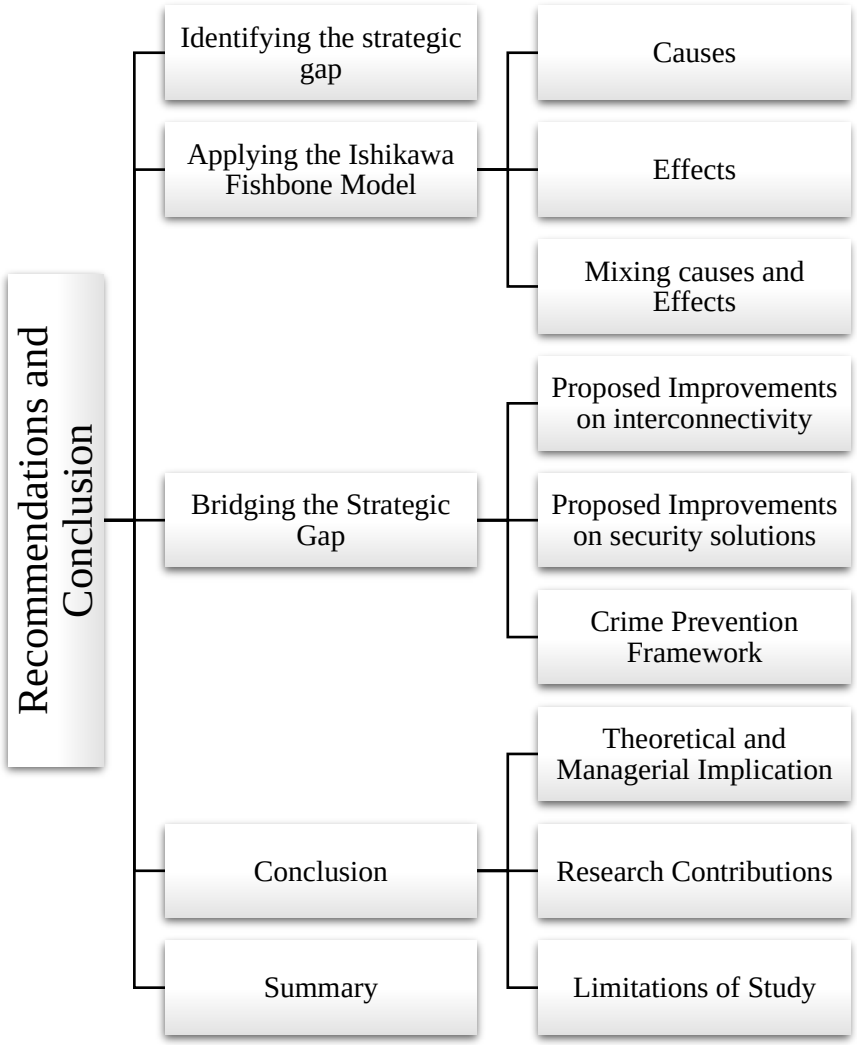
This chapter will detail how the security solutions can be improved in the supermarkets. During this study the three different aspects of security solutions have been critically evaluated in Aldi and Sainsbury Stores.

Excellent responses from the participants have created a good opportunity for a better recommendation that will enrich the security of these stores.

This chapter also discusses the research findings learnt by the researcher from qualitative and quantitative methods used in these studies. The strategic gap is identified using the Ishikawa fishbone framework and how it has helped to determine the causes of retail crimes including the effects of the application of the three security solutions in stores. Efforts shall be made to bridge the strategic gap with recommendations.

Security organisations have operated for centuries without being regulated but currently all types of security that have been studied in this research have regulatory bodies that ensure that certain criteria are met before any company or individual operates in securing property and individuals. So, this chapter shall also discuss the crime prevention framework which is one of the results of this research and its usefulness for retail supermarkets in the UK. The conclusion of this research shall be discussed in this chapter with the theoretical and managerial implications. This chapter will end with the contribution of this research to the body of knowledge and the opening for further research.

Figure 90: Diagrammatic Representation of Recommendation and Conclusion



6.2 Identifying the Strategic Gap

The essence of this research is to evaluate the interconnectivity between different security solutions and their effectiveness in preventing or reducing retail crimes. The reason for the evaluation is to see if there is a gap between the present and potential effectiveness of security solutions in combating retail crime. The results from this research have shown that there is a need for continuous improvement in the current security solutions used in supermarkets as some of the present methods and procedures are now outdated.

Part of the process has been the monitoring of relevant variables through qualitative and quantitative reasoning. Gap analysis was employed in this study to assess the current situation of the three security solutions and how they can be improved. Winer (1998) stated that gap

analysis can be used to assess the current administration of a business and to find a way to meet the expectations of the employers, customers, clients, security personnel and the operators of CCTV.

This study has examined the current skills, abilities of the personnel, the apparatus being used and the possible enhancements.

Parasuraman *et al* (1985) described Gap analysis as a divergence between the expected and perceived service from a customer's perspective. They went on to state that there can be differences between the customer and the clients' view but in this case the difference is between how the security solutions are performing and how they ought to perform. Some differences have been identified through this research and that is what is addressed in this recommendation.

Gap analysis involves the comparison of the actual performance with what is expected to be achieved, that is, the potential or desired performance of any business, organisation, or service in industry (Well, 2018). An organisation is deemed as not using their full potential when they are not making use of their full current resources and overlooking capital or essential investment with their technology.

Gap analysis in this research is used to compare what has been achieved with the projected performance (Cohen et al., 1973). In projection in an organisation, it is particularly important to identify the shortfalls of the business at a given time which can help to predict future problems. According to Johnson *et al* (2014), when the strategic gap analysis is conducted, the gap identified can be small or big and the size will determine the extent to which the strategy will change.

Gap analysis is also applied to help consider what has been budgeted or allocated to a particular area of the retail business and the level of performance in relation to that allocation. This has helped to spotlight areas of current improvement that the retail supermarket needs, and the current capabilities needed to achieve set objectives. Gap analysis is also applied to benchmark the performance of the organisations under study against similar organisations in similar situations; in particular it has helped in creating a comparable crime prevention framework between the UK and other parts of the world. In every organisation, there is always a general expectation which has to be agreed by the management and once those performing the duties understand what is expected of them, the comparison will be between what is achieved and the expected outcomes. A shortfall becomes the gap which is the difference between the expected outcome and the actual.

Gap analysis has been applied here also so that retail supermarkets can identify what their business is currently doing and where they want to be in future especially in relation to reducing or minimising retail crimes.

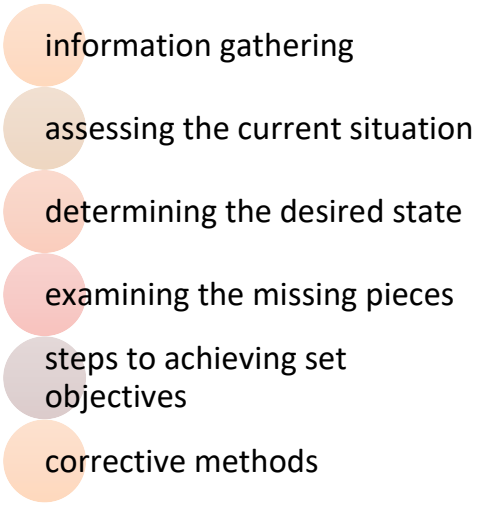
This analysis is needed to provide a solid foundation to measure the investment of money, time, and the manpower to achieve a required outcome in retail supermarkets. It is also used to measure how well the security solutions meet the targets required of them.

In strategic gap analysis, vital tools have been used to discover performance gaps in policies, processes, technology, and strategies with a decision of how the gaps can be closed.

This research has followed the six steps needed to conduct an effective gap analysis according to Alexander (2019) which he referred to as needs analysis.

6.2.1 Steps to conducting an Effective Gap Analysis

Figure 91: Steps to conducting an Effective Gap Analysis



The steps are discussed below.

a. **Information gathering**

The information needed has been gathered on the current business processes in terms of performance and how security solutions are distributed in the retail stores. The types of organisation under study have influenced the process of information gathering. The process of information gathering has been detailed in chapter four under data gathering.

b. Assessing the current situation

The current situation of the business has been known which included documenting the processes that the organisation have the resources and the technologies that are in place.

c. Determining the desired state

The desired state of the retail organisations was determined and how it would be met. This desired state is a drastic reduction in retail crime and several solutions were identified so that retail supermarkets could get to that state.

d. Examining the missing pieces

In determining where the gaps are, it was pertinent to examine the existing missing pieces in the processes, available resources, and organisational policies. These missing pieces were identified through the Ishikawa fishbone tool in existing security solutions which has helped to strategically outline the plan for a successful outcome.

e. Steps to achieving set objectives

Steps have been identified that will help achieve set objectives and goals which can connect to strategic planning and improvement of the organisation.

f. Corrective measures

Methods have been developed for corrective measures to fill the gap between the current performance and the desired goals that need to be achieved. The crime prevention framework has been developed for this purpose.

6.2.2 Strategic gap analysis in relation to the security solutions in retail supermarkets

There are standards set out by SIA (Security Industry Authority). These standards have also influenced the analysis carried out on retail supermarkets with the aim of knowing if they are being complied with or not. The current stand of retail supermarkets in relation to their approach and use of security solutions has been compared with the standards laid down by SIA. In the retail industry, the current competitive business environment has become particularly challenging that supermarkets must make it their priority to protect their valuable assets, staff,

and customers (Heru *et al*., 2011). Increase in demand for security solutions is usually caused by an increase in crime rate which might indicate that there are gaps in the efficiency of existing security solutions.

The security industry is a service industry and the services purchased by clients are for safety of their goods, customers, and staff. One of the well-known gap analyses that was developed was by Parasuraman et al. (1985) which focuses on the analysis of gaps between the services that the clients expect they will get and the actual that was delivered to them. This gap identification process has also been applied to this study and the steps are classified thus.

Gap A – the difference between the clients' expectations and the expectations of the management of the security service provider.

Gap B – the difference between the supermarket's perception of the quality of security solutions provided and how the service provider views the quality of the service delivery of the security solutions.

Gap C – the difference between the actual specification of the services demanded by the supermarket owners and the actual that was delivered.

Gap D – the difference between the actual performance and client's perception of the service.

Security companies that provide security solutions to retail supermarkets ought to strive to gain competitive advantage by closing identified gaps in the services they render to improve clients' satisfaction. This can help to reduce cost for the supermarkets, increasing profits and productivity, thereby maintaining the highest quality of their customer satisfaction, (News Bites, Nov 2019). Security companies must strive to be transparent in the services they deliver to retail supermarkets. The gap analysis has helped to develop steps that will be taken to know how the solutions are working and how satisfied the clients are.

One of the major areas of analysis will be identifying the gap in the security management compliance by security personnel (Munirul *et al.,* 2011). The outcome of the gap analysis will lead to recommendations for supermarket owners considering their desired security solutions. The analysis of gaps can help in the implementation of supermarket's security solution plan leading to the store's effectiveness in security operations (Sora, *et al.,* 2018).

Four aspects of strategic gap analysis developed by Sora et al (2018) has also been applied to the evaluation of the effectiveness of security solutions under study. These are steps that will be proposed to any retail supermarket making use of security solutions to go through for proper analysis of their security situation.

i. Identifying the security needs of the supermarket by assessing the current situation.
ii. Establishing the ideal or preferred situation of the organisation on security for future references.
iii. Finding out the gaps in the services that already exist which need to be filled. This is ascertained by analysing the difference between their current and ideal situation with regards to the security provision.
iv. Based on the gaps identified, a security implementation plan will be proposed for adoption to fill the gap.

The different gaps in the security solutions which may be identified will include performance gap, training gap, compliance gap, legitimacy gap, interconnectivity gap, conformance gap, ideal gap, factual gap, maintenance gap and expectation gap (Panwar, Hansen, & Kozak, 2012). The occurrence of these gaps is a probable indication of security failures which can be detrimental to lives and property in a retail supermarket setting. These gaps can also depict the likelihood that the supermarkets under study expect more from the security solutions they make use of in their premises. When these gaps are identified, the providers of the security solutions can discuss the responsiveness with the owners of the supermarkets.

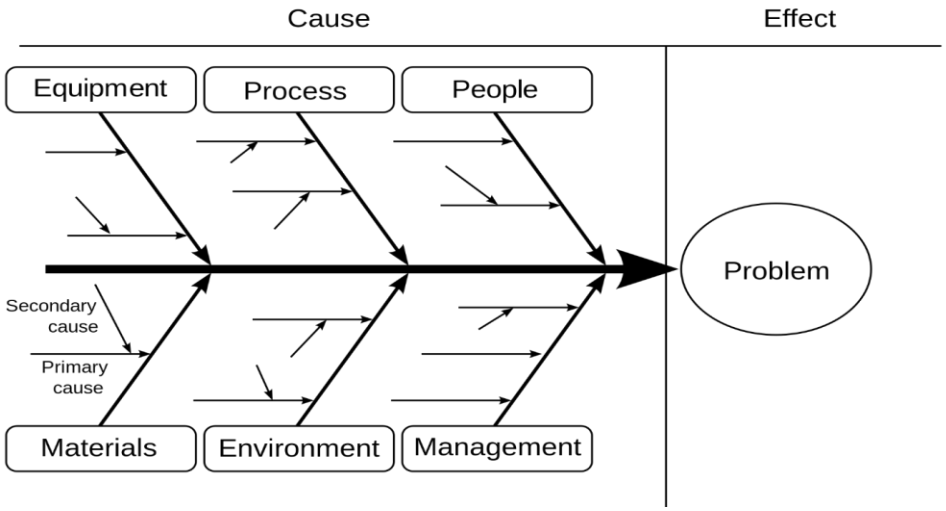
The importance of identifying these gaps is that the more they are left unattended, the more they widen which can adversely affect the survival of the supermarket and the security solutions. In examining these gaps, it would be necessary to find out where they are and their exact cause. Each Gap in security requires different solutions and identifying the gap is very crucial for the supermarkets with the aim of developing strategies to close them.

