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DISSERTATION

: TITLE :

**EXPLORING THE ROLE OF AI IN DETECTING FRAUDS IN
THE BANKING INDUSTRY IN THE UK**



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Master's Degrees by Examination and Dissertation

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1. 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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3. This dissertation is the result of my own independent work/investigation, except where otherwise stated.

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Chapter 1: Introduction

1.1 Research Background

The indelible footprint of financial services of UK is the reason of nation's pride out of which UK banking industry reflects their significant performance and contribution. As reported by UK Government (2023) UK banking industry contributes 12% of GDP and the banking industry is of world leader. The income of UK banking industry is projected to reach by 280.3 billion dollars in 2023 and traditional banks in this sector dominates with a projected volume of 181.1 billion in market (Statista, 2023). In this dimension, UK banks are facing an insurmountable challenge regarding frauds, digital thefts, because of more and more susception to fraudulent activities. As cited by Sanusi, Rameli and Isa (2015) though various controls have been put over the years the banking industry has become highly susceptible to frauds which has severely changed the landscape of this sector and made it complex.

It is evident that UK banking industry has faced fraud issues leading to steal of 1.2 billion pounds in 2022 through authorised and unauthorised financial frauds (Bloomberg, 2023). It is also reported that the losses indicate stealing of 2300 pounds per minute in UK banks. As reported by Bloomberg (2023) unauthorised payments in UK amounts of 727 million pounds that comes more than half of losses has recorded frauds for stolen cards and 485 million pounds amounts to authorised frauds including investment scams, criminals posing as police or bank staffs. In this scenario, UK banks are highly focusing on different actions for remedies and preventing the frauds.

UK banks spends 5 billion dollars per year for combating financial crimes (Arnold, 2018). In UK, between a year 66% increase in fraud activities was recorded and this led to imposition of substantial fines and recovery amount being given to victims by the UK banks (Walker, 2018). As a result, banks have focused on technological support and incorporation of AI to prevent them for frauds and save them from this this complex landscape. In this regard, integration of artificial intelligence (AI) has come as a powerful and helpful tool to reduce fraudulent activities in banks.

AI is an umbrella term which includes a range of algorithms that helps in solving complex tasks and the different concepts are machine learning (ML), Generative AI (Gen AI), Large Language Models (LLM) and Deep Learning (DL) (PWC, 2023). As revealed by Chou (2023) traditional methods of investigating bank frauds include human analysis and manual verification. These

methods are falling short in terms of increased fraudulent activities in the banking industry and hence it also triggers to explore the potential and role of AI to detect and revolutionise the fraudulent banking operations (Chou, 2023). As cited by Buchanan and Wright (2021) ML has been able to reflect a considerable impact on UK financial service industry by its successful application in credit card fraud detection. On the other hand, application of AI has been acting as a revolutionary change in UK banking industry for prevention and detection of frauds, compliance, analysing credit risks and prediction of financial distress (Buchanan and Wright, 2021). Moreover, as cited by Kalyani and Gupta (2023) inclusion of AI application has the chance to save trillions of dollars for banking industry by detection of frauds and minimising them through effective prediction. The study is therefore relevant to focus on the role of AI in detection of frauds in UK banking industry.

1.2 Problem Statement

In the digital era, frauds in banking activities have become more sophisticated and insidious. As cited by Zhu et al. (2021) in digital era fraudsters are carrying out various fraudulent activities involved in online activities. UK banking industry is highly digitally integrated and is facing the complexities associated with frauds. This is creating a bad image of the banks, imposition of penalty charges and taking care of the victims. As cited by Zhu et al. (2021) bank frauds are generally related from loan frauds, credit card frauds and money laundering activities. In this context, AI has been integrated by banking industry to overcome the challenges related with bank frauds.

AI is leveraged by banking industry because of the supervised learning techniques banks has been able to detect frauds and improve accuracy. However, reports disclosed by PWC (2023), AI is proving itself to be a double-edged sword for banking industry. It is evident that by leveraging AI in detecting bank frauds has been supportive to become a prowess in data and significant strain on stabilising the financial systems (Finextra, 2023). On the other hand, different techniques of AI like LLM, Generative users are used by fraudsters also and through this software they easily create fake accounts, identify documents and images which leads to scams, phishing attacks and access to sensitive data (Finextra, 2023). Therefore, it is necessary to use higher models of AI by banks in UK so that the fraudulent activities are reduced and the AI should have a strong control over the database of banks.

On the other hand, as cited by Buchanan and Wright (2021) aggressive decline of transactions to prevent frauds and transactions wrongly declined due to suspicious frauds are known as false

positive. False positive is represented as a serious threat to financial industry. False positive creates disadvantages to the issuer when it is ordinarily an authentic issuer and it thus tampers customer loyalty about the chosen financial institution. Application of AI techniques can be effective to reduce the number of false positives and improve credit card approvals. Furthermore, as cited by van Liebergen (2017) money laundering is also one of prevalent issues related to fraudulent activities on banks and many financial institutions in UK still uses traditional methods that creates difficulty in reducing the number of false positive cases. Individual transactions and simple patterns in traditional methods are not enough sophisticated for detecting issues in complex transactions which further intensifies the need for integrating AI modes in banks.

1.3 Research Aim and Objectives

Aim

The study aims to explore the role of AI in detecting frauds in the UK banking industry.

Objectives

- To explore the role of AI in modern banking industry in UK
- To achieve a knowledge about the issues faced by banks for fraudulent banking operations
- To seek an in-depth knowledge about the role of AI in detecting frauds in the UK banking industry

1.4 Research Questions

RQ 1: What is the role of AI in modern banking industry in UK?

RQ 2: What issues faced by banks for fraudulent banking operations?

RQ 3: What is the role of AI in detecting frauds in the UK banking industry?

1.5 Research Rationale

Frauds in UK banking industry has been a significant challenging dimension in banking operations. As cited by Buchanan and Wright (2021) banking fraud and scam prevention has become a paramount in the modern financial landscape and integration of AI has been a promising aspect that can help the banks to overcome the challenges of frauds by detecting and preventing. The study is logical to conduct because it intends to explore the role and

contribution of AI for detecting frauds in banking operations in UK. Furthermore, it is rational because the study emphasises on the UK banking industry which has a significant contribution in country's output and also facing paramount challenges related to frauds, money laundering, digital scams and other risks. It is logical to conduct this research because it focuses on exploring the role of AI which has gained momentum in fraud detection and prevention.

UK banking industry has been found to be second largest amount of fraud losses in 2015 where a total amount of 133.5 million was recorded (Clark, 2022). Therefore, it is valid to conduct the study to know about how UK banking industry is been encountered with frauds and the contribution of AI to detect frauds. The study is also encouraged for conducting because it emphasises on the issues faced by banks for fraudulent banking operations and integrates AI to detect frauds and prevent those.

1.6 Research Significance and Scope

The importance of this study is that it incorporates understanding the role of AI and its extended operations in detecting frauds and preventing those and managing risks in banking operations. The study is important to investigate because it focuses on the issues faced by UK banks for fraudulent banking activities. Furthermore, as reported by Financial Times (2023) fraudulent banking activities lead to UK banks to treat the victims with care and the instructions from Supreme Court has warned the banks to treat the victims with care as per the new rules of breach of consumer harm. These dimensions also trigger the UK banks to take effective steps to prevent frauds and for preventing frauds detection is the much-needed aspect. In this context, AI plays a vital role and the study thus shows its significance for proceeding.

The study has scope because it extends the knowledge regarding the role of AI in detection of frauds by UK banking sector. The study intends to understand the role of AI in detecting frauds and how it fills the gap that is not been managed by the fraud and complaint teams of banks. The issues that bank faces for the fraudulent banking operations are loss of money, compensation to victims, bad corporate image and for which incorporation of AI tool to detect and prevent those frauds can be a remedial action in the critical landscape of UK banking industry. Understanding these dimensions through this study extends the scope of this research and reflects its importance of investigation.

1.7 Dissertation Structure

The dissertation comprises of five chapters to proceed it in an organized and systematic manner. The first chapter of this research is introduction where the research background is presented along with identification of research problem. In this chapter aim and objectives of the research is formulated and rationale and significance of the study is given. The second chapter is literature review where a through description of theories and themes collected from previous literature has been presented with critical evaluation. Based on the gaps and merits identified in previous studies, the literature of this present research intends to fill those gaps maintaining relevance with the research context.

The third chapter of this research is methodology where the description of chosen research methods and design are presented along with the justification of choosing those methods with their strengths and limitations. This chapter also presents the details of data collection methods and the analysis techniques. The fourth chapter of this research is findings and analysis which presents the evidence collected from the data sources. It also discusses the results through critical evaluation by giving opinions and arguments of other authors and giving examples. The last chapter of this research is conclusion and recommendations which highlights the summarisation of overall findings and presents practical recommendations and business recommendations in terms of limitations identified from the study findings. This section also provides the future scope of the research with its practical implications.

Chapter 2: Literature Review

2.1 Introduction

The literature provides a through understanding based on the gaps identified from previous studies. It has critically evaluated the merits of this research in comparison with other author's opinion and arguments. This section has discussed the facts and concepts of UK banking industry through which the scenario can be understood. The literature has also discussed about AI and understood its dimensions. This section reflected in-depth insights about the role of AI in the modern banking industry in UK. It has also highlighted on the issues that UK banks are encountering for fraudulent activities. In the last the literature pointed out the role of AI for detection of frauds in UK banking industry. The theoretical insights have been considered to understand the dimensions of the chosen theories to be applied in this literature.

2.2 Facts and Concepts about UK banking Industry

UK banking industry has always been a strong hub in the financial service sector and has a significant contribution to country's national output and progress. As reported by Statista (2023) the total asset of all banking institutions in UK was 16.7 trillion dollars in 2021. The revenue of this industry is 123.2 billion pounds and gives employment to 277000 people. Reports from IBIS World (2023) highlights that over the five years from 2023-24 the revenue of banking industry of UK is growing at 0.3% CAGR where anticipated hike is 9.9% for 2023-24. The top 5 banks in the world are from UK which are HSBC, Barclays, Lloyds Banking Group, Standard Chartered and NatWest Group plc (Nomad Capitalist, 2023).

