Exploring Factors that Influence Artificial Intelligence Adoption in Banks and Credit Unions

by

Vijaya S. Tumma

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Co-Major Professor: Sajeev Varki, Ph.D.
Co-Major Professor: Aharon Yoki, D.B.A.
Jean Kabongo, Ph.D.
Joann Quinn, Ph.D.
Douglas E. Hughes, Ph.D.

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DEDICATION

To my dearest husband, your unwavering support, patience, and love have been my anchor throughout this journey and always. Your belief in me, even during the most challenging moments, has given me the strength to persevere. Thank you for being my constant source of encouragement, my sounding board, and my greatest cheerleader. This achievement is as much yours as it is mine, and I am forever grateful to walk this path with you by my side.

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ABSTRACT

The importance of Artificial Intelligence (AI) is exploding in the banking sector, fueled by enhanced productivity, improved efficiencies, and personalized services to the consumers. For credit unions, the adoption of AI technologies presents opportunities and challenges. This research explores the factors influencing AI adoption in the banking sector through the lens of Unified Theory of Acceptance and Use of Technology (UTAUT) framework. This study aims to explore the influence of key aspects of UTAUT model, Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI), and Facilitating Conditions (FC) on the intention of AI adoption among credit unions, banks, and their consumers. This research combines qualitative insights gathered from semi-structured interviews with leaders in the banking sector and quantitative data from consumer surveys.

CHAPTER ONE:

INTRODUCTION

Artificial intelligence (AI) technology is transforming every walk of life, and it is empowering banking organizations to completely redefine how they operate, establish innovative products and services, and most importantly, impact customer experience interventions (Malali, & Gopalakrishnan, 2020). In this context, credit unions that have traditionally focused on personalized, consumer-centric services have been slower to adopt the latest technologies compared to other financial institutions (Dow, 2006). The focus of this research is to investigate how AI is used in the banking sector for the benefit of their consumers and employees for sustainable growth and leverage these best practices within credit unions and banks.

AI is an area of computer science that emphasizes the creation of intelligent machines that work and react like humans and enables the machines to reason and perform sophisticated mental tasks (Korteling et al., 2021). The extent of AI technologies in the banking industry will continue to increase as more entrants and the growth of new large language models become more available to consumers and business (Biswas et al., 2020). McKinsey's (2021) estimates suggest AI can potentially deliver up to $1 trillion of additional value each year for global banking (Biswas et al., 2020).

The focus on personalization in consumers' daily experiences sets a higher standard for financial institutions to deliver similar personalized experiences to their consumers and

employees. By leveraging AI solutions, financial institutions can create unique and high-quality experiences by personalization (Boustani, 2022). Clydesdale and Yorkshire Banking Group (CYBG) is a medium-size bank in the United Kingdom, and their digital strategy includes an application that uses AI to help manage their customer's accounts (Burgess, 2018). This AI application allows the customer to open an account in 11 minutes, learns the patterns of usage to predict fund depletion in their accounts and suggests ways to avoid unnecessary bank charges (Burgess, 2018). The customer relationship is healthy if financial institutions fulfill their consumer's needs and expectations, which change frequently (Satheesh & Nagaraj, 2021).

AI leverages technology to expand services and reach consumers regardless of their geographical location. Nigeria's United Bank for Africa's (UBA) has a banking chatbot, called Leo, that helps customers with several transactions, such as transferring money, paying bills, buying airtime, and checking account balances (mTransfersHQ, 2018). Customers can remotely chat with Leo on various channels via WhatsApp, Facebook messenger, and Apple business chat and the chatbot responds immediately (Kshetri, 2021). However, credit unions are unable to meet the consumers demands in a similar manner, and these challenges stem from various factors including their operational models, member expectations, and technological advancements.

Statement of Purpose and Contribution to Knowledge

The purpose of this study is to investigate attributes that influence financial institutions' adoption of Artificial Intelligence (AI) with a focus on applying the Unified Theory of Acceptance and Use of Technology (UTAUT). As AI continues to change the financial services landscape, credit unions encounter challenges and opportunities to integrate these tools to improve consumer experiences, streamline operations, and enhance decision-making process. However, there is a lack of understanding of performance expectations, effort expectations,

social influences, and facilitating conditions that influence AI adoption in the context of credit unions and other financial institutions.