In the gap analysis, the historical trend of the security solutions has also been evaluated looking into where the gaps are, how they can be improved and closed, leading to the profitability of the stores. By analysing how the stores are currenting making use of security solutions, new ideas have been developed to close the identified gaps.

6.3 Applying the Ishikawa Fishbone Model

An important tool used to identify the causes of gaps in the provision of security solutions to retail supermarkets is based on the cause-effect framework of Ishikawa (1968). It is one of the tools used for strategic gap analysis to create more accurate models in research and improve both the accuracy of the cause and effect of a study (Komuraet al., 2023).

Image 7: The original Ishikawa Fishbone Diagram (1976)



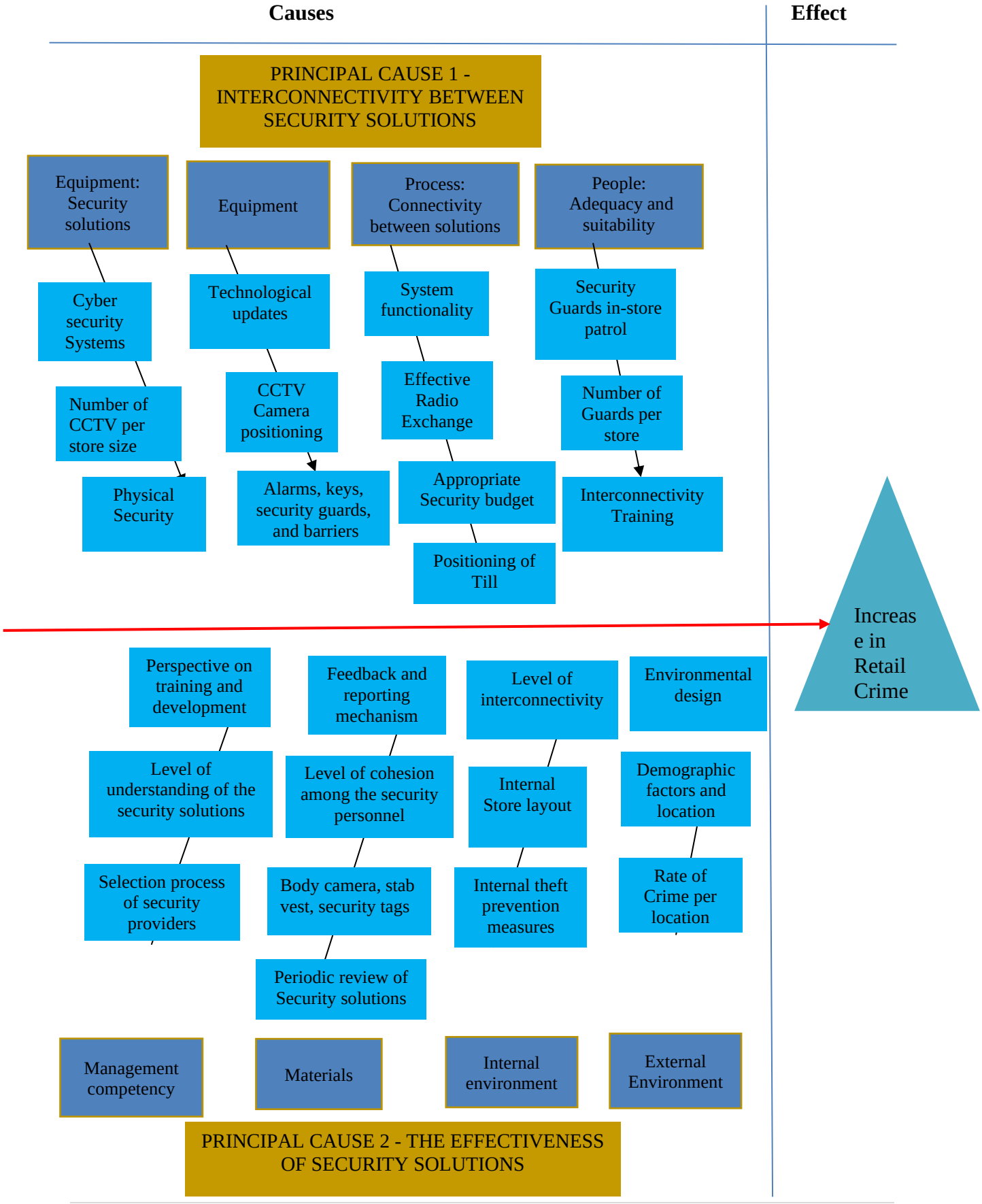
Source : https://enlaps.io/us/guide/ishikawa-diagram.html

Ishikawa (1968) developed this framework originally for the manufacturing industry which he termed the fishbone depicting the cause-effect diagram used as a tool to search for problems especially their roots (Slack *et al*., 2001).

Ishikawa fishbone analysis starts with the identification of causes of increase in retail crime from both the major and minor sources before the effects are treated.

From the research findings in the analysis of results, the following are principal and sub-categorised causes of retail crime which shall form the basis for recommendations. They are depicted in the diagram below.

Figure 92: Adapting the Fishbone Model for the Security Cause and Effect Analysis



The major causes are in yellow with sub-causes in blue while the effect is in red.

The fishbone analysis has been used to address security-related problems in the three security services used by retail supermarkets under study. It has also been used to formulate end-of-life strategies for deteriorating security systems which have been supported by many studies (Satyanarayana *et al.*, 2009).

6.3.1 Cause and Effect

A cause is the action that is enabling the problem to arise or continue. There are many causes that have led to an increase in crime in retail supermarkets. A major or notable cause is related to security failure as security solutions are employed to combat crime and when the required result is not visible, the fault must be traced back to the system employed.

According to the variables in the hypothesis tested through this research, the independent variables are the major causes of crime; the interconnectivity of security solutions and their effectiveness, while the dependent variable is the effect and that is an increase in crime rate in retail supermarkets.

The fishbone diagram illustrates how the cause-and-effect analysis is carried out. It is used to examine different causes of the probable failure of security solutions.

6.3.1.1 Causes

Ishikawa (1968) has categorised causes as equipment, materials, process, people, environment, and management. These are discussed below based on the findings of this research.

A. Equipment - Security solutions

The major equipment needed in security service provision are related to the three security solutions under study. Major causes are identified in the equipment used in cyber security and the need for technological updating of cyber systems for online protection of customers. It also includes problems with CCTV in terms of the number of CCTV per store size and CCTV Camera positioning which should aid apprehension of criminals. Problems were identified also with physical security measures such as alarms, keys, security guards, barriers, and perimeter control of stores.

Other problems identified with equipment have to do with proper security uniform which is for identification, deterrent, and the legitimate authority for security personnel to act on behalf of the store and their company. When uniforms are not made in such a way that security personnel

can be distinguished in stores or visible in such a way that everyone knows who they are, then deterrence of criminals might be low.

B. Process

Process has to do with the smoothness of the delivery of security services. It is there for the deterring and arresting of criminals, communication among security personnel and providing maximum security for the shoppers. Laxity in process leads to an increase in retail crime. Issues identified with the process come from lack of connectivity between security solutions**,** low system functionality, ineffective radio exchange, low security budget and the positioning of the till.

C. People

These are the security personnel in the shopfloor, the CCTV operators and store management team who will be securing the store through CCTV, Security personnel and Cyber Security. Causes of increase in retail crime have been identified to arise from the inadequacy and non-suitability of security personnel employed as security guards or CCTV operators. Lack of interconnectivity training for these security staff has led to ineffective working relationships. Lack of monitoring of security guard patrol in stores and even the lower number of guards per store have all aided the increase in retail crime.

D. Material

Materials can be classified as hard and soft. Hard materials for security management are materials that should be provided adequately and in working conditions for security guards. Inadequate or untimely provision of these materials are causes that aid retail crimes in supermarkets. These include body cameras, stab vest and working radio for communication with management and colleagues. Tags on expensive products are also materials that deter criminal activities. Soft materials are provided through security information which are used for effective security management and crime deterrence. These types of materials are from the information received from the periodic review of security solutions. They are also from the established feedback and reporting mechanisms such as logbook updates and incidents reporting. The level of cohesion among security personnel is also a material for deterrence of retail crimes.

E. Environment

The environment of the supermarket consists of both the internal and external situations that affect retail crime occurrence. The internal environment is lacking in internal theft prevention measures as the rate of employee theft is found to be on the increase. Another cause is the internal store layout, which should be seriously considered when constructing a retail supermarket. The internal environment is seen in the level or ease of interconnectivity among security solutions which has affected retail crime occurrence. Improper positioning of CCTV cameras in stores can encourage internal (employees) and external criminals (shoplifters).

Another issue with the environment arose from outside which is the external environment. The demography of some of the stores has played a major role in the persistent occurrence of retail crime. The rate of crime per location is a major determinant as the location of the store and the demography of the people around the location have encouraged the experience of crime. The environmental design is another issue, and this has to do with the structural layout of the store.

F. Management

The management are those that make the major decisions that affect security service provision, and they are either from the security service provider or the retail supermarket. The store managers, assistant managers and supervisors are also in this category. The competency of the management of retail supermarkets affects the selection process of security providers which might be as a result of their level of understanding of security solutions. The perspectives of these management both of the security service providers and the retail supermarkets on training and development have impacted the level of crime in retail supermarkets. The selection process of security service providers have been seen to be untidy and less rigorous which has led to the supply of inadequate security solutions causing ineffectiveness in combating retail crime.

6.3.1.2 Target Problems: Retail Crime

There are different types of crimes committed in a retail setting. The recommendation cannot be made without discussing the identified problems in this study which is the effect brought forward using the Ishikawa model. Below are the examples of retail crime as extracted from the responses of the participants.

a. Shoplifting

Shoplifting can be defined as the act of stealing from a supermarket by a customer during the opening hours of the business (Francis, 1979). It is the most rampant of retail crimes identified in this study. However, its causes have been identified in this research and the goal is to reduce its occurrence.

b. Self-scanning Theft

Self-scanning is also known as self-service technology (SSTs) which is a technological interface that gives the customer opportunity to serve themselves without direct employees' involvement (Fernandes *et al*., 2016).

Many supermarkets including Aldi and Sainsburys have now installed self-scanning machines which have been associated with an increase in shoplifting. It is not the installation of the self-scanning itself that causes the retail theft, it is associated with the effectiveness of security monitoring devices and laxity in management control.

c. Employee Theft

Employee theft is also one the major crimes identified in this research as employees have been found to steal by colluding with customers who are friends, relatives or outsiders who intimidate them. They carry out this crime by deliberately over-looking to scan goods bought by their collaborators, give excess change or place goods where they can steal them later. Goods can be left near the waste bins for later collection and sometimes fake refunds can be given to their friends for goods that are not bought. There are many causes identified with this crime and some of them include the management's insensitivity to employees' plight, wrong positioning of CCTV cameras among others.

d. Suppliers & Warehouse Theft

The retailers found out that lots of fraud occurs involving the warehouses and suppliers.

Warehouses are distribution centres that operate 24 hours, and this is where large-scale as well as small-scale thefts occur.

Warehouse theft occurs where there are no strong security processes. good security systems, a good warehouse management software and good hiring criteria to make sure that honest staff

are hired. When there is no monitoring, planning, and forecasting, or absence of CCTV cameras in the warehouse, the criminals among the employees strategically use that as an opportunity to hide goods.

e. Errors

Internal thieves capitalise on errors that come through planned sales, wrong computer prices and goods mistakenly taken to other stores. Improper and ineffective computer recording systems, incorrect information in the central system, maladministration and staff failing to adhere to the company procedures are causes of errors that retail criminals capitalise on.

f. Refund Fraud

Criminals defraud supermarkets by returning the goods stolen from the store and claiming money from such. They steal receipts and try to come and pick up items that will match such receipts. They engage in "wardrobing" or "free renting" where they buy a product, use it, and return it to get the money back. All these happen as a result of lack of interconnectivity between security solutions.

g. Burglary

Stores have reported burglaries at night or during major public holidays. Major causes of burglaries are from both the internal and external environment of the store. Internal environment has to do with the layout of the store and leakage of information from criminal employees. External environment is related to the demography of the store and where the store is located. Lower security budget for a high-risk store will open the door for burglars.

h. Vandalism

Vandalism of properties and premises is an occurrence in retail supermarkets located in high-risk areas. Although vandalism is a crime that is difficult to curtail retail premises, a reduction in security budget and lack of regular police patrol can increase crimes like burglaries and vandalism.

i. Online Scams

With the massive movement towards online sales, faster checkout, and prompt delivery, customers are now more prone to fraud. This is caused by online security breaches which make it possible for fraudsters to hijack customers' data digitally and use them to commit fraud or rake in debts in the name of the customers. Lack of constant monitoring and adequate

investment in cybersecurity will put customers at risk and make the company vulnerable to criminals who are smarter than them.

j. Violence and Threats Against Employees

Violence against employees is one of the major problems that retail supermarkets battle with. Violence occurs when shoplifters are challenged while stealing from the store especially when they are under the influence of drugs or alcohol. Lack of backups for security guards, inadequate security guards in stores and low police response time are causes that aggravate violence against employees.