On the other hand, Nomad Capitalist (2023) reported that British Banks though faced the turmoil of Covid 19 and Brexit, still London remains Europe's Largest financial centre. London is the major financial hub in UK with 23% revenue coming from this area (Maddren, 2023). The UK banking industry is known for huge investment and lending to business for financial inclusion and economic development. In 2021, UK banks has lent 525.5 billion pounds to the businesses of UK (Nomad Capitalist, 2023).

Furthermore, considering the reports published by Maddren (2023) UK banks are responding towards digital development by automation in work process and scaling down the workforce. Digital transformation in UK banks has been a focus to reshape its work process. However, it has also created a decline in workforce. It is evident that the number of banks in UK increased from 365 which reflects a 3.5% growth from 2018 to 2023 (Maddren, 2023). Whereas, the

number of workforce is 289000 which reflects a decline in 2% from 2018 to 2023 (Maddren, 2023). Moreover, reports of Haines (2022) highlights that the megatrends that are ongoing and is also going to reshape the world 2023, it is important for banks to focus more on digital transformation, digital disruption. Banks are focusing on using personalised digital solutions to achieve greater level of customer centricity. Personalisation through digital analytics like AI and big data analytics supports the banks to connect with customers in meaningful ways and enabling them to proactively help people with better financial decisions (Haines, 2022).

2.3 Conceptualising Artificial Intelligence

The concept AI has a long tradition going back to decades ago. The name artificial intelligence was coined by McCarthy at the Dartmouth conference in 1956. As cited by Streib, Harja and Dehmer (2020) the initial emphasis on AI was to consider symbolic models and reasoning followed the first waves of expert system (ES) and neural network (NN). Following a severe setback in the field of conceptualising AI in NN where other two experts demonstrated problems in it (O’Leary, 2013). In 1990 the research for AI again started and finally in early 2000s big data become available which led to another revival of NN in the form of deep neural network (DNN) (O’Leary, 2013). In this context, Streib, Harja and Dehmer (2020) pointed out that there is no specific definition or concept of AI, instead it is characterised informally from its beginnings. The multiple concepts of regarding AI reflects that it is used for making machines smarter, whereas it is the art of creating machines to perform the functions that require intelligence.

Moreover, Baker (2016) provided a definition of AI that highlights that computers which perform cognitive tasks for problem solving and learning and are usually associated with human minds. AI is considered an umbrella term in perception of Baker (2016) where it describes a range of technologies and methods like ML, NN, algorithm, data mining (DM) and natural language processing (NLP). While, as opined by Hoehndorf and Queral-Rosinach (2017) AI had high aspirations that focuses on ultimate goals centred around smart and intelligent behaviour instead of focussing on simple questions. On the other hand, opinion from Richter et al. (2019) reveals that the concept of AI originates from computer science and engineering; however, it has strong influence on other disciplines like philosophy, cognitive science, economics and neuroscience.

Furthermore, opinion from Hassani et al. (2020) highlights that AI is a rapid growing tech phenomenon that all industries intend to exploit to derive benefits from it for efficiency gains

and cost reductions. At macro stage, AI application appears to be potential for undertaking intelligent tasks that are generally a limitation for human brains (Alhajeri and Alhashem, 2023). On the contrary, Masih (2019) suggests that instead of being a replacement of human minds, AI can be incorporated for intelligence augmentation (IA).

2.4 Role of AI in modern banking industry in UK

The application of AI has been evident in multiple arenas including healthcare, education, medical sciences, government payments, banking, business, logistics and others. As cited by Doumpos et al. (2022) AI in banking industry helps to manage both financial services and customer engagement with personalised products. It is evident from the background of this study, that the banking sector of UK is most reliable, major and significant sector which accounts for a significant portion of country's GDP and generates a higher value of money. As cited by Haines (2022) integration of AI in UK helps the banks to generate insights by offering context specific experiences, services and products. AI are deployed in UK banks for enabling that customers make right decisions and provide more bespoke products.

It is evident from the opinion of Ng et al. (2021) that AI in banking industry is widely used for asset management, improving efficiency in customer services, preventing frauds, risk management and data. Moreover, Noreen et al. (2023) also pointed out that the huge and complex data sets available in banks. AI plays a vital role for processing data to predict the future of banking industry. The key aspects in which AI has reflected a promising dimension to the banking industry are mentioned below.

Cost Savings: Emergence of AI in banking industry has significantly reduced the costs related to paperwork and printing. According to the report from Millenium (2023) 416 billion dollars will be saved in 2023 with the AI application in banking industry. Banks are not bearing the costs for paper and personnel costs to access information for customer and managerial use.

Chatbots: As cited by Noreen et al. (2023) chatbot technology is one of the most interesting technologies of AI which has paved the way of customer interaction. While, Mogaji et al. (2021) cited that chatbot technologies interacts with customers by programmed queries of customers for effective, courteous communication and enhances the way of instant problem solution. Furthermore, Huang and Lee (2022) stated that chatbots of AI application not only resolves customer queries with fast interaction, it also collects data on customer queries which banks prefer to use for future improvement and resolving problems.

Customer Experience: As opined by Noreen et al. (2023) customer satisfaction and experience have reflected a proportionate relationship in terms of adoption and use of digital financial services in banks. AI technology has been a point of preference by banks because the drastic changes in consumer preferences over the years can easily be analysed which predicts customer behaviour to meet their demand with personalised contents (Millenium, 2023).

Automation: Using AI technology in the banking sector without human support and intervention is evident which reflects counting of money accurately by digital machines (Ashta and Herrmann, 2021). Automation technology in AI contributes in these machines which has helped to create banking environment more conducive and reducing work stress, improvement in operational efficiency (Ashta and Herrmann, 2021).

Fraud Detection: AI is regarded as future of banking that brings innovative solutions and has been playing a vital role in detecting frauds (Doumpos et al., 2022). Banks which are often exposed to various risks for huge online activities, AI plays a vital role in detecting frauds by using mathematical computation and complex algorithms (Mogaji et al., 2021).

Sentiment Analysis: As opined by Noreen et al. (2023) consumers' behavioural prediction is a core concern of financial institution that helps the banks to understand the needs of customers and offers financial products and services accordingly. In this context, suggestion from Mogaji et al. (2021) highlights that AI application has the ability to analyse sentiments of customers and predicts the emotion, feelings and responses via mail, social media and other channels accordingly for predicting the sentiments of customers. Furthermore, as cited by Verma (2022) AI technology plays the role to develop and display contents of the users given their preferences and choices (Afjal, Salamzadeh and Dana, 2023).

2.5 Issues faced by banks for fraudulent banking operations

Banking industry in UK are becoming more and more susceptible to frauds because of increasing digital activities and improvement in banking operations. The background from this study has already reflected the triggering effects of frauds and losing 2300 pounds by per minute by customers from UK banking sector. As cited by Vanini et al. (2023) the fraudulent activities happening in banks or bank related operations has a serious impact on the banking industry. Vanini et al. (2023) also highlighted those frauds in banking industry happens via several channels like phone banking, credit cards, checks, online banking, payment card frauds. Opinion from Hoffmann and Birnbrich (2012) revealed that banking fraud hurts both banks

and the customers. This is because banks have to incur substantial operating costs for refunding the customers for the monetary losses happened with them.

On the other hand, as opined by Randall, Gravier and Prybutok (2011) bank's consumers experience monetary loss, emotional loss and loss of trust from banks or digital process and loss of time. Customers experiencing these issues further prevents them to use digital techniques or use credit cards or online payment methods which has been actually a measure of approach by banks for reducing consumer hassle and the smaller operations of bank employees. This in turn affects customer loyalty and satisfaction and might stimulate customers to switch their behaviour (Hoffmann and Birnbrich, 2012).

Furthermore, as cited by Kelkar (2022) bank frauds have a negative impact on banks and their market values and their performance. Confronting the frauds to economy and legal authority creates a negative reputation of the bank and overall losing consumer loyalty who plays a significant role in increasing market value of banks (Kelkar, 2022). In addition, illicit activities like frauds shakes the stability of the bank and this also create a further challenge for banks and the overall economy. As cited by Afjal, Salamzadeh and Dana (2023) when different fraudulent activities like money laundering, credit card risks, financial distress often operates in a synergy which significantly causes a ripple effect that can destabilise the banking industry. Combating fraudulent activities banks has to bear high charges which results in reducing the amount of bank loans provisions and increasing the interest rates (AL-Dosari, Fetais and Kucukvar, 2022). This creates further dissatisfaction to customers and it hampers the process of digital inclusion by banks.

On the other hand, as opined by Gabudeanu et al. (2021) privacy intrusiveness is another challenge that banks faces for fraudulent activities. In case of detecting fraud, the first work is to analyse personal information and details of the banking aspects. In this context, banks face the issues of continuously using improving algorithms to detect frauds and competing with the fraudsters to identify the mechanisms they are using (Gabudeanu et al. 2021). This scenario raises a question that the inputs used by banks for detecting frauds do maintain privacy of a customer or is in turn increasing the likely chances of frauds.

2.6 Role of AI in detecting frauds in the UK banking industry

Bank frauds are increasingly become sophisticated and simultaneously use of technology by fraudsters is making the situation difficult for banks to detect the patterns and prevent them. As cited by Ramana et al. (2022) AI has been playing a key role in fraud detection and saving the

banks from the critical landscape of fraudulent activities. AI is used in detecting anomalies where the AI calculation examines each piece of new information when a banking operation is active (Alhajeri and Alhashem, 2023). It is effective in any financial occasion like withdrawal from cards and if any irrelevance is noticed by the algorithms of AI, then it will immediately stop the function (Ramana et al., 2022).

On the other hand, as stated by Benchaji, Douzi and Ouahidi (2021) ML techniques are used for automated credit card fraud detection and this is beneficial because it generally does not take account into behavioural changes or fraud sequences. Furthermore, AI systems are also able to detect frauds even in imbalanced datasets which is effective for improving detection accuracy. It also helps to overcome the challenge of adapting the system of real time situations and ensure preventing the frauds while credit card transactions.