This study aims to fill this gap by researching how the UTAUT determinants affect AI adoption among employees and consumers of financial institutions, such as credit unions, and identify the enablers and barriers of this adoption. This research seeks to provide practical insights that can guide credit unions and other financial institutions in effectively leveraging AI technologies for operational efficiencies, to enhance consumer engagement, and to maintain a competitive edge. This study seeks to contribute to wider academic discourse on AI adoption in the financial sector.

As a technology leader in a credit union, the researcher's motivation is rooted in uncovering how AI can be strategically implemented in credit unions to increase their value proposition without compromising their core values. As a practitioner and researcher focused in the credit union industry, the researcher took this opportunity to bridge the gap between credit unions and their AI technology adoption.

Theoretical Foundation

This study's theorical foundation is the Unified Theory of Acceptance and Use of Technology (UTAUT) model. UTAUT is a comprehensive model that combines elements from various technology acceptance theories to explain and predict user acceptance of technology (Venkatesh et al., 2003). UTAUT incorporates four constructs that are determinants of user acceptance and user behavior: Performance Expectancy, Effort Expectancy, Social Influence, and Facilitating Conditions (Venkatesh et al., 2003). UTAUT also has four moderate variables: gender, age, experience, and voluntariness of use (Morris et al. 2005). The research design explores the research questions through the lens of the four main UTAUT constructs.

When applying UTAUT to AI adoption in credit unions the following key elements are considered:

1. Performance Expectancy (PE) is defined as the degree to which an individual believes that using a system will enhance their job performance (Venkatesh, 2022). The goal is to assess how credit unions perceive the advantages their consumers and employees would gain with AI implementations.
2. Effort Expectancy (EE) is the degree of ease associated with the use of the system (Venkatesh, 2022). The effort expectancy can be improved when concerns regarding the difficulty or ease of the AI systems are addressed.
3. Social Influence (SI) refers to an individual's perception that others believe he or she should use the new system (Venkatesh, 2022). The objective is to understand the social factors influencing AI acceptance within credit unions.
4. Facilitating Conditions (FC) refers to an individual's belief that an organizational and technical infrastructure exists to support use of the system (Venkatesh, 2022). When infrastructure and support for AI adoption is evaluated in the credit union, it lays down the foundation for the facilitating conditions for AI adoption.

The UTAUT model provides the necessary framework to explore the complex factors that influence AI adoption in credit unions and actionable insights for enhancing this integration.

Research Questions

The goal of this research is to study the usability of AI in the banking industry and how these practices may be applied in credit unions and banks. This study is guided by the research questions below:

RQ1: What UTAUT factors influence financial institutions' intention for AI adoption?

RQ2: What UTAUT factors influence financial institutions consumers intention for AI adoption?

These research questions help to understand attributes involved with AI adoption in banks and credit unions from perspectives of various leaders in the financial institutions.

The interview results drive the analysis of the survey information gathered from consumers in the banking sector. Hypothesis statements for the quantitative data analysis are based on the most significant UTAUT factors from the interview results:

H1: PE has a stronger influence than EE and FC on consumers behavioral intention for AI adoption.

H2: EE and FC have a stronger influence than SI on consumers behavioral intention for AI adoption.

The units of analysis for this study are financial institutions and their consumers. Consumers provided their insights regarding their usage of AI tools for their financial needs through a survey. Organizational insights for these research questions are provided by individuals involved in AI related planning or AI projects within their organizations. The interview and survey questions are based on UTAUT constructs.

Researcher Bias and Assumptions

A potential challenge considered during the qualitative research design was the researcher's experience in the technology area and view of AI as beneficial, potentially amplifying the positive aspects of AI integration. Selection bias can also arise from focusing on participants who are inclined towards AI technology, which may result in skewed understanding of AI adoption attitudes. To ensure objectivity and comprehensiveness, the researcher focused on seeking diverse perspectives from technology leaders, executive leaders, and leaders in the

business areas who influence AI adoption in their organizations. In addition, survey information was gathered anonymously from the consumers in the banking sector for more accurate and unbiased responses.