6.3.1.3 Mixing Causes and Effects

Having identified the causes and the subsequent effects, below is the mixture of how the causes bring effects. The essence of this is to help retail supermarkets recognise immediate signs of ineffectiveness in security solutions and take steps towards correcting them so retail crimes can be prevented or minimised.

A. *Failure of security guards to regularly patrol the shopfloor.*

When the guards are not patrolling the store more often, they will easily miss out when the criminals enter the store and hide goods or products in their person or bags.

B. *Incompetent security staff.*

When the security staff are incompetent, they will not be able to discharge their duties diligently and effectively. This incompetence must be identified straight from recruitment and selection.

C. *Lack of adequate communication:*

When security personnel or operators cannot communicate effectively either as an individual or problems that arise from outdated gadgets, their performance will be affected. They will not be able to relate to the customers, criminals, and colleagues. Lack of proper communication can lead to a serious misunderstanding that can make a criminal escape or mismanaged.

D. *Lack of continuous professional training for security personnel.*

Every profession needs continuous training or upskilling on the field, the security personnel and the operators need to continue learning things to increase their performance in the supermarkets. Training must cover both internal and external aspects of their job.

E. *Lack of support from the management when an incident occurs.*

Some participants complained that when incidents occur in the store, especially where there is

only one guard on duty, they sometimes lack support from the management thus endangering the lives of concerned guards.

F. *Mismatching security personnel with varying levels of experience.*

Some of the participants stated that security guards should be attached to a store depending on their experience and performance. When an inexperienced guard will fail if he is allocated to a challenging store.

G. *Nonchalant security personnel.*

Nonchalant security guards are an encouragement to retail criminals. Their nonchalant attitude shows on their faces or the way they react to situations. Noticing such an attitude and failure to address it will lead to more criminal activities in the store.

H. *Not enough support from the head office.*

When challenging situations occur, the first thing a security personnel wants to do is to get in touch with the control room. But when the control room is not reachable or fails to return the calls to give the guard directives, mistakes will occur in making timely decisions.

I. *Obsolete CCTV cameras.*

The participants stated that the cameras in some of their stores were too old, not visible enough, not proficient enough to be used to follow the criminals and know the products they are picking. Images from such cameras can be too blurred to be used in court for a criminal conviction.

J. *Police not responding:*

Situations arise all the time that will warrant assistance from the police. When the security personnel need such assistance from the police in arresting shoplifters or troublemakers, most times they do not turn up unless the shoplifter is becoming violent and sometimes before they will arrive at the scene, damages must have been done.

K. *Reduction in security expenditure.*

As things are becoming difficult economically, many businesses are cutting their expenditure on security despite the increase in crime. Such cuts have also affected the security budget, which automatically affects the hours the security guards work and the type of security solutions they use.

L. *Security personnel are not vigilant enough.*

Lack of vigilance from security guards to his environment can make criminals get away with crime. The management must be alert to security guards that do not concentrate while on duty. Such lack of concentration comes from idle chatting with customers, checking their phones and lack of patrol.

M. *Security solutions not sufficient to curtail crime.*

When security solutions are insufficient to combat crime, supermarkets pay a huge price in terms of criminal infiltration into the store. Some areas need more security personnel and more hours for the security personnel but when the management of the supermarket decide to cut down because they want to save cost criminals will make them incur such costs at the end of the day.

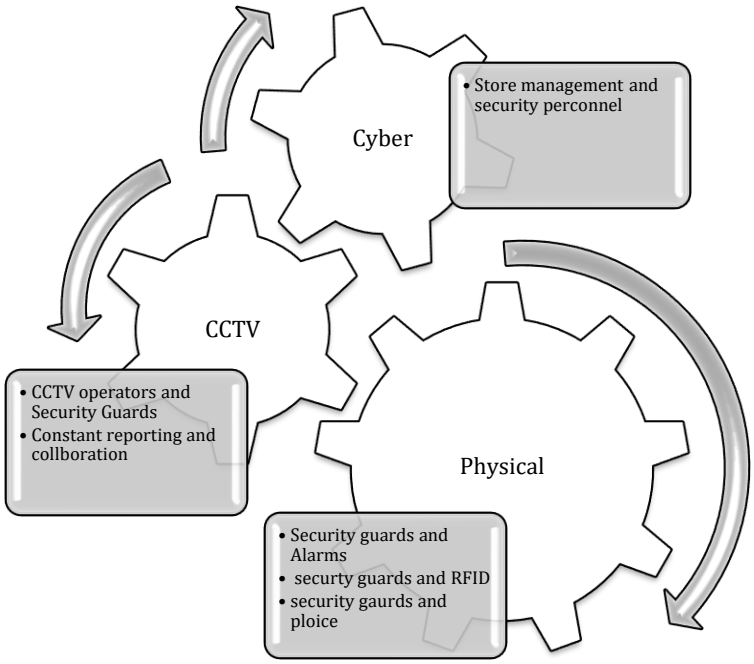
N. *Sick security guards are not promptly replaced*.

Security guards can call in sick on critical days, but it should not lead to vulnerability of the store to criminals as systems must have been put in place to ensure prompt replacement. Where this is lacking because of management laxity or cost cuts, the store will be vulnerable to criminal activities which can disrupt business.

6.4 Recommendations: Bridging the Strategic Gap

It is not just important to identify problems or effects, this research is set out to proffer solutions to retail supermarkets so retail crime could be reduced or prevented. This is the bridging of the gap identified through gap analysis of the actual performance of security solutions and the potential or targets intended by retail supermarkets. The gaps have been identified in the interconnected use of security solutions, their delivery and effectiveness in relation to crime reduction in retail supermarkets. These recommendations have been supported by previous research to establish their authenticity as well as their originality from the research carried out in this study.

Figure 93: Interconnectivity of security solutions



6.4.1 The Interconnectivity between Security Solutions

The three security solutions, physical, cyber and systems security are used as surveillance to protect goods, customers, employees, and property. They also help to provide maximum observation and drive effectiveness in protecting goods and premises. (Fennelly, 2004).

Alarms are aspects of physical security which have many layers aimed at protecting the goods in the store. During the planning of a supermarket, the management must ensure that the physical security survey is carried out to identify the vulnerabilities of the store against known or suspected threats which security solutions must be applied to(Fennelly, 2004).

The guards work with the alarms augment barriers to prevent shoplifters from escaping while the CCTV operators monitor the customers' behaviour in order to identify potential criminals which they then communicate to the guards and the management of the store. The three solutions working together are known as detecting processes (Fennelly,2004).

The alarm systems can be used to alert the security guards of any potential crime while the barriers will slow the intruder down.

When an audible alarm system sounds in the store, the alert mechanism that signals the presence of an intruder will also be used to call the attention of the security personnel through

the personal store Blip or radio they usually carry on themselves while the store employees are alerted through the system in the office (Fennelly, 2004). The audible alarm can serve as deterrence to shoplifters as the noise will call the attention of everyone to the alarm activation in the store.

There are many types of alarms within the physical security profile, but the most commonly used systems are intrusion detection and fire detection. The intrusion detection is used to detect the particular area that has been compromised while fire detection will detect smoke and fire. Anti-viruses are installed in systems to protect them against attack or corruption of data.

When there is a suspected attack in the first layer of the store parameter area, sounding the alarm serves as a warning that security has been compromised there by alerting the physical security personnel and the store team.

6.4.1.1 Connectivity between the Guards and the Alarms Systems

Alarms are used to protect properties and products in a supermarket and also to alert the store team or security personnel that there is an intruder.

Alarms can only be effective when the security personnel or police respond. Alarms are usually connected to security systems in order to alert security operatives of any intrusion, When the connectivity is broken it will be impossible for the security personnel to know or respond to such intrusion as required. This then renders the alarm ineffective which means that the management must ensure effective interconnectivity between security apparatus in their store. When an alarm is not connected to the system, it nullifies the alerting mechanism and as such there will be no response from the security personnel and the management team in case of intrusion.

The security personnel should identify the current and potential vulnerabilities of the store so that alarms will be connected to those places or products. Security personnel will be alerted when augmented barriers are tampered with. Alarms are important to the security personnel, the management team, the alarm company, and the law enforcement agency like the police (Fennelly, 2004). The Alarm Alert Mechanism (AAM) is used to slow the shoplifter down before a security personnel arrives. Alarms in the supermarkets must be audible which also serves as a deterrent to the culprit as the guard will be alerted when the alarm is activated.

Supermarkets must have two layers of alarms where expensive products are kept, when the first layer is tampered, this will alert the security personnel before the shoplifter reaches the second layer where the products are kept. There are situations where the perpetrators try to test

the alarms by causing their activation and watching the response from the store team or security personnel. Lack of immediate response will give the shoplifter a signal that they have enough time to carry out their illegal activity in the store. It is important that alarms should be periodically tested by store management and the security personnel should know when the alarms are not in good condition. The management should also test the response of the security guards sometimes to know their alertness level.

In supermarkets, as the security guards and the CCTV operators cannot be everywhere, the alarms are used to protect areas that might be ignored, obscure or in need of constant security.

6.4.1.2 Connectivity between the Radio Frequency Identification (RFID) System and the Security Personnel

Radio frequency identification (RFID) is the technology that uses wireless radio waves to identify tagged products in supermarkets (Wu *et al*.,2019). This can be used to track items from when they are picked on the shopfloor until the goods pass through the till. If the goods are not paid for, the alarm will sound there by alerting the security personnel. The security personnel or the store team member will take the item which has missed scanning in order to pass security. Supermarkets are using this now especially for self-purchase as recently started by Sainsbury supermarket. Sometimes the use of RFID technology and the barcode scanning system can spark some problems which can be identified and dealt with by a member of the team (Gao *et al.,* 2014; Sujing *et al.,* 2010). They can use Time Division Multiple Access (TDMA) to solve the problem as this is used to monitor collisions which is widely used in digital mobile radio systems (Wei *et al.,* 2012).

The TDMA gives available channels to multiple users based on time allocated.

When this system is designed, it involves networking with the team through the database, and the RFID technology (Wu et al.,2019). The use of these systems through their connectivity with other security systems leads to high efficiency, accuracy, and effectiveness of the team (Li *et a*l., 2014).

These systems work for self-checkout, and anti-theft measures in a supermarket.

Image 8: Self-checkout machines at Aldi supermarket



Source: Retail Gazette (2019) accessed online at https://www.retailgazette.co.uk/blog/2019/04/aldi-launches-self-service-checkouts/

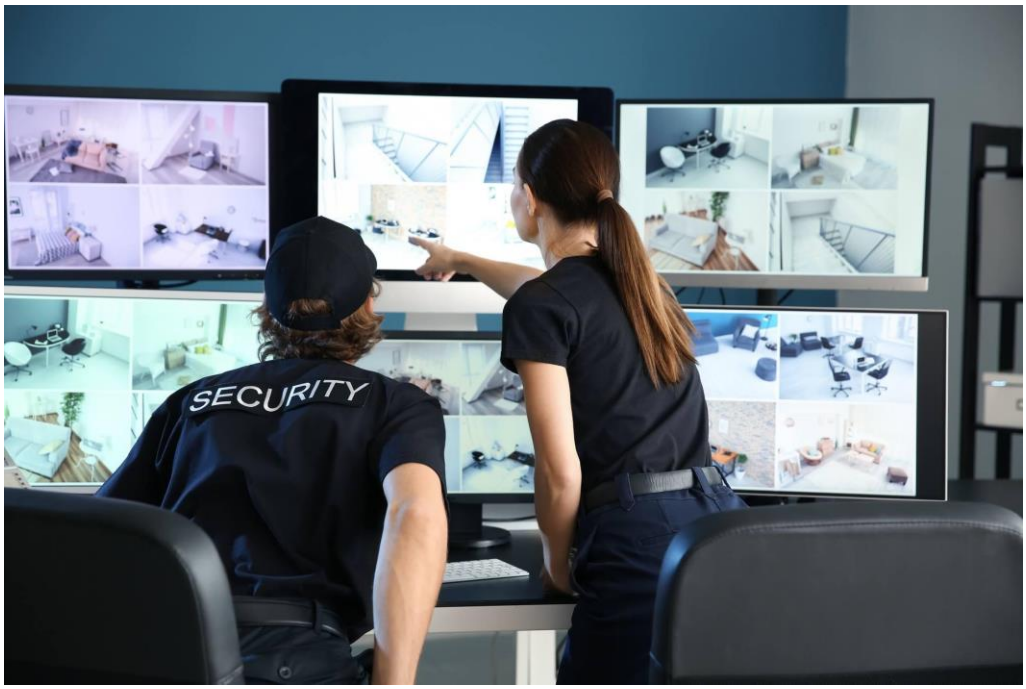
The self-checkout machines use the binary search algorithm to avoid the collision of the plurality of the electronic tags in the customers shopping, and also to determine the achievement of the functions of the check out for customers at a specific area which is also manned by the security personnel.