Furthermore, Mahalakshmi et al. (2021) cited that AI has become a method for the banks to improve customer experience and expectations by providing them with convenient, innovative and safer ways to access banking operations and use online banking platforms. In addition, AI assists the banking industry in streamlining and improving procedures from investment decisions to quantifiable trading by reducing the risky dimensions (Mahalakshmi et al., 2021).

2.7 Theoretical Perspectives

Social Response Theory has been applied in the study conducted by Huang and Lee (2022) which explains how human like characters make people to respond to computers. Integrating the insights of social response theory, the study intended to understand human computer interaction and users' response mechanism (Huang and Lee, 2022). These theoretical insights can be considered in the present study to reflect on human computer interaction by focusing on AI application and its acceptance by banks and their customers.

Theory of Planned Behaviour (TPB) has been applied in the study considered by Noreen et al. (2023) which focuses on evaluating the effect of adopting AI on banking-based services. The study focuses on understanding consumers' intention to choose AI based banking services by the assessment of behavioural tendencies like awareness, subjective norms, attitude towards AI, perceived risks and opportunities and knowledge of AI (Noreen et al., 2023). Applying the insights of this theory in this present literature would be fruitful from banking dimensions to understand the pros and cons of applying AI and how consumers are accepting it can also be clear.

2.8 Conceptual Framework

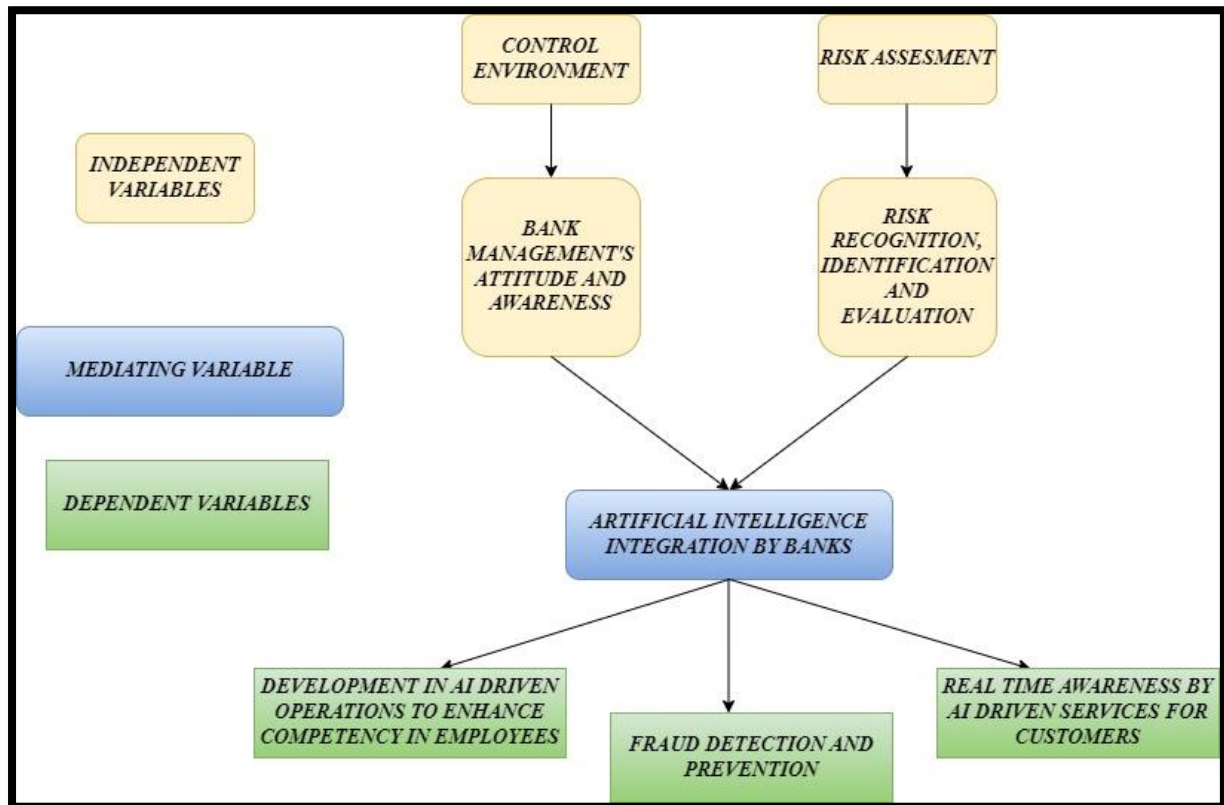


Figure 2.1: Conceptual Framework

(Source: Self-created)

The figure above depicts the overall concept derived from the literature which includes the dependent, mediating and independent variables. The independent variables in relevance with this research are control environment of banks and the risk assessment. The independent variables highlight the management's attitude and awareness about risks and frauds of the banks and their risk recognition, identification and evaluation techniques. In this context, banks incorporate AI for better performance and resolving problems which acts as a mediating variable in this study. The dependent variables are the outcomes driven from AI integration which are detection and prevention of frauds, real time awareness for consumers and improving competency of employees by development in AI driven banking services.

2.9 Literature Gap

Popat and Chaudhary (2018) conducted an extensive review on fraud detection of credit cards where a detailed description of ML for detecting frauds of credit cards are analysed. Whereas,

Ryman-Tubb, Krause and Garn (2018) reviewed that using DM techniques, fraud detection in payment cards in financial sector has been covered. Despite these studies, there exists a gap because most of the studies focuses on a specific area of finance like credit cards or payment cards, or fraud in online banking and emphasis on a specific segment of AI like using DM technique or ML techniques or others. Hence, this study founds the gap that there has been a need to bridge these gaps and focus on the overall activities of banking operations in UK to detect fraud in overall areas, not only a specific finance area. Furthermore, the need for bridging the gap is highlighted to show the contribution of complete AI for fraud detection in banking activities.

2.10 Summary

The literature has pointed out the scenario of UK banking industry which reflects its significant performance and contribution to economy. The concept of AI is discussed in this literature with its different dimensions and importance of use. The literature reviewed that AI in modern banking industry has brought facility in cost reduction, automation, customer experiences, chatbots and fraud detection. The issues faced by banks for encountering frauds are privacy intrusiveness, bad reputation, taking care of victims and compensating them, lack of trust and others that creates troubles for the UK banks. The role of AI in detecting frauds in the banking operations is enormous and UK banks being likely exposed to stronger risks of fraudulent activities, the intention to integrate it has increased.

Chapter 3: Methodology

3.1 Introduction

Research methodology is the science of conducting research following systematic procedures. This may be understood as a method that systematically solves the research problem. As cited by Patel and Patel (2019) in a research methodology, various steps are adopted that helps researcher to proceed systematically for solving the research problem along with finding the logic behind them. It is necessary for researcher to know both methods/techniques and methodology. Methodology aims to describe and interpret the chosen methods, throw light on their benefits and clarify their limitations relating their capabilities. On the other hand, Melnikovas (2018) opined that research methodology is a general strategy which includes a system of belief and assumptions that help to maintain consistency between the chosen methods and techniques. The study has considered research onion model proposed by Saunders, Lewis and Thornhill (2016) to delineate the chosen methods and provides a through description behind choosing those methods.

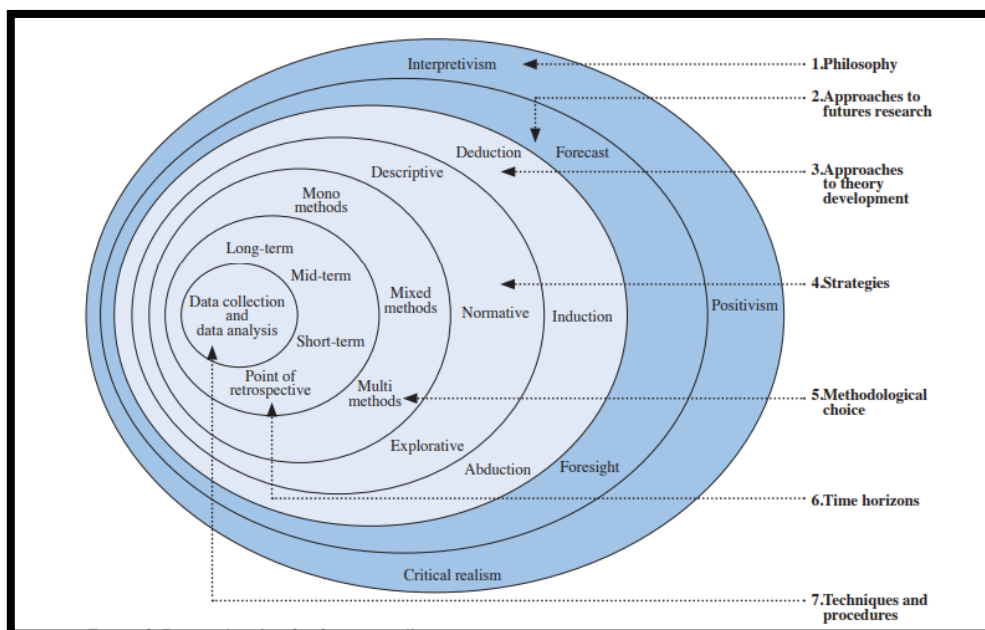


Figure 3.1: Research Onion Model

(Source: Melnikovas, 2018)

The research methodology has its starting point with research philosophy and ending point at data collection and analysis techniques. It has chosen seven methods to conduct the study and those are research philosophy, approach, strategy, methodological choice, time horizon and

data collection and analysis methods. Through research onion, the exhausting description of the chosen methods has been given in this chapter that has supported in accomplishing an effective methodology.

3.2 Research Philosophy

This layer is the first stage in the research onion and this method is what the researcher perceives about a truth. As cited by Blackwell (2018) it is a set of value, beliefs and assumptions that guides the design of the collection of data collection and analysis process. Research philosophy includes the components of ontology, epistemology and methodology and methods (Alharahsheh and Pius, 2020). There are generally three research philosophy considered in academic research which are positivism, interpretivism and critical realism. Positivism philosophy mainly reflects subjective assumptions regarding research context, whereas interpretivism considers the subjective assumptions and critical realism focuses that world consists of real entities and the whole world perceive sensations and images of real entities (Melnikovas, 2018).