CHAPTER TWO:

LITERATURE REVIEW

The financial landscape is rapidly evolving and the adoption of advanced technologies, such as AI, has become crucial for financial institutions to maintain competitiveness, efficiency, and consumer satisfaction (Deloitte, n.d.). Credit unions are more consumer-centric financial institutions than commercial banks (McKillop & Wilson, 2011), and integrating AI incorporates embracing technological advancements and aligning these modern technologies with their core values of personalized service, trust, and community (Garg, 2024). As financial institutions explore the rapidly evolving landscape of AI solutions, it is important to understand the factors that influence AI adoption for successful implementation and sustainability. The literature review aims to explore the existing operational variations between banks and credit unions, AI adoption in banking and other financial services, key constructs of UTAUT and how they apply in the context of the financial industry and challenges as well as carriers to AI adoption in banking sector.

Banks and Credit Unions

In 2012, the number of credit unions and commercial banks were nearly equal in the United States; however, banks in the aggregate held $13 trillion in assets and credit unions held $1 trillion in assets (Anderson & Liu, 2013). The literature review revealed numerous factors that contribute to the dominance of banks over credit unions.

Credit unions' unsophisticated management styles are a predominant cause for their lack of growth (Gutenberg et al., 2014; Turner, 1996). Management in credit unions often demonstrates an attitude of moral superiority to banks due to their non-profit nature, which may cause them to overlook the necessity of employing efficient practices to increase their market penetration (Gutenberg et al., 2014). Credit unions must understand the consumer's demand for their products, make best use of their competitive advantage, and create increased value for their consumers to compete in the changing banking marketplace (Gutenberg et al., 2014).

Consumers in a credit union do not rely on credit unions for their primary financial services and potentially invest savings in large retail banks due to credit unions' technological inefficiencies (Turner, 1996). The designation "Primary financial institution" is considered desirable as consumers typically first think of this institution when increasing their current relationship or shopping for new financial products (Turner, 1996).

Economies of scale in the banking industry occur when the cost per dollar of loans or assets declines as the number of loans or assets increases, and an efficient bank operates at the lowest cost per dollar of assets or loans (Jacewitz et al., 2020). Credit union's smaller size restricts them from attaining profits through economies of scale (Almehdawe et al., 2021; Turner, 1996; Lu & Swisher, 2020). Economies of scale are driven by the increased use of information technology in banking as well as by regulatory changes (Wheelock & Wilson, 2012). In addition, there is evidence of scale economies in bank holding companies, which is attributed to technological advances (Hughes & Mester, 2013).

Differences in the composition of product portfolios of credit unions are expected to have implications in their growth performance (Goddard et al., 2002). Employing cross sectional and panel methodologies, Goddard et al. (2002) analyzed the patterns of U.S. credit union growth

and identified that larger financial institutions, such as banks, are moving towards new areas of business and becoming more diversified. State chartered credit unions in this competitive environment are unable to operate across state lines and constrain their growth potential (Goddard et al., 2002).

Contrary to the popular belief that credit union's consumers are key to their growth, credit union's consumers potentially have a vested interest in keeping the credit union in their community, even if the credit union can increase their earnings by shifting their business to other densely populated centers (Maiorano et al., 2016). This mentality of a close-knit community is driven by the credit union's mission and value, which have a distinct niche (Maiorano et al., 2016). This mentality motivates the consumers to be comfortable in their niche market and are unwilling to take the financial risks associated with reducing their niche market (Maiorano et al, 2016),

Several other factors were identified that impact credit unions' growth performance. Macro-economic variables, such as interest rates, fiscal policies, consumer behaviors, mergers, and acquisitions, were identified as significant factors to attain new consumer growth (Almehdawe et al., 2021; Lu & Swisher, 2020). As noted by Almehdawe et al. (2021), compliance and regulatory requirements can substantially affect a credit union's financial performance; the need for credit unions to find solutions to protect their consumers and simultaneously follow regulatory requirements are challenging tasks(Almehdawe et al., 2021).