The use of self-purchase is similar to self-checkout. The goods are identified in a particular area and are counted to meet the clutter of purchase of small items so as to nullify artificial statistics of products passing through the self-checkout machine. but this also has to be supervised by the management or security personnel.

6.4.1.3 Connectivity between the CCTV Operators and Security Guard

The presence of closed-circuit television (CCTV) in the supermarket and the surrounding has grown enormously in the last few years (Seen *et al.,* 1998). The effectiveness in crime prevention can be infrequent with when there are only security personnel working than when cameras are installed to work with the security personnel.

Image 9: CCTV operators working with security guards to detect crime



Source : https://www.precisionfm.co.uk/services/security-services/

There are concerns relating to the effectiveness of CCTV on crime reduction when they are installed to work alone or the CCTV operators working without effective collaboration with the security personnel on ground. Crime prevention or reduction can be very effective when the operators of CCTV work with security personnel on the ground. This can also lead to the geographical displacement of offenders or criminals moving to a different store (Repetto 1976; Barr, and Pease 1990).

Connectivity can also be enhanced between CCTV recording and security guarding when security personnel make use of a bodily-worn camera (BWC). The video recording in the BWC can be used as additional evidence in prosecuting criminals. So, it is very important for retail supermarkets to ensure that their security guard puts on the BWC so that claims against criminals can be substantiated.

Image 10: Bodily-worn Camera on a security guard



Source: https://www.css.limited/blog/security/2-reasons-why-body-cameras-security-guards-are-so-important (Carter security August 2018, accessed on 19/09/2023)

Another example of the interconnected work between security guards and CCTV operation is seen in the concealment detector camera rolled out by Sainsbury's.

Image 11: New Concealment detector camera for Sainsbury's



Source: online at https://www.chargedretail.co.uk/2020/08/12/sainsburys-is-catching-thieves-with-ai-as-it-rolls-out-new-concealment-detector-tech/

According to Ben Stevens (Retail Tech News, 2020), Sainsbury's has taken a giant step to initiate a drastic reduction in shoplifting and catching thieves in their stores nationwide. This is referred to as a concealment detector which uses artificial intelligence to detect and record when a shopper places an item in their pocket or coat instead of baskets or trolley. As soon as the technology detects a concealment or a customer behaving suspiciously especially in high priced product isles like the spirits' aisle, a four second video will be sent to the security personnel immediately. This is an interconnected work between security solutions as the CCTV on its own cannot apprehend thieves but as soon as security guards receive the alert from the video recording, they swing into action. This invention has helped prevent 5591 thefts representing 50 per cent of all attempted thefts where it was installed.

6.4.1.4 The Working Relationship Between the Store Management and Security Personnel for Effective Cybersecurity

Cybersecurity is the system used in organisations to deter criminals from having access to online sensitive information belonging to the organisation and their customers.

The paradigm shift of Internet of Things and the emergence of the edge computing concept have many potentials for future IoT applications in the supermarkets, smart homes, security transit vans for transferring money and valuables, and the energy that is used in the stores which are programmed to switch off at certain time when not in use (Pan, 2018). This brought many challenges to physical, system and cyber securities leading to more effective interconnectivity between the three security solutions.

Most of the security data needed to protect the goods will be collected and processed through a centralised structure and sent to a small data centre that is used for storage, processing, and networking. Goods that have passed through this process are certified for payment at the till. This security information can be assessed by the management team anytime through an inbuilt system called cloud architect which is designed to protect the security device and lower the cost of employing a software manager to monitor the device round the clock.

As most systems in the supermarkets are centralised, this brings about a paradigm shift to the Internet of Things (IotT) meaning the massive number of mobile and wireless devices at the bottom of the Internet Hierarchy can be connected, generating a huge amount of data at high speed which must be protected. As there are thousands of products being sold in the supermarkets every minute, it is almost infeasible for the system to process each item through the security device, the management will be alerted when the security device is not picking up the goods and when the data has been corrupted.

There are times when malicious attacks on the system can jampack its storage, this can bring security breaches there by making the organisation very vulnerable. All these must be properly looked into if the reputation of the supermarket would be protected so they do not lose customers to internet hijackers. More funds should be made available for up-to-date software while systems must be put in place to ensure automatic updates of management software.

6.4.1.5 Working Partnership with the Police

The management of supermarkets should ensure a better working relationship between the security personnel, the CCTV operators and the police thus forming a more beneficial partnership in crime reduction. They should exchange more knowledge in Crimewatch so that known shoplifters and criminals that live in the locality of the store can be monitored and apprehended seamlessly.

Those working in the store must be inducted well into government guidelines so that they will not be going contrary to the law ignorantly.

6.4.1.6 Benefits of Interconnective Security Solutions

The following have been identified from the research participants' responses on the perceived benefits of interconnective working of security solutions (physical security, CCTV, and cybersecurity). These are recommended to retail supermarkets in the UK.

A. *Combining the three maximises the security of the store and stakeholders.* In a supermarket where there is interconnected use of CCTV, Security personnel and Cyber Security, the employees, clients, and customers will feel safer. When the customers and employees of the supermarket are aware that the three security solutions are operational, everyone feels safer thus fostering a good working environment while customers feel safe doing their shopping. The three security solutions also enhance the performance of the employees as they assure them of maximum security, which subsequently accelerates the productivity of the shop.

B. *Crime is reduced or prevented when the three solutions are in use.* The interconnected use of the three security solutions reduces crime in the store. When they work as a team, relating to each other and carrying each other along on the situations and occurrences in stores, criminals are deterred.

C. *Interconnected security solutions minimise retail loss.* Retail loss is always associated with shrinkage which Sennewald and Christman (2008) define as the difference between book inventory and the actual physical inventory. Applying the three security solutions will reduce

losses in many departments arising from both internal and external theft.

6.4.2 Improvement Recommendations

The interconnected use of the three security solutions have been appraised and the benefits of using them interconnected have been discussed.
There are areas of suggested improvements on each security solution as extracted from participants' responses which are discussed below.

6.4.2.1 Better Security Communication

A. *Better security communication device:* retail supermarkets should invest more in better communication for security personnel such as two-way radio, so they are able to communicate among themselves and other employees. The use of Device-to-device (D2D) communications is a necessary and promising technology for the next generation that can allow high output and reduce communication delays through the radio (Hamoud et al., 2017). The prompt response of the personnel is essential as in security every minute/second matter and radio can help towards this trajectory. Some of the stores do not have good radios and these can put the employees and security personnel at risk when dealing with isolated incidents.

Image 12: Security communications device



Source: https://www.chicomm.com/blog/professional-radios-or-commercial-radios-which-do-you-need (Chicomm Blog, May 2023).

B. *Clearer instructions to security guards:* Security guards and the security solutions operators must be given clearer instructions on what needs to be done, how they should perform their

duties and be promptly advised of any changes in a particular supermarket relating to security issues.

Some stores do not have routine training for new security personnel either in security guarding or CCTV operation as they start their new role. The management must provide a welcome package for the newcomers that will help them deliver their job effectively.

6.4.2.2 Improvement Strategies for CCTV

There are recommendations on CCTV improvements that will help reduce retail crime. These include the following.

a. *Provision of Better CCTV cameras:* Some of the CCTV cameras in stores reached for this research are old according to participants as they do not record or do what they are meant for. Some of the participants suggested that a good CCTV system would reduce crime. So, retail supermarkets should invest in the latest cameras so that crime recordings will be clearer and fit for prosecution.
b. *Better positioning of CCTV cameras:* Some CCTV cameras are not strategically positioned in the sense that they miss certain crimes or fail to detect criminals that come in stores. When the cameras are not positioned in areas that are more prone to theft, the goods might easily be stolen, and shoplifters leave unnoticed.
c. *A more proactive approach to reviewing footage and identifying potential threats:* There should be *r*eal-time monitoring of CCTV feeds. Incidences should be reviewed proactively by looking at what caused them in the past as this might help prevention in the future.
d. *A more proactive maintenance of CCTV cameras:* CCTV cameras are equipment and as such they must be properly maintained. There have been instances where CCTV cameras have not been able to replay incidents leading to a loss of evidence. Proactive maintenance means that the supermarket does not need to wait for issues to rise before fixing them, cameras are to be checked for effectiveness. Obsolete cameras are detected during routine checkups, and they can easily be replaced.
e. Supermarkets should invest more in the latest technologically advanced cameras like concealment detectors rolled out by Sainsbury's.

6.4.2.3 Improvement Strategies for Cybersecurity

Hackers have been seen to get access by pretending to be one of the legitimate users of a configured system of a supermarket. Management must ensure they use up to date firewalls to prevent this type of attack. Also, to tackle this security challenge, a different Internet Protocol (IP) address can be used which can only prevent outside attack but not inside attack. The systems in the supermarket should create cryptography that will be recognised by the IoT devices, this will prevent the outside world from intruding while also ensuring that the employees pass through strict procedures to get access.

Some companies use IoT devices that can easily be attacked due to limited resources. Supermarkets need a degree of protection against potential attacks. As some supermarkets face fierce competitive price wars, they look for lightweight methods to save cost and certain algorithms to balance the security and power consumption of the devices, which can cause the systems to be easily targeted.

Heiney (2020) prescribed four major strategies that can help retail organisations become more effective with their cybersecurity. It is depicted in the diagram below.

Image 13: Improvement strategies for effective cybersecurity



Source : https://www.imperosoftware.com/blog/cyber-security-trends/

From the above diagram, these improvement strategies can be broken down into four major parts according to Heiney (2020) and they are; encryption, authentication, compliance, and consolidation. These have been broken down into smaller bits for easier discussion.

A. ***Compliance****: better* ***compliance*** *with industry standards on cybersecurity.* Every business should be aware of cyber standards, including Aldi and Sainsbury. There is the need for more investment in compliant-remote control software because of global policies relating to GPPR, CCPA, and PCI DSS standards. With a comprehensive control solution, they can be sure that their business is compliant in every way and with this they avoid penalties.
B. *Invest in stronger antivirus:* There are few of the participants that stated that the store antivirus might be weak which could easily render their systems vulnerable to cyber-attacks. There is the need for more investment in stronger antivirus that can prevent cyber trolling of customers details and system attack.
C. *More education in cybersecurity for staff:* Most employees of the supermarkets do not know anything about cybersecurity. Personnel involved primarily in cybersecurity are usually trained in such matters but there should be training and education on cybersecurity for everyone involved in the online business of the organisation. This ensures that employees are more aware of cybercrimes and what to watch out for. Such training should also include best practices in cybersecurity as lack of awareness in such areas can put the company in more cyber mess.
D. *Periodic review of systems and customer information*: The system should be checked regularly, and customers' information must be monitored to make sure that they do not end up in the wrong hands.

E. *Regular software updates*: Cybersecurity users in the organisation should be conversant with available and necessary updates of software including when the systems are due for such updates. Neglect of updates will lead to outdated software creating leeway for cybercriminal activities.

F. ***Encryption***: *Review encryption protocols*. There must be a periodic review of systems in place that the supermarket uses to transmit credit cards and bank details to avoid identity fraud. Retail supermarkets must invest in higher levels of encryption which are necessary to protect customers and company data.

G. *Stronger password policies:* They must ensure that their passwords are strong enough to the extent that criminals cannot guess or copy them easily.

G. ***Authentication****:* authentication is important across the company's networks. This is in the form of multi-factor authentication for customers so that their details are not easily changed or stolen by cyber criminals. This will also prevent malicious attackers from entering the system through their sophisticated practices.

I. ***Consolidate platforms***: retail supermarkets commonly use multiple platforms and devices to project their businesses and even streamline them. To ensure cybersecurity control, the management must understand the importance and safety of using a stop solution platform that supports end-users with multi-dimensional connectivity. This will mitigate cybersecurity threats.