Among the three philosophies, the study has chosen interpretivism philosophy mainly for its subjective stance and assumptions. As cited by Alharahsheh and Pius (2020) interpretivism philosophy is developed through critique of subjective perceptions. The belief of interpretivism philosophy are relativist ontology, subjective epistemology and qualitative methods. In relativist ontology the reality is perceived through intersubjectivity where the social and experiential aspects of the research are considered. This ontological belief has been supportive to explore the intersubjectivity of role of AI in modern banking functions and also the role of AI in detecting frauds in banking industry. The subjective epistemology provides a clear connection between research and research subject because it assumes that real world happenings from their knowledge (Alharahsheh and Pius, 2020). This philosophy aims in including richness in the insights gathered rather attempting to provide a definite and universal laws (Blackwell, 2018). This has helped to gain in-depth insights about the role of AI in fraud detection and prevention in the UK banking industry. Adoption of interpretivism helps in generation of high-level data validity because it is generally based on personal contributions considering different variables.

On the other hand, as cited by Pervin and Mokhtar (2022) interpretivism philosophy is based social constructivism, hermeneutics and phenomenology. This paradigm also helps the researcher to explain the research elements and therefore, researcher incorporate subjective

notions, beliefs into the research to understand societal construction and exploration of human language. Considering this paradigm has supported the existing study to seek in-depth knowledge regarding the contribution of AI in fraud detection in UK banking sector. This philosophy has also supported in deriving knowledge about the issues faced by banks for frauds. The loss in consumer loyalty, satisfaction are some major dimensions that banks face due to the frauds and this paradigm helped to intervene in these aspects thoroughly.

Interpretivism is limited in some context and it has been highlighted in the study conducted by Junjie and Yingxin (2022) where interpretivism is criticised for not being able to consider in making substantial contribution to social analysis. It is also asserted that interpretivism creates a doubt on all epistemology because it's ontology depends on multiple perspectives that requires equality. It is also criticised that in order to gain deeper understandings of a phenomenon instead of generalising it, there occurs a chance of gap in result validity (Junjie and Yingxin, 2022). However, the preset study has minutely observed these shortcomings and focus on through review of the research results so that the limitations does not affect the research.

3.3 Research Approach

This is the second stage of research which are general techniques that is followed in a research study to understand data collection and analysis process. Considering the research onion model, three approaches are followed in research studies for theory development and those are deductive, inductive and abductive. Melnikovas (2018) pointed that deductive research approach is inferred when the research moves from general to specific which is in contrast of inductive approach. Abductive reasoning is a best notion for future studies that aims to control information using structural and categorisation argumentation (Melnikovas, 2018).

This research has considered inductive research approach which is known for moving from specific context to broader generalisations based on the observations or inferences drawn. It has not considered deductive and abductive because the role of AI in present UK banking industry to detect frauds can be well analysed through observations of specific context and then drawing generalised inferences which can only be done by inductive approach. As cited by Zalaghi and Khazaei (2016) induction is a reasoning approach by which law or general principles are inferred by observing some special cases. This reasoning approach observes special cases based on the theories established in previous studies and then draw general observations from it. It basically emphasises on observations highlighted in previous studies

and then deriving generalised conceptualisation and conclusions from it (Zalaghi and Khazaei, 2016). This approach has helped to understand the role of AI in modern banking industry and through those observations it has also been able to draw inference that fraud detection has been a major job role of AI which helps to secure the UK banking sector from money laundering and fraudulent activities. Furthermore, Kim (2021) cited that inductive research starts with establishing a theory and then observing to find a generalised theory. In inductive approach, the researcher starts by collecting relevant data for the research topic and after data collection, empirical generalisations are established to get an overview. This approach has helped the study to develop overview about the role of AI in fraud detection.

On the other hand, Liu (2016) cited that inductive approach is advantageous because it does not depend on any prefabricated model or theory and is widely accepted for its methodological flexibility and less rigour. This advantage was a potential cause behind choosing inductive approach. It has helped in retrieving evidence from potential data sources without rigour and high methodological flexibility. The significant role of AI in detecting frauds in banking sector has been derived with the observations drawn from it. In inductive approach, the previous observations are used by researcher to describe the circumstances being studied. Inductive is also efficient to derive thick descriptions and logical reasoning of the research context (Casula, Rangarajan and Shields, 2020). With this ideology the study has been able to reflect thick descriptions about the issues faced by UK banks for fraudulent activities. It has also supported in providing logic behind the issues faced by the UK banks. However, inductive research also encounters some limitations. As cited by Zalaghi and Khazaei (2016) inductive is limited because limited knowledge of data and research has the potential to influence researcher's observations. Though this limitation is predominant, however, the study has been done with minute care in order to overcome the limitation.

3.4 Research Strategy

This method is the third stage of the research onion which reflects the blueprint of the study. Considering the onion model, three strategies are employed in academic research and those are descriptive, exploratory and normative. As opined by Melnikovas (2018) descriptive strategy is chosen when that aims in providing through description of the research context. Exploratory strategy is aimed to explore the unexplored dimensions of the research and explores possible development, while, normative strategy aims at exploring what the future should look like (Melnikovas, 2018). This research has considered explorative research strategy for the feature

of exploration and shedding light into new phenomenon. Casula, Rangarajan and Shields (2020) stated that exploratory strategy is considered when the research tries to enter the unknown for discovering a new dimension. Effective exploratory strategy undertaking helps to resolve unexpected problems and is a type of reconnaissance which is a type of inquiry that is done in preliminary stages (Casula, Rangarajan and Shields, 2020). This strategy has helped in exploring the role of AI in fraud detection in UK banking industry.

On the other hand, as cited by Thomas and Lawal (2020), exploratory research strategy is employed in research that helps to gain background information about a phenomenon. It is also stated by Thomas and Lawal (2020) that exploratory studies are conducted for a problem where there is limited evidence in past research and it serves as tool for initial research to provide a theoretical idea of the research problem. This strategy has helped to identify and explore the double-edged sword problem of AI in fraud detection. It has supported in understanding that why high-quality models of AI need to be implemented in banking sector to reduce fraudulent activities.

Exploratory research is appropriate in case of research problem where the research knowledge is limited (Thomas and Lawal, 2020). This design has been supportive to overcome the constraint of limited knowledge about double edge problem of growth of AI integration in banking sector and also tried to find out suitable solutions to overcome it. In addition, as cited by Makri and Neely (2021) exploratory research focuses on finding out seeking new insights and finding out what is happening. This strategy has helped to seek new insights about the role of AI and also the issues faced by banks for fraudulent activities. It has also helped to gain new insights regarding the role of AI in detection of frauds in banks. Despite several advantages, exploratory research strategy is limited because it has chances of offering inconclusive results (Hallingberg et al., 2018). Moreover, it is evident, often with exploratory research the problem arises where intervention feasibility is to be discussed because of limited guidance (Hallingberg et al., 2018). Though these are the critical aspects of exploratory research, this study has been careful while choosing this method and has been able to derive conclusive results efficiently.

3.5 Methodological Choice

This is the method that is considered in research which supposes selection of particular methods and techniques from a given set of rules. As cited by Melnikovas (2018) the choice for methods within the research may be implied by research problem question and focusing on meeting the research aim. Considering the research onion model there are three major types of

methodological choices and those are mono method, multi method and mixed method. The study has considered mono method because it has considered data collection through single method. It has considered only secondary methods to collect data. As cited by Melnikovas (2018) mono method is considered when the research emphasises either on quantitative or qualitative data collection. The study has considered mono method qualitative choice which is effective to derive broader insights in textual format.

Qualitative research is considered as the study of the nature of a phenomenon which is appropriate for answering questions of why something is observed. Qualitative study does not consider number instead it considers the pattern observations and intends to understand “why” a thing is happening and its possible explanation (Busetto, Wick and Gumbinger, 2020). This has helped to gain knowledge about the excess frauds in UK banking industry and why AI has been chosen in prevention of frauds. This in turn has also supported in deriving knowledge about the role of AI in UK banking industry to detect frauds. The purpose of qualitative research is to describe and interpret issues or phenomenon systematically which is deep rooted in deriving systematic understanding of the research context (Mohajan, 2018). This has supported the study to reflect systematic understanding about the role of AI to detect frauds in UK banking sector.

3.6 Time Horizon

Time horizon refers to the period to be studied or chronological horizon of varying breadth. There are three different types considered and those are short term which is up to 10 years, mid-term which is up to 25 years and long term which is more than 25 years (Melnikovas, 2018). This study has considered short term time horizon because data has been collected within last 5-6 years of time period. Though it has not followed any chronological pattern for considering the study period, it has just considered datasets published after 2016 to understand the recent changes and role play of AI in fraud detection in banking industry in UK. This time horizon has been considered based on the research objectives and point of retrospection.

3.7 Data Collection Methods

This is the vital stage of a research and it includes two forms of data collection in academic research. The two forms are primary and secondary methods and this study has considered secondary data collection methods. The study has collected secondary qualitative data sources for which it accessed different websites, company reports and news articles. The study has

collected data from websites like Deloitte, UK government, UK banking industry websites, specific consultancy business reports like Deloitte, PwC, KPMG and EY. It has also accessed reports published by the banks working in UK. The study further considered news articles published by BBC, Fortune, Guardian, Reuters, Forbes and Bloomberg.

The study has accessed 15-20 specific datasets (samples) from the chosen secondary sources out of the numerous articles and reports (population) available on Google. As cited by Creswell and Creswell (2018) simple random sampling allows each unit an equal chance to be considered as sample from the population. The study considered the datasets published after 2016 and written in English language has been taken. It has considered relevant keywords like UK banking industry, AI, ML, fraudulent activities, fraud prevention, fraud detection, role of AI, functions of AI, issues regarding fraudulent bank activities to retrieve relevant and authentic information in concern with research context.