Credit Unions' Growth Strategies

When financial expertise, marketing expertise, and development capital available from a bank are combined with market and community acceptance, a sense of financial commitment with its members and a low cost of operation from a credit union is created (Turner, 1996).

Credit union innovations are important in sustaining an organizations' financial performance and raise their competitive strength (Chepkwei, 2018). The need for improved efficiency is exerting pressure on the credit unions to develop into more competitive entities and understand strategic innovation management practices that lead to success (Kalay & Lynn, 2015). Consumer-focused initiatives, such high quality services and favorable rates, eventually attract customers (Almehdawe, 2021; Lu & Swisher, 2020). When a strong service culture is created, it has a substantial impact on attracting consumers to the credit unions, which can be achieved through the adoption of technological innovations for efficiencies (Allred, 2001; Duncan & Elliot, 2004; Turner, 1996). When credit unions integrate their values and traditions into a high-tech development such as Artificial Intelligence (AI), it can solidify their position in the marketplace (Thowfeek et al., 2020).

AI in Banking

The banking sector has been one of the leading adopters of AI technology to reduce operating costs and accelerate the inclusion of banking services (Tulcanaza-Prieto et al., 2023). AI brings transformation in governance, economy, and society in developing countries (Kshetri, 2019). According to the World Bank Group (2017), about 1.7 billion people are unbanked around the world. Traditional banks are unwilling and reluctant to serve this population due to high transaction costs and inefficient processes (Kshetri, 2019). AI is rapidly developing and creating social, economic, and political transformation in these developing economies; this shift has been driven by matured AI algorithms, increased competition, growth in AI investment, and changes in consumers' preferences for digital financial products facilitated by AI (Kshetri, 2021). Countries such as Mexico, Nigeria, Indonesia, Malaysia, Chile, and Brazil are using AI

technologies to improve efficiency, lower the risks, and reduce operating costs to improve lower-income population's access to financial services (Kshetri, 2021).

Deutsche Bank used AI speech recognition technology to listen to employee conversations with clients to improve efficiency and ensure employees comply with regulations (Burgess, 2018). Deutsche Bank also used AI to identify potential customers (Burgess, 2018). In addition, it is important that banks maintain the relationship with their existing customers (Wulandari, 2022). Customer loyalty to the bank can be improved if the banks provide high quality services at lower prices (Kishada et al, 2016). An AI model for assessing customer loyalty in the banks will help management successfully develop and implement customer loyalty strategies (Kishada et al., 2016).

The banking sector is implementing chatbots to develop stronger customer-brand relationships, and deliver contextual information to customers (Trivedi, 2019). Chatbot is a software system that can chat or interact with a human user in a natural language such as English (Shawar & Atwell, 2007). AI-enabled chatbots in the banking sector offer personalized customer service, assist in transaction processing, customer education, prevent fraud, and can offer other products and services through upsell and cross-sell (Singh et al., 2018; Trivedi, 2019).

Banking customers believe using online banking websites increases the potential for phishing attacks and identity theft, which can lead to trust concerns with the banking relationship (Aburrous et al., 2010). Phishing websites are malicious platforms disguised as legitimate institutions that can steal a customer's personal account information; this data and identity theft occurs when a customer attempts to access their account while believing the site is legitimate (Aburrous et al., 2010). An intelligent phishing website detection system based on AI will reduce

the need for human intervention and enhance the precision and performance of the phishing detection websites (Aburrous et al., 2010).

One of the most effective uses of AI in financial services is identification of fraudulent activity (Burgess, 2018). AI-based fraud monitoring systems oversee customers' real-time transactions to identify potential fraudulent patterns based on known patterns from previous fraudulent transactions (Burgess, 2018). AI supports customer credit approval by predicting potential customer credit in the approval process and avoiding situations such as bankruptcy as well as fraud activities (Moro et al., 2015). HSBC Bank detected possible money laundering activities by searching transaction patterns which reduced their false-positive investigations by 20%; this process made efficient use of their expensive resources (Burgess, 2018). HSBC also assessed risk using AI simulations to understand their trading positions and associated risks (Burgess, 2018).