6.4.2.4 Improvement Strategies for Physical Security

There are strategies needed to improve the physical security of a retail supermarket.

a. *Consistency of security service provision and quality.* There should be consistency in the provision of security solutions in that the hours and days that have been allocated to the companies must be covered. There should never be working or opening hours that are not covered by a security guard on duty. There should be a coefficient standard to measure the expected and actual services and/or quality of the guards.

b. *Improvement in security personnel attendance and punctuality:* Managers must not take punctuality and attendance of guards with levity. Shifts must be promptly and constantly covered with systems in place for late reporting.

c. *Increase the number of security guards:* guards must be employed based on the needs of the supermarket. Busier and bigger stores must increase the number of security personnel as advised by some of the participants. The need for more security personnel has to do with dealing with multiple incidents that occur in busy stores.

d. *Proactive approach to identifying security threats:* Security personnel should be assessed on proactive capabilities which is sensing criminal tendencies in shoplifters before they commit any crime. Their training should involve proper identification of signs of criminal acts as this can help in preventing the escalation of situations that might be detrimental.

e. *Installation of security barriers:* Barriers are aspects of physical security which must be installed in every checkout of the store and some areas where customers are not allowed to enter. This will prevent customers or shoplifters from passing through the till that is not open for operation as this is where stores lose products.

f. *Improved Anti-theft System:* **S**tores are encouraged to have in place anti-theft systems

to protect some of their expensive products which are susceptible to theft. These include electrical equipment like mobile phones and tablets. There can be a "Big Box" in the store where all these are stored that when it is tampered with, the alarm will go off calling the attention of security personnel and the shopfloor attendants. The sensors in these systems are very effective in triggering a switch when the circuit is broken, and this will notify the employees to where the items are secured. As technology is changing often, the supermarket should invest in new technology to deal with continually evolving challenges faced in the current times.

g. *Banning Order*: Supermarkets started implementing antisocial behaviour order in the UK in 2004 (Donoghue, 2008). This is placing bans on those that have committed crime in the stores or other stores from shopping or entering any of the stores. Facial recognition technology is increasingly being used to identify banned shoplifters and troublesome customers. Retail supermarkets need to invest more in this technology by improving on it with the latest artificial intelligence which updates the list of shoplifters on crime watchlist. This helps to reduce shoplifting and violence against staff thus reducing police interventions as criminals are barred from shopping as soon as they enter the store. The security guards must follow the principle of SCONE before arresting or banning anyone in the store as failure to do that can lead to unlawful arrest.

6.4.2.5 Management related improvements

There are improvements proposed for the management of retail stores which will aid the effectiveness of security solutions.

a. *Compliance with security standards:* The management of the supermarket should ensure that they work with reputable security companies. These are those who have the right licences to operate as there are many mushroom security outfits that offer services at a cheaper rate but with substandard security solutions. They must also ensure that guards supplied have a valid SIA licence as required by the Security Act 2001 in the UK. A licensed security guard must have undergone first aid and security training with examination passed before issuance of licences.

b. *Using an approved contractor:* Security industry authority (SIA) is an organisation that was set up by the government to regulate security companies. They do this by setting standards that security companies must meet before they attain the status of an approved contractor. When retail supermarkets employ the services of an approved contractor, it

is easier for them to measure the quality of their services against set criteria relating to their duties. Using an approved contractor will help the supermarket to ensure that those working in their stores have required licences and work permits as it is an offence to work in this industry without these requirements. Having an approved contractor will also ensure monthly meetings are held to assess and discuss how the security services provided have performed in all aspects within the month. It also ensures that supermarkets do not just employ security guards without vetting them within three months of being employed. These steps will ensure consistency in security measures across different stores. This will also ensure greater safety for staff as measures like this show the employees and the security personnel that their employers have their interest at heart, which motivates them to give their best to the company.

c. *Provide* im*proved training packages for security personnel:* although security personnel are trained professionally before their employment with retail supermarkets, yet the management should provide continuous improvement training for them and other security operators. This will be upskilling the staff for the betterment of the organisation. A more structured approach to training and assigning security personnel should be put in place. Staff induction at every level in a retail store should include security matters.
d. *More cooperation and collaboration between providers and client's staff:* The management should foster better working relationships with providers of security solutions. They should not shy away from letting security providers know if there is a gap between the actual and expected performance of security solutions provided with the aim of developing strategies that can fill those gaps.
e. *The ratio of security service to retail crime should be balanced.* The management should ensure that the security solutions employed correlate with the demands of the store. Each store should use the right security solution suited to their needs.
f. *Regular security Audits.* The management should not trivialise regular checks on the performance of the security solutions. This should be done by experts who can recognize security issues and report accurately on the performance or non-performance of security systems.

Tips for management in choosing Security service providers.

The following are tips for the management when choosing a security service provider apart from the main requirement of being an approved contractor.

The Security service provider must be more proactive in their adoption of new developments in security solutions. The security providers should be conversant with new training and newly improved security solutions suitable for retail security.

There should be continuous training for the guards and the time should be arranged with the management for proper arrangement of shift covering during training. Such training must also be according to industry standards.

Security providers must be ones that have systems in place for faster response to security problems. There should be frequent supervision of the security guards and the clients, which gives the management team the opportunity to know what is happening and what to do when urgent issues arise.

Security providers that can cooperate more with clients on security matters by paying periodic visits to client stores to conduct the job assessment of their staff. By visiting the staff in the supermarkets, KPI can be tailored towards the needs of the clients and needed improvement can be made.

6.4.3 Minimising Retail Crime

Retail crime is a major depressant to the economy and as such it is pertinent to discuss steps to minimise it. Before strategies are developed to minimise crime, it is important to examine the three main participants in retail crime. These include boosters, handlers, and fencers; they are discussed below.

6.4.3.1 Three Main Participants in Crime

Boosters: these are professional shoplifters who usually have the list of the goods they intend to steal before they enter the store.

Handlers: The middlemen in the retail criminal settings who receive stolen goods from the boosters and sell them to the fencers.

Fences: (or diverters): having bought the stolen goods from the handlers, the fencers sell the stolen goods at discounted price to targeted audiences.

The Boosters need to be known so that when they turn up in a store to steal merchandise, they can be deterred. These boosters are very professional as they can slip in and out unnoticed and when they are noticed, they will try to distract the employees. That is why staff must always be alert and not allow themselves to be distracted.

6.4.3.2 Minimising Crime at Different Levels

The main aim of this research is to establish how retail crime can be reduced with the effectiveness of security solutions. Dealing with retail crime in order to minimise it can be done at three different levels which are:

Local or store level

- ✓ There should be robust signage throughout the store stating what will happen to anyone caught stealing. Warning of CCTV should be shown for deterrent.
- ✓ The use of electronic article surveillance (EAS) will help in loss prevention.
- ✓ Fitting rooms for clothing items in a retail supermarket must have a strict guideline.
- ✓ IDs must be adequately checked so that goods will be sold to the right people with the right age and return items should only be from the same store or sister stores.
- ✓ The reports of POS should be utilised, and the video surveillance should be used to monitor the pattern of shoplifters.

Regional

When a retail company is a part of a group or a franchise of an outlet, these stores can have the opportunity to share fraud patterns and the inventory report of the whole company. When these data are collected, they can help the store create an organised response to criminals.

National

At the national level, the corporate headquarters of the retail supermarket should collaborate with law enforcement authorities by linking the evidence they have to identifying these criminals through fraud analysis. This will go a long way to mitigate circumstances leading to retail crime both at the local and regional levels.

6.4.4 Crime Preventions Framework (CPF)

A major part of the research is on crime prevention strategy. This is to meet the 4th objective of this research which is to propose a strategic crime prevention framework from the comparative study using security solutions that will help reduce crime in retail supermarkets in the UK.

Crime prevention framework will be a model that can be developed for supermarkets to use across the UK and many parts of the world. This model will cover many aspects of security solutions and how security companies and supermarkets can operate to maximise their security

solutions effectively and efficiently.

6.4.4.1 Proposed KPIs for the Crime Prevention Framework

From the participants responses on the possibility or adoptability of a crime prevention framework, the following inferences were made, and these have been adapted to stand for key performance indicators for the proposed crime prevention framework (CPF).

The CPF can act as a security standard policy for all retail supermarkets. The standard policy can be integrated into the training and/or induction of security personnel and the employees of the supermarkets. Security careers will become more attractive to people from many walks of life because standards are in place to regulate security delivery thus stamping it as a professional job.

The CPF can serve as a better accountability framework. When the standard of the framework is known across the supermarkets, operators of security apparatus will have a structure too. The security guards and CCTV operators will know what is expected of them and if they want to move from one job to another, the transfer is seamless as the standard is the same for every retail supermarket.

The CPF must identify causes of the increase in retail crime both from the external and internal environment.

The CPF must be one that explores technological advancement. New employees can use this framework to learn about the new advanced technologies in security. The framework must include E-learning so that security personnel can have access to learning about technologically advanced security solutions. The framework that must therefore stipulate more investment in Security training.

The CPF must stipulate a standardised crime response approach for everyone. Security personnel will have a standard approach to dealing with arrest, incidences, altercations, assault, verbal abuse and applying SCONE during arrest. This will help the management of retail supermarkets to measure the performance of security operatives.

The CPF can also help to standardise security service provision from security service providers. Requirements and expectations from security service providers will be easily assessed.

The CPF is expected to take security solutions to the next stage. This framework has not been developed yet for retail supermarkets and it is expected that it will take the working ethics of security providers to the next stage thus meeting the expectations of client organisations.

Some of the participants were not sure of the suitability or possibility of crime prevention

framework as they were not aware of any crime prevention measure. Some believed the framework might not eliminate crime because they were not familiar with crime prevention strategies. Nevertheless, the fact remains that there will always be criminals that want to steal from supermarkets, so having a crime framework with the KPIs above can help to reduce criminalities in those stores.

Users of security apparatus can have a multi-faceted way of dealing with many scenarios relating to security issues.

6.4.4.2 Hierarchical Taxonomy of Security Solutions Framework in relation to Crime Prevention to Supermarkets

Hierarchical Taxonomy in relation to this study is the classification of the actions in hierarchical needs to achieve a tailored framework for supermarkets that will help in deterring and preventing retail crime.

Hierarchical taxonomy will help the organisations to develop a more comprehensive framework that will reduce crime in the stores and facilitate the effectiveness of the interconnectivity in the security solutions. Developing this framework will be in line with the findings through the Ishikawa model. However, this can help those applying the security apparatus with proactive and reactive measures when incidents occur. The essence of this crime framework is to develop a model that will be modified specifically for retail supermarkets in deterring and preventing criminal acts in stores.

Crime is made of three factors: a motivated offender which include shoplifters, a suitable target which can be the goods of the stores and the absence of anyone who could intervene directly or indirectly when criminals want to act (Cohen & Felson, 1979; Clarke & Eck, 2005). Those that could deter them are the security personnel, CCTV operators, the store management and the cyber security used in protecting online customers against cybercrime.