3.8 Data Analysis Technique

After completion of secondary data collection from websites and reports, analysis of data is important for its establishment and drawing inference of the research. In secondary qualitative research, three process are followed ad those are case study analysis, content analysis and thematic analysis. This study has considered thematic analysis technique because it is supportive for novice researcher and also helps in interpreting huge datasets into textual format. As cited by Braun and Clarke (2006) thematic analysis technique is a method which is used for identification, analysis and interpretation patterns of themes within qualitative data. Thematic analysis provides accessible and systematic process for generating codes and themes from qualitative data. One of the main benefits for which the study has considered thematic analysis is its flexibility. Its flexibility has helped to interpret the datasets and establish potential inferences regarding the role of AI in UK banking sector for fraud detection. Thematic analysis is done by following some stages and this study has considered the stages followed in the study conducted by Braun and Clarke (2006). The stages are familiarisation with data, thematic small codes generation (Refer to the table of Chapter 4), searching for themes, reviewing themes and then naming and defining themes.

The first stage is familiarisation with data which indicates reading and re reading of data to note down the vital things. This stage is vital and it requires researcher to immerse with the datasets in order to be familiar with breadth and depth of the context. Immersion involves the process of re reading of data and reading it in active way. The second stage of this process is

generating initial thematic codes. As cited by Braun and Clarke (2006) this phase involves producing codes from the datasets that has been collected from secondary sources which identifies a feature of the data. On the other hand, Vaismoradi et al. (2019) cited that coding is the process of data reduction which is an element of organising data in most qualitative approaches. The codes have been done in the thematic table of next section.

Stage three begins with the process of searching for themes when all the data has already been coded initially and collated. This stage is started with a long list of initially codes which has been identified across the entire datasets. This stage is considered because it refocuses on analysis of themes at broader level instead of codes and involves sorting the codes into potential themes. The fourth stage that has been followed was reviewing of themes. This stage is conducted because after following stage three, a set of themes is devised and stage 4 allows the refinement of those themes. The last stage that has been employed is naming the themes and has been defined with possible evidence and examples. It has been interested with opinions and arguments from other authors.

3.9 Ethics Consideration

The study has maintained all the ethical aspects properly in order to maintain its research integrity and trustworthiness. Though it has considered secondary research, however, there arises some ethical issues in different context. Secondary research as used many times has the chances of low validity and reliability, however, this research has checked datasets and only included reliable datasets. There is a chance of ethical issue in case of secondary research regarding identifiable information. As cited by Tripathy (2013), secondary research is approved by ethical board when a full review is done that the data has no identifiable information or is devoid of such information or the researcher has already coded the data so that while using those datasets as secondary research cannot be identified. This research has been considered very carefully and no identifiable information has been put. It has not included any sensitive or plagiarised contents which is considered an academic misconduct. The study has included datasets which were relevant in regards with research objectives. In secondary research, ethical issue also arises if any paid, restricted data sources are used because freely accessible and available data on internet is only included in secondary research (Tripathy, 2013). This research has accessed such datasets and has also acknowledged the ownership of the datasets with proper citation and referencing guides.

3.10 Summary

The study has conducted a robust methodology to systematically proceed with the methods and is successful to meet the research aims. This chapter has reflected that subjective epistemology and realistic ontology has been the primary reason for consideration of interpretivism philosophy. It has also shed light on the limitations of this method and the study has avoided it has also been discussed in the chapter. Inclusion of inductive approach for less rigour, higher flexibility, logical and thick descriptions are the advantageous aspects of inductive approach. The chapter has also discussed the reason behind considering exploratory design and the effectiveness of qualitative methodological choices. Secondary qualitative data sources with 15-20 sample size have been the method of data collection and thematic analysis has been described for interpretation of research findings.

Chapter 4: Findings and Discussion

4.1 Introduction

This chapter provides the evidence that has been collected from secondary data sources. It has organised the datasets and has integrated it into meaningful themes. Three themes have been formulated and through which the datasets have been presented in an organised way. The first theme has pointed out that AI has been playing a significant role in modern banking industry in UK and this theme is linked to first research question. The second theme which is linked to second research question highlights that the issues faced by banks in UK for fraudulent activities. This themes mainly presents the barriers encountered by the UK banking sector for fraudulent activities and this theme is linked to third research question. The third theme reviews the role of role of AI in UK banking sector to prevent frauds. In this context, AI has come as a powerful tool to save the sector from fraudulent activities by fraud detection and prevention. This chapter also provided the analytical discussion of the research findings where the themes has been critically evaluated through opinions and arguments of other authors. Critical interpretation has helped the research to focus on contradictory or different opinion in terms of the research findings which further has helped in establishing the validity and reliability of the datasets.

4.2 Findings from secondary sources

4.2.1 Thematic Coding

<u>Link with Objectives</u>	<u>Keywords</u>	<u>Sub Codes</u>	<u>Meaningful Themes</u>	<u>Website Citation</u>
Objective 1	Role of AI, contribution of AI, modern banking activities, UK	AI and its contribution in banks	Explore the role of AI in modern banking industry in UK	UK Finance, 2021
Objective 2	Issues for fraud activities, challenges, barriers, fraudulent	Challenges encountered by banks for fraud activities	Issues faced by UK banks for fraudulent banking operations	Financial Times, 2023

	activity, UK, banking industry			
Objective 3	Fraud detection, fraudulent activities, role of AI, support from AI, AI benefits to detect frauds, UK, frauds in UK banking sector	Fraud detection in UK banks with AI integration	Role of AI in detecting frauds in the UK banking industry	MasterCard, 2023

The sub codes are...

For Theme 1: “Explore the role of AI in modern banking industry in UK”

For Theme 2: “Issues faced by UK banks for fraudulent banking operations”

For Theme 3: “Role of AI in detecting frauds in the UK banking industry”

4.2.2 Discussion of themes

Theme 1: Explore the role of AI in modern banking industry in UK

Reports from UK Finance (2021) highlights that UK financial institutions has seen a substantial opportunity in integration of AI. The survey done by UK Finance (2021) with 23 financial institutions has reflected results that 90% of the respondents supported predictive AI and 60% believe that generative AI is able to deliver significant cost savings and improvements in operational effectiveness. It has been found from the reports of UK Finance (2021) that 65% of high street banks in UK has taken action to upgrade AI for ensuring risk management policies. It is evident from the report that banks in UK wants a faster and efficient way of fraud detection where AI has been playing a significant role to detect and prevent frauds. Development of defensive AI tools has been efficient to detect cyber risks, fake images or impersonations that helps the banks in better identification of suspicious transaction.

Reports provided by Deloitte (2023) reflects that AI integration is changing the quality of products and services that a banking industry offers. It has provided better methods to handle data and enhance improvement in customer experience and has also simplified, speed up and redefined traditional process to make them more efficient. Reports from Deloitte (2023) highlights that banks in UK are in a highly competitive landscape where AI integration has optimised current service offerings, take new offerings and provision of more personalised experience for their customers.

AI integration has helped in explosion of big data that has a major impact on the banking industry and has been a successful incorporation to meet changing customer expectations. Integration of big data has helped to enhance interaction process and consumers now interact with their banks on a digital level and banking organisations nowadays are able to collect large volumes of unstructured data like emails, text and voice messages (Deloitte, 2023). Reports from Consultancy UK (2017) highlights that AI has been touted has the next major disruptor in the UK financial sector. It is reported that UK banks are using AI because it is driving innovation securely. 86% of business leaders in the banking industry states that integrating this technology has played an evolutionary role in different dimensions of banking operations and those are IT, customer service, HR functions, procurement, finance and accounting marketing and sales (Consultancy UK, 2017).

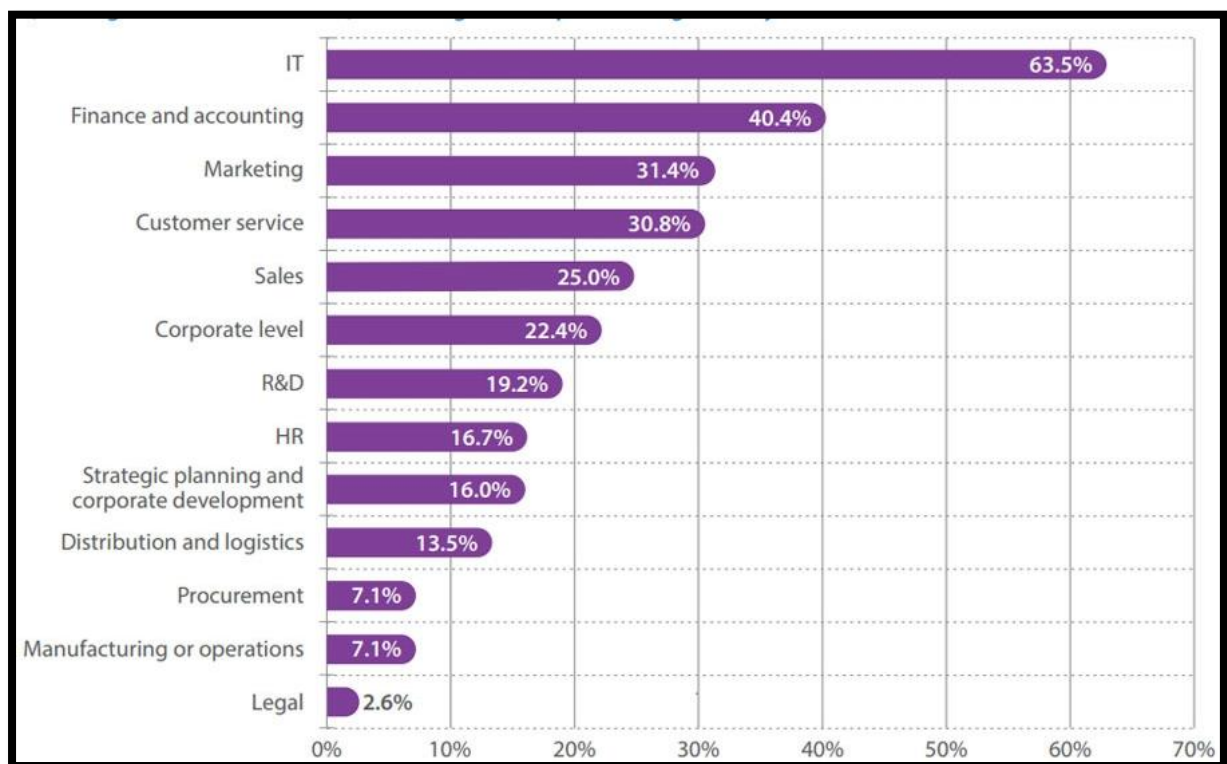


Figure 4.1: Percentage of different functions in banking operations where AI has been used

(Source: Consultancy UK, 2017)

Furthermore, article published by BBC (2017) states that AI has become a gamechanger in the banking sector and it will be the way to interact with customers in the next three years. Royal Bank of Scotland uses chatbots to answer queries and has now an average of 30000 of conversations with AI used chatbots (BBC, 2017). Forbes (2023) has pointed out that AI in banking industry serves different purposes which are account enquiry, money transfer, credit score monitoring, loan applications, financial applications, customer service, account management and insurance claims.