Banks are increasingly adopting cloud computing technologies to create flexible and agile banking environments to respond to business needs (Asadi et al, 2017). Several cloud security issues exist in the banking industry; these include lack of standards and Service Level Agreements (SLAs), lack of transparency, regulatory and compliance requirements, malicious activity, security issues, and cyber-attacks, etc. (Elzamly et al., 2017). Artificial Neural Networks (ANN) is a modeling technique inspired by the human nervous system that allows learning by example from representative data describing a physical phenomenon or a decision process (ScienceDirect, n.d.). By using ANN algorithms in AI, critical cloud computing security issues can be predicted (Elzamly et al., 2017). Ortiz et al (2016) studied another aspect of ANN to improve the physical banking system security and prevent robberies in banks and ATMs.

Liquidity risks in banks can be interpreted as the ability to quickly turn an asset without capital loss, interest penalty, or the risk of inability to raise funds in the financial market (Vento & La Ganga, 2009). A simplistic AI model using endogenous factors can address loan-based liquidity risk prediction issues in banks (Tavana et al., 2018). This model presents the efficiency, accuracy, and flexibility of AI and Machine Learning methods to measure the ambiguous occurrences related to bank liquidity risks (Tavana et al., 2018).

AI is the driving force behind digital technologies in modern banking (Sathish & Renu, 2024). This research studies the adoption of AI in the banking sector through the lens of the Unified Theory of Acceptance and Use of Technology (UTAUT) to understand the underlying theoretical foundations.

Unified Theory of Acceptance and Use of Technology

UTAUT is a model that combines elements from several technology acceptance theories to explain and predict user acceptance of technology (Venkatesh et al., 2003). UTAUT was formulated with four constructs that play a significant role as direct determinants of user acceptance and user behavior: Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI), and Facilitating Conditions (FC) (Venkatesh et al., 2003), and up to four variables that moderate various relationships - gender, age, experience, and voluntariness of use (Morris et al. 2005).

Several studies consider UTAUT as the theoretical basis to research technology adoption. An individual's intention to adopt mobile banking is influenced by performance expectancy, social influence, perceived financial cost, and credibility (Yu. 2012). In a study conducted by Roh et al., (2023), they concluded that PE, EE, and SI enhance user attitudes toward adopting

robo-advisors. They also showed strong evidence that attitude and facilitating conditions increase user intentions to adopt robo-advisors (Roh et al., 2023).

Research indicates that performance expectancy, effort expectancy, and social influence are consistent and significant predictors of behavioral intention to adopt mobile and internet banking services (Bhatiasevi, 2016; Dendrinos & Spais, 2023; Mensah & Khan, 2024). However, some studies found contradictory results regarding the influence of certain UTAUT constructs. For example, while perceived financial cost and facilitating conditions were not supported as significant factors in Thailand (Bhatiasevi, 2016), they were discovered to be important in China (Mensah & Khan, 2024). This instance highlights the importance of considering contextual differences when applying the UTAUT model.

Several studies extended the UTAUT model by incorporating additional constructs to explain banking technology adoption. These include perceived credibility, perceived convenience (Bhatiasevi, 2016), awareness, and government regulations (Mensah & Khan, 2024). Trust and security concerns were identified as critical factors, especially in the context of Fintech adoption (Jafri et al., 2023). The integration of consumption values and motivational factors provides further insights into mobile banking adoption (Dendrinos & Spais, 2023).

UTAUT is a robust framework that can be applied to understand banking technology adoption. Researchers found UTAUT beneficial for adapting and extending the model to capture context-specific factors (Ayaz & Yanartaş, 2020). The literature suggests a comprehensive approach considering technological, individual, social, and institutional factors most effective in explaining and predicting the adoption of digital banking services across different markets (Souiden et al., 2020; Yuliana & Aprianingsih, 2022).