Figure 94: Hierarchical Taxonomy of Crime Prevention Framework

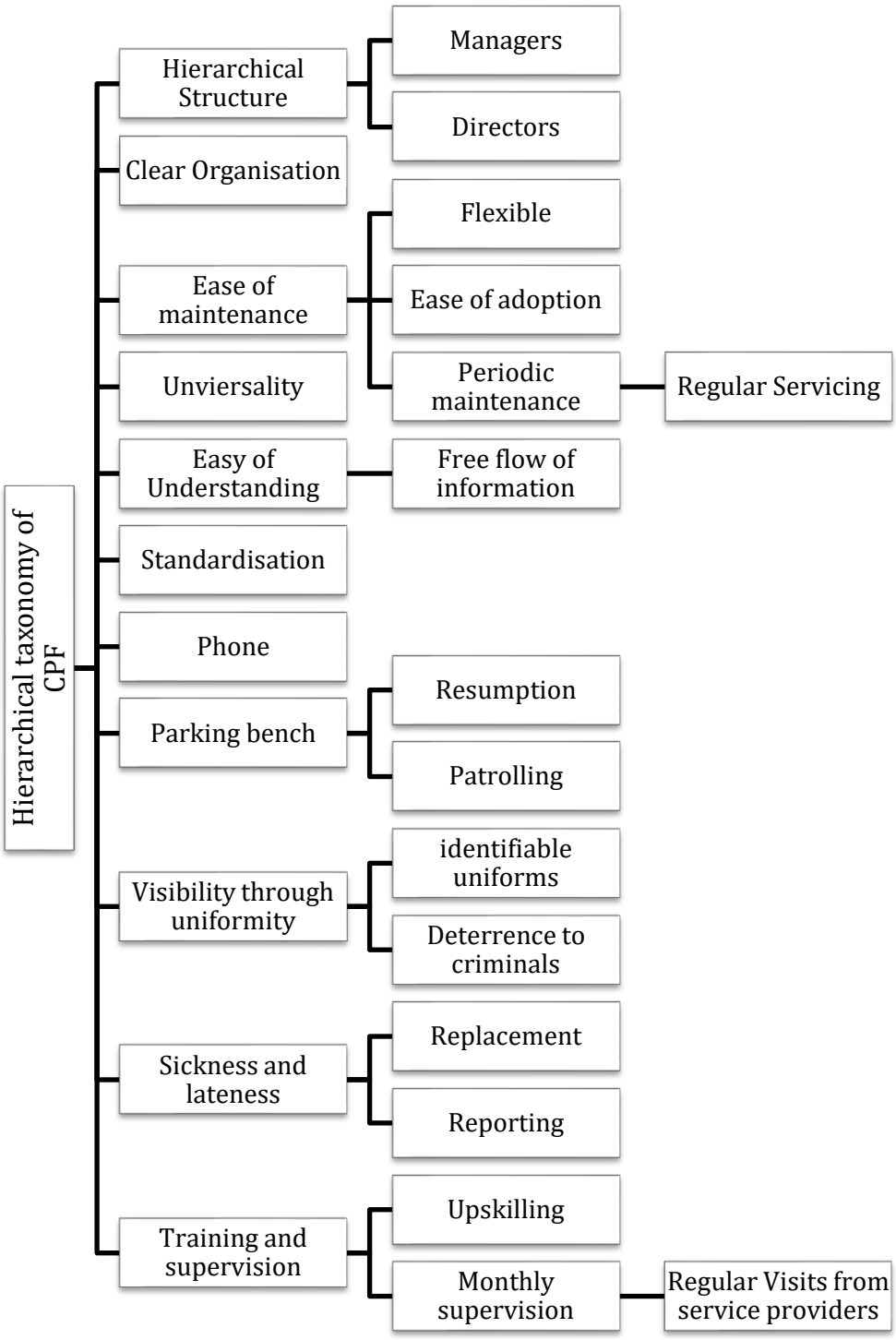


Table 82: The Design of the Taxonomy

Taxonomy	*Explanation*
Hierarchical Structure	At the top of the hierarchical taxonomy of the supermarket is the manager of the store or the manager of the security company or the directors of both. These are the key decision makers that will authorise the framework in these stores.
Clear Organisation	Once the hierarchical taxonomy is established on the framework, the organisation can start the process of training the new employees on the security solutions and what they need to maximise their efficiency. The framework will include training for the security personnel and CCTV operators on discerning the early warning signs of criminal behaviour and mechanisms for assessing the risk. Guards are to be updated on alertness to when three bells ring because of an emergency and when the alarm in the doors goes off when shoppers want to get away with goods.
Ease of Maintenance	Hierarchical taxonomy framework should be flexible and easy to adopt. The radios, CCTV cameras, and cyber security apparatus should work hand in hand and there should be easier navigation among the operators for the effectiveness of the security solutions in the stores. They should also be periodically maintained and serviced.
Universal	The security framework is developed for universal use among stores employees and all the operators of the security solutions. This will include the training of security personnel on the ways they should be handling complex security issues that will be arising from time to time.
Understanding	The Security framework should be designed to reflect the interconnectivity among the security solutions. **T**he method

	the systems use in tackling crimes in stores should be shared among all operators which should be easier to understand and adopt.
Standardisation	The framework should be standardised and widely adopted by the supermarkets showing a particular way of dealing with any incident that every operator can easily familiarise themselves with.
Phone	The framework should contain regulations on personal phone usage by security operatives. Issues relating to attendance and lateness can be dealt with through the Timegate app.
Parking Bench	This has to do with a specified time for resumption, patrolling and general work of security personnel. It also includes being conversant with what is happening on the shopfloor.
Uniform	The uniform should be universal so that criminals could easily see that there is a presence of security.
Sickness and lateness	The company should be able to replace a new guard within two to three hours of a personnel calling in sick and security guards must let their office know when they are running late.
Training and supervision	The guards should be trained in stores between one to two days shadowing an experienced guard. They should be taught SCONE and emergency three bells. There should be monthly supervision from the security company and continuous training for the guards to upskill themselves in order to become more proactive. They must use Blip or Time Gate to sign on when they arrive in the stores. They guards should know what the shoplifters usually steal like alcohol, meat, and expensive goods.

> They should have periodic security meetings with the local police for effective collaboration on retail crime.

6.4.4.3 Situation Prevention in Supermarket

The initial situation for crime prevention is decreasing opportunities for criminal offence and managing the environments where goods are displayed through increase in detection and surveillance activities (Clarke,1980, 1982, 1983).

Situation prevention in retail can be defined as comprising opportunity-reducing measures which can be directed at highly specific forms of store crimes. This involves the management taking steps to design and manoeuvre the store in a systematic and permanent way possible, in order to reduce risk and the efforts of all criminals. This in effect can reduce the reward perceived by criminals which motivate them to steal from stores (Clark, 1992).

This also involves increasing the focus and targeting on access control, that is, customers coming into the stores can be screened to know those that have been banned. The reward retail criminals get can be decreased by marking the products(Clarke, 1992).

As stated by Clark (1992) any situation prevention in the store must have certain elements which includes;

(1) Collection of the data about the how the shoplifting occurred.

(2) Analysing what makes these shoplifters to steal in a particular shop.

(3) Looking into possible ways that can block opportunities for criminals to steal.

(4) Implementing the most promising and economic measures that are also sustainable.

(5) Monitoring the results.

From the above elements according to Clark (1992) it can be concluded that crime preventive initiatives in the stores should be monitored intentionally and periodically so as to establish their effectiveness.

6.4.4.4 Steps in Preventing Retail Crime

Critical analysis of the crime is a very important technique to prevent shoplifting (Ekblom, 1986, 1988; Burrows, 1988; Hope,1991). The first thing to do is to find out where the crime occurred in the store and how it happened. The second step is to identify and choose the methods and designs that can be used to deter these culprits. This could be increasing the staff

presence in the shopfloor, public notices, warning that there will be arrest for shoplifters, using mirrors in corners, locked cabinets for some expensive small goods, closed-circuit television, electronic tagging, security personnel in uniforms, non-uniformed store detectives and increasing surveillance where there might be risk of theft. These should be implemented and monitored, and their effectiveness should be evaluated.

Shoplifting occurs when certain individuals that have the potential of offending in a certain environment or situation see an opportunity to commit such crime. Whether an individual commits crime or not will depend on any given time, situations, opportunities, benefits and costs, and the offender's subjective probabilities of a successful outcome. (Farrigton, 1993). This shows that shoplifting as a retail crime can be prevented targeting individual's energising, inhibiting processes, and situational factors.

Below is the discussion about known steps that can help reduce crime in a retail setting

a. Strategic Environmental Design

Retail supermarkets are always constructing or redesigning existing structures in order to add more stores to their portfolio. According to the Retail Gazette (September,2023) Aldi planned to invest £1.4b on new stores and expansion.

Since retail supermarkets think of expansion through new store openings, it becomes imperative that designers and planners of retail outlets should work hand in hand with store managers, Police, security personnel to identify future problems that might arise before they commence work on the design of the store. This is because most buildings would have been completed before the thoughts of security come up. Most times when the security agencies want to bring suggestions with what might improve security, the law enforcement agency can view the managers, architects, and event planners as being myopically concerned (Crow, 2000). It is essential to know that planning ahead to make things go right is key to reducing and eliminating crime.

In crime prevention through environmental design, (CPTED) there can be defence space in retail where there are installations of natural surveillance and natural access control used in protecting the premises. This is needed in case certain areas of the premises are left open, but those who want to pass through cannot do so unless they pay or pass through the tills.

The environment of the store must be strategically designed to deter crime, and this can only be possible with the incorporation of expert advice including security while the design is being considered.

b. Electronic Article Surveillance (EAS)

EAS was invented by Arthur Minasy in 1966 after retailers had a big concern about pilferage in their stores. This technology was devised to prevent shoplifting in a retail environment, pilferage of books from libraries and removal of properties from office buildings (Zahid et al.,2020). Special tags are fixed to the goods which can be removed by the cashier once these products are paid for. When an item is not deactivated and a shoplifter tries to leave the premises with the product, the alarm usually goes off which prompts the employee or the security personnel to stop the suspect. Attaching more EAS to products will help reduce crime but more investment has to be made on higher EAS technology as criminals are constantly looking for ways to outsmart retailers.

c. Quality relationship with stakeholders

Every year retailers lose billions of pounds through shrinkage because of shoplifting, employees' theft, supplier fraud and administrative errors which occur deliberately. Retailers therefore are forced to invest money in CCTVs, RFID tags, security guards, store detectives and other reasonable majors that might help them protect their goods. The relationship between retailers and their workers should be harmonious as this will help to secure a business environment with reduction in crime. This is a very important area that most participants of this research hammered on.

The customers, employees and suppliers are all stakeholders and can be responsible for the loss in the retail store and several studies have accepted this argument as a fact (Bamfield, 2004; Lasky et al., 2015). The three stakeholders that are mostly responsible for the uncertain and casual behaviour towards theft in retail sectors are customers, employees, and suppliers according to the findings of this research. As for the customers who come to shop, it is like a simple offence and for the workers who steal, they see it as a supportive means to their day to live.

The retailers have the challenges of finding out the accurate source of their continuous financial losses (Bamfield, 1988). To minimise losses in retail, retailers need to establish appropriate majors such as integrity testing for employees before employment as it enhances productivity and a good royalty for the organisation. This view is also supported by (Brown *et al.*,1987). The goods that the suppliers supply should be checked before they are stored in the warehouse so as to discover defective ones and under-supplying.

One of the most important parts of retail business management is to manage relationships with other sectors (Ford *et al.,* 2011). Growing problems in the retail sector include getting new

customers, retaining the existing ones, having a good relationship with the suppliers, government parastatals, financial institutions and other agencies that work with retail companies (Dawson, 2001). According to Lowson (2005), for retailers to be successful, they must have a good practical approach, good strategy and be efficient in their day-to-day transactions. Success is therefore determined by a strong relationship which is the building block with stakeholders especially in such a highly competitive business environment like the retail supermarket sector. This research agreed with Athanasopoulou, (2009) that retailers need to understand the necessity of maintaining existing relationships rather than to acquire new ones.

6.4.4.5 Preventive Measures for Cybercrimes

Preventive measures are those systems that must be put in place to deter criminal activities both in stores and online. Prevention is always better and preferable to counter attacks and as such every supermarket must consider security measures that can enhance the peace of mind of both their customers and staff. Some of the preventative measures identified for an effective cybersecurity system include.

- Well-configured Antivirus software for all systems.
- Updating the systems from time to time.
- Excellent training and motivation for staff.
- Effective back-up strategy and contingency plan in case of any disaster.

It is equally important to set up deterrent controls aimed at warning a would-be attacker not to act and this must be monitored or tracked. These can be useful in discouraging cyber criminals and delaying a cyber-attack on the infrastructure which is used in processing the data of the supermarket.

From a cybersecurity perspective, it is good to apply artificial intelligence (AI) and Machine Learning to analyse behaviours, identifying potential threats, addressing vulnerabilities, and detecting malicious attacks in the computer systems that can disrupt the business of the day. With this in place, the system could collect the data to predict the specific user's behavioural pattern and can match that with a specific type of attempted attack on a specific sensitive data(Pan, 2018).

Some businesses could use AI and Machine Learning to build an automatic robot that can silently scan and check all the environment to see whether there is any potential threat, vulnerability or malicious act going on in the store. AI could also be used as a reminder to human administrators and respond to some threats when there is specific data that the AI is trained with which can also serve as a model.

6.5 Conclusion

This aspect presents the implications of research findings, the theoretical and managerial implications, research contributions and limitations experienced during this research with steps taken to address them to minimise their impact. The research gap has been identified with suggestions for further research.

6.5.1 Implication of Research Findings

There are several implications of the findings from this research. These have been categorised into two, theoretical and managerial.

6.5.1.1 Theoretical Implications

The theoretical implication of this research is the application of Ishikawa fishbone analysis and strategic gap analysis to security solutions and retail crime in two retail supermarkets. This research has followed the six steps needed to conduct an effective gap analysis according to Alexander (2019). This analysis has been effective in identifying the gap between the actual performances of security solutions and the potential or expected performance.

The different gaps in the security solutions which also need to be identified include performance gap, training gap, compliance gap, legitimacy gap, interconnectivity gap, conformance gap, ideal gap, factual gap, maintenance gap and expectation gap (Panwar, Hansen, & Kozak, 2012). The occurrence of these gaps is a probable indication of security failures which can be detrimental to lives and property in a retail supermarket setting. These gaps can also depict the likelihood that supermarkets expect more from the security solutions they make use of in their premises. When these gaps are identified, the providers of the security solutions can discuss their responsiveness with the owners of the supermarkets.

The importance of identifying these gaps is that the more they are left unattended, the more they widen which can adversely affect the survival of the supermarket and the security

solutions. In examining these gaps, it is necessary to find out where they are and their exact cause. Each gap in security requires different solutions and identifying the gap is very crucial for the supermarkets with the aim of developing strategies to close them.

In the gap analysis, the historical trends of the security solutions have been evaluated looking into where the gaps are, how they can be improved and closed, leading to the profitability of the stores. By analysing how the stores are currenting making use of security solutions, new ideas have been developed to close the identified gaps.

In identifying the gap, the fishbone model of cause and effect was applied. The analysis from the model has been used to address security-related problems in the three security services used by retail supermarkets under study. Furthermore, the fishbone model is useful as it helps those in charge of security in supermarkets to formulate end-of-life strategies for deteriorating security systems which have been supported by many studies (Satyanarayana *et al.*, 2009).

The application of the fishbone diagram (Ishikawa, 1996) has also been used to find the interconnectivity between the security solutions.
In assessing the interconnectivity issues between security solutions as a major cause of increase in crime, the following major areas have been dissected for proper analysis of causes.