It is also found from the article published by Forbes (2023) that to secure a primary competitive advantage position, consumer experience should be contextual, tailored and personalised. In this context, 77% of bankers in UK believe that the ability to unlock the capability and value of AI depends on the gap between success and failure of AI. Banks use AI to analyse customer data for understanding their preferences and needs and supports the customers by giving answers and solutions to their queries in real time. Forbes (2023) also has revealed that 24*7 availability of services in terms of account balance inquiries, password reset, freeing customer service representatives which helps to increase efficiency of banks and reduce costs. Moreover, AI in banks is integrated to provide a conversational banking experience by integrating a conversational banking experience. Integration of AI models with banking applications that helps to provide a single point of contact for users to make transactions and view account information.

NatWest another Bank in UK has collaborated with IBM for the initiative of integrating generative AI, deep learning which will be potential to improve financial results and high quality customer care (NatWest, 2023). 54% of banking industry chiefs supports that customer care is the utmost demand and advanced use of AI has supported this (NatWest, 2023). IBM's deep engineering and AI expertise has been integrated in NatWest Bank, to extend customer friendly and customer focussed functionality via the virtual assistant "Cora" (NatWest, 2023).

Theme 2: Issues faced by UK banks for fraudulent banking operations

UK banking industry faces huge problems for the rising fraudulent activities. As reported by Financial Times (2023) UK financial regulator has warned the banks that the way of treating the breached victims should be improved. Banks are warned by giving penalties and has been

imposed by new rules for protecting consumer harm by finance regulator. In UK, the banks face issue with APP where scammers trick the victims to send money and this fraud is in rise in UK where the UK banks has been instructed to make the fraud and complaint teams appropriately resourced and instructed to assist the customers more (Financial Times, 2023). It is reported by UK Finance (2021) that 38% of the frauds in UK banks are caused due to APP and 45% happens due to payment cards. For the fraudulent activities, bank regulators are paying attention and imposing huge fines on the banks which causes monetary losses in the banks. It is evident from the articles published by Forbes (2020) that regulators across the globe have imposed 8 billion dollars for anti-money laundering (AML) fines against the banks.

Moreover, it is also evident after the rise in fraudulent activities, the actions of bank to change their transaction monitoring threshold has been restricted by UK Financial Conduct Authority because many organisations struggle with high volume of alerts by lower number of staffs (Forbes, 2020). It is also evident from the reports of BBC (2021), that HSBC has been fined by 64million pounds because of failure to consider proper steps regarding AML activities. It was stated by the Financial Conduct Authority (FCA) in UK, that before this fine has been imposed, several times the bank's financial crime safeguards have been highlighted and has been warned to take necessary steps or actions (BBC, 2021).

It is evident that 31% of UK banks are facing challenges to combat the scams where the banks are facing the overarching concern where the measures complexity of balancing the need to protect consumers. The new regulatory measure of Payment System Providers (PSRs) uses a springboard to combat frauds where another problem arises because it requires the collection and publication of performance data. UK banks are facing crisis with legal requirement because in order to prevent frauds they are taking stringent actions for processing payment with strict regulatory compliance. However, the legal instructions from FCA envisages that customers should be allowed to provide frictionless payment processing which can affect consumer satisfaction and creates difficulty to consumers for payment processing. Moreover, instruction and guidelines from PRS has been given that the defrauded customers must reimburse an amount of 415000 pounds from October 2023 to next year for helping to combat scams (Reuters, 2023).

The rise in fraudulent activities has posed significant challenges regarding open banking because in this context, customer data are accessed by third party where banks allowed to do it. However, rising scams and fraudulent activities prevents this which prevents cost reduction,

financial inclusion, enhancing customer experience by banks. In addition, BBC has been reported by Barclays banks that 77% of scams are happened through social media and online market places or dating app (BBC, 2023). This has been a challenging aspect for the banks to prevent it and also further compensation increases the financial burden on banks. The NatWest Bank chief executive has confirmed BBC that that 3 million people were victims of fraud in 2022 and the percentage increased by 87% in the year 2023 (BBC, 2023). Moreover, the return of 56% of frauds amount by banks to protect consumer harms has put the banks in a huge financial pressure (BBC, 2023).

Furthermore, customer loyalty and experience get affected for fraudulent activities which is challenge for the UK banks. A report published by PWC (2023) where sentiment index for 18 UK banks has been done which reflects that fraudulent activities negatively affect customer experience for which all the chosen 18 banks face issues. It is reported that being a victim of fraud, a customers' experience negatively and this has a long-lasting effect on customer-banks relationship. PWC (2023) also pointed out that among the 18 banks, the leading bank score was -4.1% for operational sentiment of customers, though it was lowest among the highest score of -55%. In terms of sentiment analysis on social media, UK banks is evident to be considerable behind within other countries analysed data and has reflected a high percentage of negative sentiment analysis. Customers expresses dissatisfaction for the UK banks with online scams and frauds. Effective fraud counter measures are a baseline for customer expectations and those benefits are often lost in noise that are being provided by banks. This is also a challenge to reach potential customers and increase their loyalty and satisfaction level for which the banks are facing challenges due to fraudulent activities.

Theme 3: Role of AI in detecting frauds in the UK banking industry

AI has come as a significant tool in banking industry to detect frauds and plays the role of saviour to overcome the crisis of fraudulent banking activities. Reports from Tech Wire Asia (2023) highlights that MasterCard is using the latest AI powered insights to predict scams and frauds in real time and before any money is left in victim's account. Over the recent years, AI role has been pivotal in order to foster a safe and secure financial ecosystem. It has been evident TSB Bank is one of the first bank to adopt MasterCard's Fraud Risk Tool. It has been evident that using AI insights, TSB bank has been able to saved 100 million pounds across the UK over a year (Tech Wire Asia, 2023). It is also reported by MasterCard (2023) that AI insights has been leveraged using Mastercard's AI, it has partnership with nine UK banks including TSB,

Bank of Scotland, Lloyds Bank, Halifax, NatWest, and Monzo Mastercard using large scale payment data for identification of real time scams. As reported by MasterCard (2023) AI powered solutions has stopped 35 billion fraud losses in the previous three years. On the other hand, it is evident from the news published by The Finance Technology (2023) impersonation fraud has been a long persistent threat to individuals and business causing a severe pain point for banks. Authorised Push Payments (APP) has accounted from 40% of UK bank fraud losses which has been projected to cost 4.6 billion dollars combinedly in UK in 2026 (The Finance Technology, 2023). MasterCard is leading the charge against fraudsters with its Consumer Fraud Risk Solution powered by advanced solution of AI. Reports from Bank of England (2019) highlights in the entire UK finance sectors, banks are the highest percentage to considered ML for detection of frauds, prevent AML activities and estimated more personalised risk premium *[Refer to Figure 4.2]*

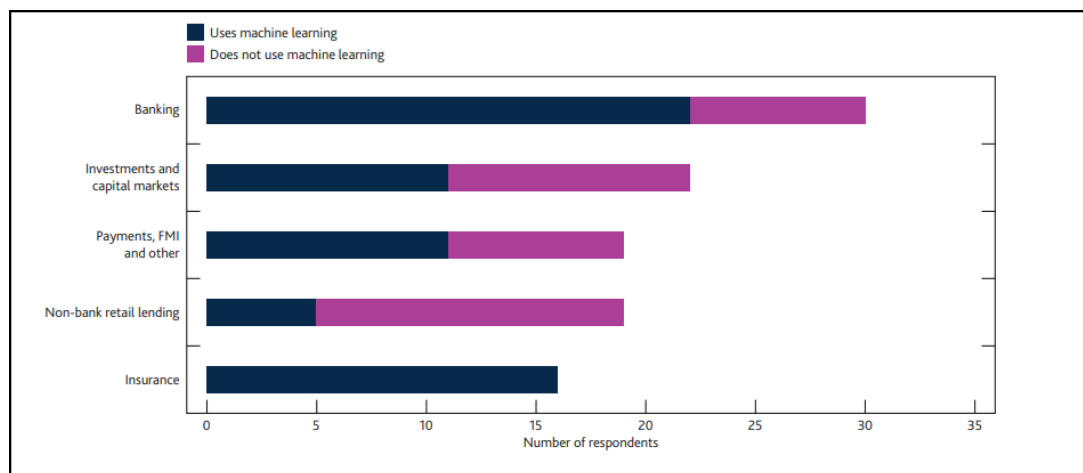


Figure 4.2: Number of respondents using ML reflecting different areas of finance industry in UK.

(Source: Bank of England, 2019)

It is evident that AI is gaining momentum in fraud detection in UK banks and the reason behind it is that ML algorithms has the potential to analyse huge amount of data to detect fraudulent transactions and this improves the precision of real time approval and reduce false positive results (Forbes, 2023). Using AI, banks are expecting to save 12 trillion dollars by 2030 that will cut down the costs by 22% (Forbes, 2023). Using AI, it has been noted that more than 12000 fraud complaints were lodged by UK Financial Ombudsman Service with an increase of fraud detection by 40 % from 2018 to 2019 (Forbes, 2023).

Furthermore, evidence received from the published article of BBC (2023), that using the rule Banking Protocol, a bank's staff in specific circumstance can go against customers' wish to transact if they think the transaction looks suspicious. This emergency procedure was used for 11643 times in 2022 and has saved 258 million pounds since 2017 in UK banks. This protocol has been the part of AI integration where detection and preventing of frauds has become easy. Therefore, the findings indicate that AI has been playing a significant positive role in UK bank industry to detect frauds.

4.3 Discussion

The findings retrieved from theme one highlights that AI is able to deliver significant cost savings and improvements in operational effectiveness. Similarly cited by Ng et al. (2021) AI based financial operations has witnessed a reduction in operating costs and also facilitates reduction in cost of data processing. Without bearing the cost for paper and personnel, AI has been supportive to access information for managerial and customer use. On the contrary, as argued by Boustani (2021) AI implementation and maintenance includes high financial cost because of the association with advanced use of technology. It has been highlighted from the findings that UK banks are taking actions to upgrade AI for ensuring risk management policies. Similarly, opined by Leo, Sharma and Maddulety (2019) ML algorithms, which is a part of AI helps in transformation of the risk management function at banks. Leo, Sharma and Maddulety also (2019) cited that banks face various risks like interest rate risk, market risk, off-balance-sheet risk, credit risk, technology and operational risk, foreign exchange risk, liquidity risk, and insolvency risk. Machine learning has the capability to detect meaningful pattern in the data and this reduces the chances of risks included in it. Classifier Algorithms, Artificial neural networks include in ML that helps in classification of risks in banks and address issues significantly (Leo, Sharma and Maddulety, 2019).

It is found from the first theme that in modern banking operations in UK, banks want a faster and efficient way of fraud detection. In this context, the result highlighted the contribution of AI to detect and prevent frauds. Similarly reported by EY (2023) that AI has been playing a significant role in combatting financial crimes, detecting frauds and improving efficiency in compliance activities. The report reflected that 33% of financial crimes are easily monitored through AI and 35% of possible banking cyber frauds are detected (EY, 2023). This highlights that AI has been playing a vital role in risk management, fraud detection, cost savings, operational efficiency. The study further pointed out that defensive AI tools are capable to

detect cyber risks, fake images or impersonations that helps the banks in better identification of suspicious transaction. Similarly cited by Alhajeri and Alhashem (2023) AI relies on accuracy data sets to effectively prevent money laundering activities and detection of frauds by analysing the data sources how much they are relevant or are fake images or websites that appears legitimate to tick customers. On the contrary, Mytnyk et al. (2023) argued that implementation of AI technology supports to detect frauds includes several challenges which includes utilisation of algorithm's lack and transparency and interpretability. It raises concern regarding data privacy because AI algorithms uses personal data that are subject to using in the analysis of decision-making process. This analytical discussion intends to focus on achieving first objective of the research with the attempt to validate the theoretical insights derived from Social Response Theory. It includes knowledge about acceptance of technology by human beings and its surrounding social world and the interpretation from theme one pointed out the acceptance of modern banking world about AI which has brought a revolution in technology.

The insights derived from theme 2 highlights that the banks face issue with APP where scammers trick the victims to send money and this fraud is in rise in UK. It has also revealed that UK banks has been instructed to muke the fraud and resourcing the complaint teams appropriately for providing more assistance to customers. Similarly cited by Gabudeanu (2021) enhancing the anti-fraud requirements and legislations increases the soundness of banks which finally increases the bank systems and financial systems. It has also been stated that customers are tricked because they could not understand the authenticity because they receive fraudulent activities where e banking credentials are related (Gabudeanu, 2021).

The theme two also found that due to fraudulent activities, bank is facing with higher penalties causing monetary losses in the banks. It is evident from the findings that bank regulators across the globe have imposed a huge amount of fines for AML and fraudulent activities across the globe. Similarly pointed out by Yeoh (2019) that banks have been imposed substantial fines or forfeits are premised due to the inability to maintain compliance and regulations with AML and fraudulent activities. A similar opinion is pointed out in the findings in the study conducted by Yeoh (2019) that UK bank regulators imposed fine to Deutsche Bank (working in UK) and was taken disciplinary action in 20 billion dollars for money laundering scheme.

Moreover, the study found that rise in fraudulent activities creates restrictions and difficulties for the banks because they have to change their transaction monitoring threshold. The reason reflected in the outcomes reveal that banks faces this crisis because of lower number of staffs

where the transactions alerts and its associated risks are relatively much higher. Similar opinion derived from the study of Sakawa and Watanabel (2021) that banks faces problems in delegating the task of monitoring and focussing on frauds at managerial level is difficult. It is difficult to rationalise fraud behaviour and with ever changing fraud natures, it becomes difficult to control and change the regulation and monitoring activities for avoid the fraudulent activities. On the other hand, Bhasin (2016) opined that lack of training to staffs, lack of staff numbers and low compliance levels rare the issues that leads to fraudulent activities and this further creates issues in monitoring and the lack of staff creates constraints to carry out the work meticulously.

The perceptions derived from UK banks are facing challenges to combat the scams where the banks face the challenges regarding the measures complexity of balancing to protect consumers. The regulations for PSR creates issues for UK bank to measure performance data, analyse them and detect frauds. This finding has a similar inference in terms of the opinion of Diadiushkin, Sandkuhl and Maiatin (2019) highlighting that financial institutions are not left with choice of compliance policies and has become a legal obligation which creates difficulty to maintain. This also compels the banks to allocate additional funds for compliance with their requirements (Valkanov and Stavrova, 2019).

Theme two also revealed that UK banks are concerned with legal requirement because in order to prevent frauds they are taking stringent actions for processing payment with strict regulatory compliance. This becomes difficult to consider and follow every minute detail and failure to adhere detailed regulations imposes fine in case of fraudulent activities (Valkanov and Stavrova, 2019). This theme has also found that increase in fraudulent activities has also become challenging because in this context, customer data are accessed by third party where banks allowed to do it. Customers worry about their personal data and this affects consumer loyalty and positive customer experience. It is similarly opined by Albaity and Rahman (2021) that due to a fraudulent activity customer loyalty gets affected which simultaneously affects customer satisfaction and experience. It is necessary that banks have to reflect their proactive behaviour in protecting personal information of consumers and can make them believe that their digital payment process are safe (Chaimaa, Najib and Rachid, 2020). Ensuring this dimension would increase customer satisfaction and loyalty and also increases the likelihood of customers to recommend their chosen banks to others. Furthermore, Ofori, Boakye and Narteh (2016) cited that formation of customer satisfaction influence loyalty towards However, in case of banks digital payments and e-banking services, achieving customer loyalty is difficult

and challenging to maintain (Albaity and Rahman, 2021). This analytical interpretation aims to meet second objective of the research and it has validated the theoretical insights derived from TPB. It reflects that if planned behaviour is considered then the issues of banks can be overcome. Applying the insights of this theory has helped in evaluating the issues faced by banks for fraudulent activities and banks are accepting AI to include it as a powerful tool to prevent from frauds.

The perceptions gathered from third theme AI role has been pivotal in order to foster a safe and secure financial ecosystem. The findings highlighted that using AI insights has been effective for identification of real time scams for fraud detection. Similarly cited by Batani (2017) in order to get accurate fraud detection, banks are investing more in perfect algorithms for combatting the fraud. It is evident from the study conducted by Fucci et al. (2022) pointed that ML algorithms plays a vital role to gather informative data about customers and their real time transaction details. Theme three has found that impersonation fraud has been a long threat in banking sector because of causing severe loss to individuals and business. It reflected that AI solutions can have significant impact to avoid impersonation fraud. Similarly, opinion cited by Al-Dosari, Fetais and Kucukvar (2022) and Afjal, Salamzadeh and Dana (2023) AI offers powerful tools to banks for combatting cyber crime threats. It could easily identify impersonated videos, images or fake websites and can prevent frauds by detecting its irregularities. However, as argued by Greene et al. (2023) AI has a disadvantage and can acts as a double edge sword in the banking sector. Using AI needs to be careful in this context, because fraudsters can also use AI to retrieve personal credentials and trick customers, and can imitate a person's voice and identity for carrying out the scams (Sina, 2024). Moreover, Greene et al. (2023) stated that AI integration in fraud detection process may have bias, multiplicity, dark patterns and perverse incentives which can be contradictory to the benefits of AI in fraud detection in banking sector.

The findings from theme three further reflected that APP has led to high percentage of frauds in UK banks. In this context, using MasterCard is leading the charge against fraudsters with its powered by advanced solution of AI. Similar opinion reflected that MasterCard is one of the leading users of AI based solutions to prevent frauds. Adoption of AI technology has helped Mastercard to reduce the occurrences of false decline. Furthermore, Naik, Choubey and Bajpai (2023) stated that MasterCard AI solutions has the scope of supplying factual information regarding the fraudulent instances that were identified as act of extortion. This further helps in

preventing frauds and acts as a saviour in banking sector to protect customers from fraud related activities.

From the findings, it has also been noticed that AI is gaining momentum in fraud detection in UK banks. This is because included ML algorithms has the potential to analyse huge amount of data to detect fraudulent transactions which improves the precision of real time approval and reduce false positive results. Similar opinion has been identified from Bin Sulaiman, Schetinin and Sant (2022) that ML algorithms plays a vital role to analyse customer data and analyse the fraudulent and legitimate transactions in credit cards and debit cards. The UK Finance have proven that major frauds in banking industry arises from credit and debit cards and incorporating AI can be a saviour (Xuan et al., 2018). This analytical discussion has intended to acknowledge objective three of the research with a focus on validating the social response and TPB theoretical insights.