- Types of security solutions in use in the retail supermarket
- Adequacy of security solutions
- Proper connectivity of different security solutions
- Strategic positioning of security solutions in the store

The outcome of this has many theoretical implications. The researcher has looked into the chronology of events many decades ago through the lens of previous literature. The research on retail security solutions and their interconnectivity is limited as this is not an area many scholars have delved into.
In this study, combining the primary data gathered through questionnaire and interviews and secondary data gathered through existing literature were empirically significant to understanding what was happening in the stores chosen for this research.
The research has identified important factors relating to the lapses in security solutions both in the past and how these can be corrected. When the findings are applied in retail stores, they will be useful for all the parties involved leading to a more efficient security package.

6.5.1.2 Managerial Implications

The result from Ishikawa fishbone analysis is a useful tool for management and security teams to brainstorm on how to solve identified problems thus enabling them to deal with the real issues rather than appearances.

The finding of this research has many managerial implications for many of the stakeholders which include Aldi stores, Sainsbury's stores, security personnel, management of the stores and the security companies.

The unprecedented increase in shrinkage, employees' assaults, shoplifting, vandalism, and ineffectiveness of the stores security solutions have made it paramount to look into how the security apparatus can be improved and the cause of criminal acts occurring in retail premises. The employees need to be assured by the management that their workplace is safe through these security apparatus as failure can lead to an increase in labour turnover and lack of motivation which eventually will affect the productivity and corporate image of the business.

The losses in supermarkets keep increasing and the efficiency of security personnel keep decreasing, CCTV becoming obsolete and cyber security is taken for granted. These factors necessitate the timely intervention of the management of these organisations before the situation gets out of hand.

The usefulness of security solutions has become so important that there will be a significant impact on retail supermarkets if they are not properly applied by their management and that of the security companies that supply them.

An effective security package would boost the stakeholders' confidence as most people make use of supermarkets by either buying online or visiting brick and mortar stores. In order to increase the effectiveness of security solutions, the management needs to increase the security budget. This is essential for the survival of any supermarket.

6.5.2 Research Contributions

This research has contributed to the field of knowledge in an in-depth analysis of situations that face retail supermarkets in the UK.

Little or no study has been previously carried out in evaluating the interconnectedness of security solutions and their effectiveness in reducing retail crime in a supermarket in the UK. Several studies have been conducted on retail crime and security solutions, but none have sought to investigate the correlation between the interconnected use of the three security

solutions (Physical, CCTV and Cyber securities) and their effect in the reduction or prevention of retail crime in the retail supermarket sector.

Several studies have been carried out on the impact of the security solutions in a supermarket. However, little research has focused on how security solutions can be improved, the causes of their ineffectiveness and the factors that have aided criminals to continue to succeed in their criminality despite the presence of security. The present study helps investigate these causes through Ishikawa fishbone model by applying the research paradigm of pragmatism to find out their root and recommend the way forward.

Another major contribution is the development of a crime prevention framework for retail supermarkets in the UK. This framework developed with a hierarchical taxonomy model can serve as a standard guideline for retail supermarkets on matters relating to crime and the expectations from security solutions.

This research has made a very significant contribution to the body of knowledge through the adoption of both qualitative and quantitative reasoning. The quantitative reasoning helped to identify what was happening between existing security solutions and retail crime while the qualitative reasoning helped to understand how and why there seemed to be little correlation between the existence of security solutions and the persistence of retail crime in supermarkets. The ontological part of this research led the researcher to the historical evolution of security solutions. As this has not been researched before, there were few empirical materials to support the research which made the study more challenging and interesting.

During the process of interviewing the participants, the researcher kept finding the gap in the three security solutions and why they exist including how they work for the safety of the employees, the customers, and others.

The recent significant increase in retail crime in supermarkets will make this study helpful to retail supermarkets so they can know where to focus their resources more effectively and efficiently.

Whilst examining the current security solutions in the stores and their effectiveness, other issues were discovered in relation to the dilapidated state of some stores which have contributed to an increase in retail crimes. This discovery would also benefit retailers, so they know areas that need changing and upgrading.

This research helps to explore and identify the barriers in the interconnectivity of security solutions in relation to retail crime in the supermarket.

The outcome of this research will help to reduce and deter crime in retail supermarkets thus benefiting owners and the security personnel.

The research discovers the new ways retail criminals operate and how they can be curtailed through the interconnected work of the three security solutions.

The research also explored one of the major causes of retail shrinkage which is often overlooked and that is employee theft. Several studies have concentrated on other types of retail crime like shoplifting and cybercrime but not much was done on employee theft and its causes. It exposed ways through which employees steal from their employers and suggest what can be done to minimise it.

6.5.3 Limitations

The limitation in this research is access to fewer stores, which subsequently meant access to fewer sample populations. This limitation, however, has been addressed and mitigated with the use of both quantitative and qualitative data gathering methods. Questionnaires were sent out to reach a larger number of respondents to cater for what would be missing from the interview. Also, the stores have been carefully selected with effective criteria including geographical accessibility, larger representative sample, crime rate, participants full time work status and access to security solutions so their opinion could represent other supermarkets that could not be reached because of time constraint and limited resources.

The main limitation of this study is being able to reach all Aldi and Sainsburys' stores as they are spread all over the country. It was practically impossible to access all the managers, security personnel, the CCTV operators and all the stores within the time frame of this research. As there are many stores, it became paramount that some stores should be selected in different parts of the country to represent both Aldi and Sainsbury's. This gave the researcher the ability to visit selected stores, administer questionnaires to some participants and interview the selected ones.

Another limitation was the lack of privacy for the participants that were interviewed.

Some were interviewed on the shopfloor with distractions from the customers and those that were interviewed in the office or canteen, were periodically interrupted by their team members that wanted to take a break or needed their attention for one thing or the other.

The time allocated for field research was another limitation, which was between two to four months but was extended to six months as more participants became available for interview. It was quite difficult to get the managers to agree to an interview because of their busy schedule while some were just sceptical because of privacy issues as they were not sure of the

implications of divulging security information regarding their stores. Those who agreed to interviews still felt uncomfortable while the stores were sometimes so busy.

In addition, some store employees and security personnel who indicated interest in participation were discouraged by their supervisors and managers as they labelled it security related.

The travel from one store to another was very challenging as sometimes it was practically impossible to meet the targets set for the day in terms of store visits.

This research is self-sponsored, so the cost implication of revisiting stores was huge which sometimes demotivated the researcher from reaching out more than once to a particular store.

It was very challenging following up with participants through their emails and WhatsApp messages as some of them have other priorities.

Furthermore, for this research to be validated, the framework was centred on the cause-and-effect model of Ishikawa Fishbone. All the research questions focused on accomplishing this, but answers from few participants deviated from this.

6.5.4 Further Research

This study was carried out to examine the effectiveness of interconnected security solutions in relation to crime reduction in retail supermarkets.

The crime prevention framework was developed from this research to provide a standard for determining the effectiveness of security solutions in retail supermarkets in the UK. The research tried to compare this with what is obtained in other countries based on what has helped retail supermarkets in other nations. It has not been able to achieve that to the best intent because of limitations in obtaining information from other nations.

Further research could be carried out in this area so that a more robust framework could be developed that would standardise security service provision for retail supermarkets in the European Union and globally.

Furthermore, the data collected from this research came from two major supermarkets in the UK. One of the criteria for the selection of these two was based on indigenous and non-indigenous foundation with Sainsbury's being the indigenous company and Aldi the non-indigenous. Further research would be needed in a wider coverage of UK retail supermarkets in the future.

Also, this research has concentrated on retail supermarkets which are just a section of the retail sector. Studies of this nature could be carried out on other companies in the retail sector like banks, fast moving consumer goods (FMCG) companies, cloth retailer and food service retail

chain operators like McDonalds and KFC as they all use the three security solutions examined in this research.

Another area of research could be the choice of other independent variables in relation to crime prevention and reduction in a retail setting. The independent variables could be adjusted in future research to include other factors that could lead to reduction in crime as the effectiveness or ineffectiveness of security solutions might not be the only factors responsible for increase in crime in a retail supermarket.

Also, another area of further research is the theoretical basis which could be applied to this area of research in the future. This research has applied the Ishikawa model to determine the strategic gap in the performance of security solutions. The researcher had wanted to apply other analytical tools like McKinsey 7s, product life cycle and SWOT analysis to the independent variables but for time constraint and space, it has been limited to the Ishikawa and strategic gap analytical tools.

Gaps have been identified in research into retail crime in the area of employee theft. More primary research would help to explore reasons for employee's theft from the point of view of employees and what they think could help minimise the crime. More studies could also be carried out to examine the impact of retail crimes on those affected, that is the employees and other customers who witness crimes.

The gap identified in this study is the failure to explore the comparison between the effectiveness of self-serving checkout systems and the traditional checkout systems.

6.6 Summary and Conclusion

This study was carried out to evaluate the interconnectivity between different security solutions and their effectiveness in preventing crime in retail supermarkets in the United Kingdom.

Retail supermarkets all over the world are constantly experiencing crime in their vicinity despite the heavy investment in security solutions aimed at deterring criminal activities. Retail crime has been in existence for as long as retail supermarkets started operating. Criminals have become so bold in their activities in stores with shoplifting being reported nearly every day in retail supermarkets. This had led to retail shrinkage and according to the British Retail Crime Survey (2023), the total cost of retail crime stood at £1.76 billion in 2021/22. Out of this figure, £953 million was lost to customer theft, with eight million incidents of theft over the year. £715 million was spent by retailers on crime prevention in 2021/22 and this would have included money spent on security solutions. Despite this

heavy investment in retail crime reduction, retail supermarkets are not having a respite. So, this has necessitated research into why and how retail crimes escalate despite the presence of security solutions.

Also, previous research into this area has been on the impact of security solutions with concentration on one or two at a time. The researcher thought that concentrating on the impact of one security solution at a time might not show the cause of the problem of retail crime especially when there are multiple solutions that retail supermarkets could choose and use at the same time. If these solutions were used in stores, then why the increase in crime?

So, this research intended to address the issue of the presence of security solutions without the achievement of crime reduction. The interconnected use of three security solutions at the same time came to mind with the assessment of their effectiveness so that a proposition could be made to help retail supermarkets in combating retail crime effectively. The aim of the exploration on the interconnectivity was to examine the possibility of the three security solutions working to reduce crime from the point of view of previous scholars which served as a bedrock for the outcomes of the primary research conducted and the analysis of the results.

The three security solutions evaluated are physical security, CCTV, and cyber security. Physical security includes different aspects like security guards, alarms, and barriers but the major concentration has been on security guards. The CCTV has been evaluated with assessment on CCTV performance and its operators. Cybersecurity has also been evaluated in relation to the systems in place for the prevention of customer data theft and hijacking of a company's online security. The effectiveness of these three major security solutions has been evaluated in relation to how well they prevent or reduce crime in a retail supermarket.

Two variables were examined concurrently to ascertain the effect of one on the other. Security solutions are the independent variable while retail crime is the dependent variable.

Previous studies on retail crime and security solutions were examined so the outcome of the desk research could be combined with that of the field research to develop a framework that could help retail supermarkets in the UK. This study aimed at providing a respite for retailers so they can understand and thus maximise the efficacy of the security solutions in their stores.

The study has provided the researcher useful information and very good insights into how the security solutions are managed with pointers on how the management could improve effectively in sourcing and managing them.

Careful consideration was given to the formulation of objectives from the research aim which was to establish the interconnectivity between existing security solutions and their effectiveness in reducing crimes in retail supermarkets. The problem in the retail supermarkets which is incessant retail crime was explored with the effectiveness of the existing security solutions in place. The hypothesis formed was tested to see if a better understanding of the interconnectivity between existing security solutions could lead to a reduction or prevention of retail crime.

This study highlights the significance of improvement in security solutions and how they can work better for the benefits of the security personnel, the customers, and the management. This study perceived the importance of having security solutions in the store and how the interconnectivity can lead to better services to those using the security solutions.

The pragmatic approach of using mixed methods in this research helped in exploring the depth of the lapses on security solutions and the effects of their independent operation as against interconnectivity of operation.

The mixed method is the central premise that is used in combining the understanding of the research problems and the critical evaluation. The use of both the quantitative and qualitative techniques bought an in-depth analysis of the effectiveness of the security solutions used in the stores.

The mixed method approach was used in this study because of the flexibility needed in the research which serves as the foundation of the epistemological knowledge in relation to the state of the current security solutions.

The adoption of the mixed method was to expand and strengthen the conclusions of this research leading to an informed contribution to the body of knowledge and filling the existing gap in the study of the three security solutions in relation to the retail supermarkets.

As security is a complex phenomenon, the mixed method approach helped in conducting an in-depth investigation for a proper understanding of factors leading to the complexity of the nature of security. Mixed method was also needed to investigate multidimensional nature of issues in sectors including retail and security and understand the relationship between the two.

The sample size was carefully selected to reflect the different categories of stakeholders involved in security provision, use and assessment in a retail setting.

The retail supermarket environment is huge in the UK making it almost impossible to have a representative sample that would include every section of the industry. Thus, the sample size was chosen based on certain criteria which included stores with high crime rates which necessitated their constant use of the three security solutions.

Data was collected through questionnaires and semi-structured interviews. The findings were analysed by NVivo for qualitative data and SPSS for quantitative data to get the best results so that a rich outcome could be presented. Employing these sophisticated statistical tools, SPSS for the quantitative research and NVivo for the qualitative has been limited decades ago on this topic and these have taken academia in a different direction.

Experimental research design was used in order to test and validate the relationship between and among the variables under study.

Ishikawa Fishbone Model which was developed by Ishikawa (1968) was adopted to identify the relationship between causes and effects as this study is centred on evaluating the relationship between security solutions and retail crime. The model categorised causes as equipment, materials, process, people, environment, and management. This categorisation was applied to examine the causes of increase in retail crime from both the major and minor sources before the effects are treated.

The research culminated in the use of hierarchical taxonomy to develop a crime prevention framework. This could be used by those applying the security apparatus proactively and reactively to incidences. The essence of this crime framework is to develop a model that will be modified specifically for retail supermarkets in deterring and preventing criminal acts in stores.

The issue of crime, which is the dependent variable in this research, was examined through the works of Cohen and Felson, (1979). A theoretical explanation for the causes of crime was given through the application of Routine Activity Theory (RAT) which focuses on crime situations. This established the fact that retail crime occurred because of some motivation which included an attractive target and the absence of capable guardians. In addition, the work of Crowe (2000) on crime prevention through environmental design was examined as it provided a good framework for the improvement of internal store design against shoplifting, a major crime committed in supermarkets. The work of Aloysius (2019) on shoplifting in mobile checkout settings was also explored and among others it helped to elaborate more on how cybercrime could be detected and curtailed by training employees on cybersecurity. It dealt extensively

with the reasons why employees steal from their employers and suggest what can be done to minimise. The aspect on retail crime was concluded with steps that could lead to reduction in crime and the work of Francisa (2012) 'surveillance in the supermarket; Technology and the pluralisation of crime control' was explored. Notably, there was the use of primary research which involved the collaborative work between the police and staff of local stores. One of the goals of this was to see how the facial recognition system could help in the re-arrest of shoplifters that have been caught before but came back to stores believing that they would not be recognised. Although it helped stores in the recognition and arrest of repeat offenders, the downside was the fact that the facial recognition system only recognised faces that had been recorded in police data, while there are shoplifters that are not reported to the police, hence the aim of facial recognition system might slightly be affected.

Critical analysis of crime was emphasised as a very important technique to prevent shoplifting from the works of Ekblom (1999).

With the foregoing, the objectives set at the beginning of this research have been carefully met. The first objective of this research was to explore the concept of and interconnectivity between the three aspects of security solutions: physical, system and cyber securities. This has been met with the establishment of the fact that security solutions can be used interconnectedly.

The second objective, which was to explore the extent to which UK retail supermarkets understand the importance of the security solutions they employ in their businesses was also met. From the outcome of the primary research carried out on Aldi and Sainsbury's stores, the management and users of security solutions understood the importance of security solutions although they might not fully understand the effectiveness of their interconnectivity.

The third objective, which was to conduct a comparative study of crime prevention measures from the exploration of the existing security solutions was done. From the responses of participants, the need for a crime prevention framework was established and developed from crime prevention measures they enumerated.

The last objective was also met which was to propose a strategic framework from the outcome of the comparative study of security solutions and their perceived effectiveness that will help reduce crime in retail supermarkets in the UK. The framework was developed with the responses of the participants which they believed supermarkets could adopt as standards so retail crime could be reduced in their stores.

The outcome of this research has also provided answers to the research questions.

The first question on the role of interconnected security solutions in relation to crime prevention and reduction in retail supermarkets was answered both from the literature review and the responses of participants.

The second question was answered in the affirmative. This is on the possibility of the development of a crime prevention framework that will be suitable for the retail supermarkets in the United Kingdom as compared to the other developed countries. Many participants were enthusiastic about this possibility and the benefits that retail supermarkets stand to gain from it.

The third question on the identification of areas of improvements in existing security solutions in relation to combating retail crimes was answered. These areas were also pinpointed from the responses of participants. They form the recommendations of this research.

In summary, this research has opened the eyes of the researcher to the many aspects of retail crime and the importance of combining more than one security solution at a time to combat the rising boldness and tactics of criminals both in stores and online. Security is not just needed in the physical store for crime prone customers but also store employees who contribute to retail shrinkage every year. Retailers must understand that criminals become smarter, and security evolves with so much advancement in technology that can help combat retail crime. The management of retail supermarkets needs to be more strategic in their outlook and approach to retail crime. The combination of alertness, standardised crime prevention framework and constant improvement measures on existing security solutions with prompt replacement options in place will help combat retail crime and thus reduce retail shrinkage in UK retail supermarkets.

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APPENDIX

Sample Interview

Dear respondent,

My name is Chris Onumonu, and I am a DBA student at the University of Wales.
This interview is to collect information in order to evaluate the interconnectivity between different security solutions and their effectiveness in preventing crime in retail supermarkets. I therefore request that you assist me in providing answers to these questions. I assure you. that the data generated will be kept securely and your personal data will be protected according to the GDPR requirements.
By choosing to take part in this interview session, you have already understood and agreed. that the data you provided will be used for the purpose of this project.
Thank you for your time.

Semi-structured interview questions
1. What security solutions (Security guards, CCTV and Cyber security) do you make use of in your store?
2. Why have you chosen these solutions?
3. How do you rate the crime incidents in your store?
4. Can you comment on the effectiveness of these three security solutions currently in use in your store?
5. Do you think that the security solutions are more effective in combating crime when the three are in use in your store?
6. Which of these identified solutions is most effective in combating crime in your store?
7. Enlist 3 things about the security performance in your company that bother you the most and Why?
8. How will you rate the present security service provider that your company is using at the moment?
9. Is there anything you can suggest as an improvement on security solutions provided to your company?
10. Would you like to share any other issue(s) that has (or have) not been covered in this

interview?

GENERAL INFORMATION

How would you like to be known: Gender?
Female Male

How old are you?
25-30 30-40 40-50 50-60 60+

What is your Current Position?
Supervisor Store manager Security personnel
How many years have you spent in your current Position?
Less than 1 year 1-5 years 5years & above

Name of your company……

Questionnaire

Dear respondent,

My name is Chris Onumonu and I am a DBA student at the University of Wales. In partial fulfilment of my DBA programme, this questionnaire has been designed. It is intended to collect information to evaluate the interconnectivity between different security solutions and their effectiveness in preventing crime in retail supermarkets.

I therefore request that you assist me in completing this questionnaire. I assure you that the data generated will be kept securely and your personal data will be protected according to the GDPR requirements.

By choosing to complete this questionnaire, you have already understood and agreed that the data you provided will be used for the purpose of this project.

Kindly complete it and hand it over to me personally or email it to me at

chrisonumonu@aol.com

Thank you for taking time to complete this questionnaire

Circle the response that best describes your assessment of each statement.

Part 1: THE THREE ASPECTS OF SECURITY

1.` Which of the following security services are you aware of?
   a. Security guards b. CCTV c. Cyber security

2. Which of the following security services do you currently use in your company?
   a. Security guards b. CCTV c. Cyber security

A. Physical Security

3. Do you have security guards in your store?
   Yes No
4. How many are on duty at every shift?
   1-2 2-3 2-4 4 & above Can't say
5. How often do security guards apprehend shoplifters in your store?
   Rarely often very often everyday Can't say
6. How often does your store lose item or have shop lifting when they are displayed?
   Rarely often very often everyday Can't say
7. How often do shoplifters escape when accosted by security guards?
   Rarely often very often everyday Can't say
8. Which quarter of the year does the business lose money most to criminal activities?
   1st quarter 2nd quarter 3rd quarter 4th quarter Can't say

B. Effects of CCTV

9. Do you have CCTV installed in your store?
   Yes No
10. Does your store have CCTV operators monitoring the system?
   Yes No Can't say
11. How many CCTV operators does your store have?
   1-2 2-3 2-4 4 & above Can't say

12. How often do you catch shoplifters or other criminals through the CCTV systems in your store?
   Rarely often very often everyday Can't say

13. How often does your store maintain or review the operations of the CCTV systems?
   Rarely often very often everyday Can't say

C. Cyber Security

14. Are you aware of E-commerce?
   Yes No
15. Does your company sell products online?
   Yes No Can't say
16. If Yes, are you aware of the online payment security put in place by your company?
   Yes No
17. How often are fraudulent activities reported on your online payment structure?
   Rarely often very often everyday Can't say
18. How often does your company review its online security systems?
   Rarely often very often everyday Can't say

Part 2: MEASURING THE EFFECTIVENESS OF SECURITY MEASURES IN CRIME PREVENTION

19. I would prefer to use CCTV systems over physical guards

Strongly Disagree	Disagree	Partially Disagree	Partially Agree	Agree	Strongly Agree

20. I would prefer to use Physical Guards over CCTV.

Strongly Disagree	Disagree	Partially Disagree	Partially Agree	Agree	Strongly Agree

21. I would prefer to add cyber security to other aspects of security services.

Strongly Disagree	Disagree	Partially Disagree	Partially Agree	Agree	Strongly Agree

22. Using CCTV systems is more effective than other types of security services.

Strongly Disagree	Disagree	Partially Disagree	Partially Agree	Agree	Strongly Agree

23. Using security guards is more effective than other types of security services.

Strongly Disagree	Disagree	Partially Disagree	Partially Agree	Agree	Strongly Agree

Part 3: SECURITY SERVICES' IMPROVEMENT

24. Do you or your company conduct periodic evaluation of security service provision in your organisation?
    Yes No Can't say
25. Are you aware of SIA regulations on security improvements?
    Yes No Can't say
26. Are you satisfied with the present security services presently used in your company?
    Yes No Not applicable
27. Do you feel encouraged to share new ideas on security with your management?
    Yes No Not applicable
28. Are you involved in security management of your organisation?
    Yes No
29. Do you have enough security resources to cope with security demand in your company?
    Yes No Not applicable
30. Is your supervisor committed to improving security measures?
    Yes No Can't say
31. Are you satisfied with the information shared by the management on security improvements in your store?
    Yes No Not applicable

ASSESSING THE EFFECTIVENESS OF THE ADOPTION OF SECURITY PRODUCTS/SERVICES

Does your security personnel use Blip or Timegate in recording attendance?
Yes No Can't say
If yes, has it been effective in monitoring the attendance of the security personnel?
Yes No Can't say

Has it been effective in improving the attendance of security personnel?

Yes No Can't say

Does your company make us of Radio Frequency (RF) label on your products?

Yes No Can't say

If yes, how effective is the RF in deterring shoplifter?

Ineffective effective Very effective

Does your company make us of electronic article surveillance (EAS)?

Yes No Can't say

If Yes, how effective is the EAS in deterring shoplifters:

Ineffective effective Very effective

Which of these cameras is presently installed in your store?

HDCVI Cameras IP Security Cameras CCTV surveillance Analog Cameras Can.t say

How effective is any of these cameras in deterring internal and external theft in your store?

Ineffective effective Very effective

How many thefts does the CCTV camera expose weekly?

Less than 10 10 – 20 more than 20

Do your security guards make use of Body Worn Cameras (BWC)?

Yes No Can't say

If yes, has it been effective in assisting criminal investigation of shoplifters?

Yes No Can't say

Are you aware of Thermal Cameras for till security?

Yes No

If yes, how effective is this in helping cashiers apprehend thieves?

Ineffective Effective Very effective

Which of these online security measures does your company have on their online payment checkouts?

Card lock Credit card check Security key icon Address verification system Not applicable

Does your company comply with payment card industry data security standards (PCI DSS)?

Yes No Can't say

Is your organisation Payment Card Industry (PCI) Compliant for online transactions?

Yes No Can't say

GENERAL INFORMATION

Kindly tick the appropriate box

Gender
Female Male

Age
25-30 30-40 40-50 50-60 60+

Current Position
Supervisor Store manager Security personnel

Years in Current Position
Less than 1 year 1-5 years 5years & above

Name of your organisation……

PARTICIPANT CONSENT FORM

Evaluating the Interconnectivity Between Different Security Solutions and Their Effectiveness in Preventing Crime: A Case Study of Retail Supermarkets in the United Kingdom

Please answer the following questions by ticking the response that applies

		YES	NO
1.	I have read the Information Sheet for this study and have had details of the study explained to me.	☐	☐
2.	My questions about the study have been answered to my satisfaction and I understand that I may ask further questions at any point.	☐	☐
3.	I understand that I am free to withdraw from the study within the time limits outlined in the Information Sheet, without giving a reason for my withdrawal or to decline to answer any particular questions in the study without any consequences to my future treatment by the researcher.	☐	☐
4.	I agree to provide information to the researchers under the conditions of confidentiality set out in the Information Sheet.	☐	☐
5.	I wish to participate in the study under the conditions set out in the Information Sheet.	☐	☐
6.	I consent to the information collected for the purposes of this research study, once anonymised (so that I cannot be identified), to be used for any other research purposes.	☐	☐

Participant's Signature: _____ Date: _____

Participant's Name (Printed): _____

Contact details: _____

_____

Researcher's Name (Printed): _____

Researcher's Signature: _____

Researcher's contact details:
(Name, address, contact number of investigator)

Please keep your copy of the consent form and the information sheet together.