4.4 Managerial Implication

The findings of the study have a significant contribution for UK banking industry. It has discussed that AI plays a major role in modern banking industry. It revealed that AI incorporation the quality of bank products and services. This can be efficient for the relatively small banks in UK to understand the contribution of AI and follow the path of integrating AI. It has provided better methods to handle data and enhance improvement in customer experience. This is also a roadmap for the bank to achieve competitive advantage because banks in UK are in a highly competitive landscape and AI integration has the capability to optimise current service offerings, take new offerings and provision of more personalised experience for their customers. The findings also reflect implications because the issues faced by banks for fraudulent activities can be resolved if real time fraud detecting system of AI are integrated. The huge financial burden for penalties, stiffened legal requirements to prevent frauds and stringent actions for processing payment with strict regulatory compliance are the issues that has been highlighted in the findings which reflects its market implications. Maintaining customer satisfaction and loyalty and providing them frictionless payments are some major problems that should be checked by banks and to avoid those things AI can be chosen as a solution. The findings have validated the theoretical insights gained from TPB to reflect the need for establishing AI based banking services which highlights the capabilities of AI in contributing the modern banking sector.

4.5 Summary

The chapter has provided the evidence of the secondary data sources by focusing on and interpreting three formulated themes. It has reflected that AI has been a significant contributor in the modern banking industry of UK. The theme has revealed that AI integration is changing the quality of products and services that a banking industry offers. It has provided better methods to handle data and enhance improvement in customer experience. The theme also revealed that in a highly competitive landscape, AI integration by UK banks has optimised current service offerings, and provision of more personalised experience for their customers. From the second theme it has been evident that UK banks faces challenges in terms of refunding the cash amount, problem in understanding how to combat the scams and frauds, loss of customer loyalty and positive customer experience. The second theme has shown that customers express dissatisfaction for the UK banks with online scams and frauds. UK banks are facing crisis with legal requirement because in order to prevent frauds they are taking stringent actions for processing payment with strict regulatory compliance. The third theme reflects that AI is gaining momentum in fraud detection in UK banks because it has the ability to analyse huge amount of data to detect fraudulent transactions and reduce false positive results.

Chapter 5: Conclusion and Recommendation

5.1 Conclusion

The present study formulated three objectives in order to achieve the aim by exploring the role of AI in detection frauds in UK banking industry. The study has chosen secondary qualitative sources to provide the evidence and derive research findings and has interpreted the findings through meaningful themes. It has reflected that UK banks have been supported by AI integration and has been benefitted to fraud prevention by real time fraud detecting. The literature has reflected the broadened scope of AI and its contribution in modern banking industry in UK. It has also reviewed that AI is considered an umbrella term where a range of technologies and methods like ML, NN, algorithm, DM and NLP is included and described.

In accordance with research objective one the literature has presented that AI in banks have come with efficient customer service and personalised products. The literature also reflected that AI are deployed in UK banks for enabling that customers make right decisions and provide more bespoke products. It has pointed out several facilities by AI integration in banking sector and those are cost savings, chatbots, customer experience, automation, fraud detection, sentiment analysis. It has reflected that AI technology become a preference for banks because it helps in easy analysis of customers ever changing preferences and offer them more personalised products that ensures positive customer experience.

The literature in regard with first objective also emphasised that consumers' behavioural prediction that helps in developing products according to their choices, easy fraud detection, preventing frauds and creating banking operations more conducive by AI automation. The findings in this context, from theme one pointed out that that AI integration has changed quality of products and services offered by banks. It has also found that through the provision of better methods to handle data has enhance improvement in customer experience and also simplified, speed up and redefined traditional process to make them more efficient. The outcomes also pointed that AI integration has driven innovation in banking sector and is also playing an evolutionary role in IT, customer service, HR functions, procurement, finance and accounting. The first theme has equivalently revealed that integration of AI has supported many banks to gain competitive advantage by improving consumer experience and satisfaction through innovative products and services. Findings highlights that single point of contact to get information with AI applications has also a supporting point of banks from AI. AI integration has helped in explosion of big data that has a major impact on the banking industry and has

been a successful incorporation to meet changing customer expectations. Results published by Deloitte (2023) which has been reflected as present research outcome that integration of big data has helped in enhancing interaction process and consumers now interact with their banks on a digital level. The findings pointed out that banking organisations nowadays are able to collect large volumes of unstructured data by integrating AI models. Objective one of this study is acknowledged.

In congruence with second research objective, the study focused on identifying the issues faced by UK banks for fraudulent banking activities. The literature reflected that bank frauds hurts both customers and banks because frauds affect customer loyalty and satisfaction, whereas, penalties are charged upon banks creating substantial pressure on their financial figure. The literature also pointed out that customers experience monetary loss, emotional loss and loss of loyalty upon their banks due to victim of fraudulent banking activities.

The literature also added information that, these losses make customers stop to use digital banking in future and reflects a significant negative impact on customer satisfaction and loyalty. This dimension has also been evident from the research findings. It is pointed out that customer loyalty and experience get affected for fraudulent activities which is challenge for the UK banks. The literature further highlighted that bank frauds have a negative impact on their market values and their performance. Opinion from Kelkar (2022) pointed that confronting the frauds to economy and legal authority creates a negative reputation of the bank and overall losing consumer loyalty who plays a significant role in increasing market value of banks. On the other hand, opinion from Randall, Gravier and Prybutok (2011) has been evident in literature that customers experience monetary loss, emotional loss and loss of trust if they become victims of frauds. Experiencing these issues by customers further restricts them to use digital techniques or credit cards or online payment methods which has been actually a measure of approach by banks for reducing consumer hassle and the smaller operations of bank employees.

The findings in concern with second research objective also revealed that a customer being a victim of fraud reflects negative experience and this has a long-lasting effect on the relationship between bank and customer. The findings from second theme in connection with second research objective reflected that maintaining data privacy and ensuring customer loyalty in this dimension has become a significant issue for UK banks in the era of rising online scams, money laundering activities and frauds. The outcomes emphasised that maintaining regulatory

compliance is also getting difficult for UK banks to follow. It also highlighted that legal instructions from FCA to banks for offering frictionless payments to customers has become another issue for banks in case of increased fraudulent activities. The second objective of the research has been met.

In association with third research objective the literature reflected a through comprehensive review about the role of AI in detecting frauds in UK banking industry. The literature highlighted that AI has been playing a significant role in UK banking industry to detect fraud. The complex algorithms have been effective to detect frauds in real time and preventing the frauds. The literature highlighted that detecting anomalies used in AI helps examines each piece of new information in an active bank operation and in case of suspicious transaction, AI has the ability to immediately stop the function (Buchanan and Wright, 2021). The literature also reflected that AI systems is capable of detecting frauds even in imbalanced datasets that has been supportive for accurate fraud detection. From the opinion of Femila Roseline et al. (2022), the literature reflected that ML algorithms are used as a part of AI approach which reflects efficiency to detect credit card fraud automatically. The opinion of Femila Roseline et al. (2022) also highlights that ML algorithms do not take the account into problem of deception or behavioural that might lead to alerts. In the opinion of Ryman-Tubb, Krause and Garn (2018) banks, in order to avoid frauds, timely review and understanding is necessary which is significantly done by AI to reduce the growing number of card fraud issues.

The theme three has been integrated in link with this objective and it has provided evidence that AI powered solutions has stopped 35 billion fraud losses in the last three years (MasterCard, 2023). The theme has also reflected that AI has been able to reduce the problem of impersonation fraud which has been a long persistent threat to individuals and business causing a severe pain point for banks. The outcomes highlighted that MasterCard has taken a lead in using AI solutions that has become able to charge against fraudsters with its Consumer Fraud Risk Solution. The findings also emphasised that in UK banks AI integration has been rising because it includes usage of ML algorithms has the ability to interpret huge dataset to detect frauds and this improves the precision of real time approval along with reduction in false positive results. Third objective of the research has been acknowledged.

5.2 Research Limitations

Despite the potential findings the study has some limitations. The study utilised secondary qualitative source which limits the findings to include first hand observation. Including primary

qualitative sources by conducting an interview with UK bank employees or managers could have given a broader scope regarding exploring the role of AI in detecting frauds and other banking activities. The study findings are geographically limited because it has only considered the role of AI in detecting frauds based on the geographical location UK and thus, the findings cannot be generalised in other contexts.

5.3 Recommendations

The issues or challenges that are faced by banks in UK for fraudulent activities are suggested to mitigate by incorporating an AI environment. It is suggested that the banks should lay down policies that can control and define usage of new technologies to create an advanced environment of AI. This may lead to help the banks to ensure AI systems and benefits mass people and business instead of certain deceive individuals (Mogaji et al., 2021). Banks and other financial institutions are recommended to develop solutions in using AI that can further benefit in overcoming the risks faced by clients or institutions. This will help to keep a track of money laundering activities and easily detect the frauds and prevent the clients as well as the bank itself from further financial loss (Noreen et al. 2023). UK Government is suggested to develop and update the regulatory environment in line with AI development that can support fostering radical changes and managing AI risks appropriately within the government to reach a sector that promotes the integration of AI in banking industry. It is further suggested to develop a range of policies and encourage education of a generation about AI that can help in developing the financial structure of banking industry in UK.

5.4 Practical Implications

The study is important and has significant practical implications because it reflects the contribution and role played by AI in modern banking industry. It has reflected that AI has been used in several purposes through which cost reduction, fraud detection, through identification of fake websites or messages and preventing customers from being tricked. This study provides a roadmap that how AI has been playing a powerful tool to resolve the issue of fraud detection. The double-edged sword activity of AI has also been pointed out and careful incorporation and monitoring of this technology reflects the significance of AI in fraud detection (PWC, 2023). UK banks with lower capital and revenue can derive the knowledge from this study because it can act as a guidance to understand the benefits of AI integration which further will help to build an AI integrated banking industry in UK. This can also build an infrastructure of entire digitalised world which is effective for crisis period like wars or pandemic.

5.5 Future Scope

The research in future to conduct the research based on some other countries and provide a comparative result to explore the role of AI in detecting frauds in banking industry. From methodological standpoint in future to increase accuracy, the research could increase its sample size and choose primary qualitative data source to reflect a broader view of the research. Due to time constraints., the study did not reflect on the variables that have a strong impact on AI to detect frauds and this can be another future research avenue. In last, more research is required to determine the changes in early and late adopters of AI in banking industry and understand the intention behind its acceptance.

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