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The dynamic role of the Internet of Things (IoT) on the excel performance of Islamic banks in United Arab Emirates

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ABSTRACT

The rapid advancement of technology has substantially impacted numerous sectors, including the banking industry. It is now apparent that the banking industry is affected by the innovative role that the Internet of Things (IoT) plays, which affects a multitude of operations and services. This study uses a quantitative approach and PLS-SEM to investigate the widespread impact of Internet of Things (IoT) technology on the Excel Performance of Islamic Banks in the UAE. The study integrates the Resource-Based View (RBV), Islamic Banking Theories, and Fraud Triangle Theory to create a complete framework. The research's reliability is supported by a sample of 407 replies from 504 participants. The findings strongly support the hypotheses that IoT integration improves Islamic banking performance in the UAE, such as data analytics, customer service, automation systems, fraud detection capabilities, and asset-backed finance, while aligning with Sharia Principles and improving risk-sharing mechanisms. However, the influence of IoT on escalating fraudulent activities and hence negatively impacting performance was not proven. The study emphasizes the importance of IoT in improving operational efficiency and customer satisfaction in Islamic banks in the UAE.

1. Introduction

Almost every element of our lives is now impacted by technology. We all depend on it somehow (R. Kaur et al., 2020). According to G. G. L. Singh and Ramakrishnan (2017), digital networks change connection points and enable technology to join small or huge ecosystems. New tools, systems, and technologies that were not possible previously are now introduced, and among them is the Internet of Things (IoT). According to Atalla et al. (2023), IoT refers to an ecosystem in which real-world items are connected utilizing established protocols to communicate information (Sethi & Sarangi, 2017). As stated by R. Kaur et al. (2020), IoT applications include Smart Homes, Smart Cities, Healthcare, Industries, Environmental, Commercial, and many more applications in general. Still, the critical area of interest or our focus in this paper is the application of Internet of Things (IoT) in banks, Islamic banks and the dynamic role of the Internet of Things (IoT) in their excel performance, particularly in the United Arab Emirates. Because the United Arab Emirates is continually seeking advancement and growth, particularly in the use of the best and most up-to-date technologies, the use of the Internet of Things (IoT) will be advantageous to both Islamic banks and the United Arab Emirates.

Several factors determine the significance of this study, including the importance of the Internet of Things in the UAE and its dynamic role in enhancing the performance of banks and Islamic banks. This research is considered a unique pioneering work and serves as a foundation for future studies in this field since there is limited research on the adoption of the Internet of Things (IoT) in Islamic banks. The problem of this study is to examine and investigate the dynamic role of the Internet of Things (IoT) that have a robust solid substantial effect on the excellent performance of Islamic banks in the UAE. Therefore, the more the Internet of Things plays a dynamic role in influencing Islamic banks and banks, the more effectively

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Islamic banks and banks will perform their official duties, these dynamic factors can be perfectly determined through quantitative research with analytical instruments that allow us to answer the research questions in an accurate, valuable, and efficient manner. Thus, this study aims to provide answers to the following queries:

1- What is the effect of IoT-enabled Data Analytics (RBVDA) on EPIBU?
2- What is the effect of IoT-enabled Customer Services (RBVCS) on EPIBU?
3- What is the effect of IoT-enabled Automation Systems (RBVAS) on EPIBU?
4- What is the effect of IoT-enabled Fraud Detection (RBVRFA) on EPIBU?
5- What is the effect of IoT Increases Fraudulent Activities on EPIBU?
6- What is the effect of IoT Improves Fraud Detection on EPIBU?
7- What is the effect of IoT in Accordance with Sharia Principles (IBTSP) on EPIBU?
8- What is the effect of IoT Enhances Risk-Sharing (IBTAS) on EPIBU?
9- What is the effect of IoT in Asset-Backed Finance (IBTDA) on EPIBU?

Based on these research questions, the objectives of the research can be defined as follows:

1- To examine the effect of IoT-enabled Data Analytics (RBVDA) on EPIBU?
2- To examine the effect of IoT-enabled Customer Services (RBVCS) on EPIBU?
3- To examine the effect of IoT-enabled Automation Systems (RBVAS) on EPIBU?
4- To examine the effect of IoT-enabled Fraud Detection (RBVRFA) on EPIBU?
5- To examine the effect of IoT Increases Fraudulent Activities on EPIBU?
6- To examine the effect of IoT Improves Fraud Detection on EPIBU?
7- To examine the effect of IoT in Accordance with Sharia Principles (IBTSP) on EPIBU?
8- To examine the effect of IoT Enhanced Risk-Sharing (IBTAS) on EPIBU?
9- To examine the effect of IoT in Asset-Backed Finance (IBTDA) on EPIBU?

This study is organized as follows: Section 2 examines the impact of the Internet of Things (IoT) on the excellent performance of Islamic banks in UAE; Section 3 describes the research methodology employed in this study; Section 4 presents the data analysis techniques used in this research; Section 5 provides a detailed discussion of the findings; and Section 6 summarizes the conclusions drawn from this study.

2. Theoretical Framework and Literature Review

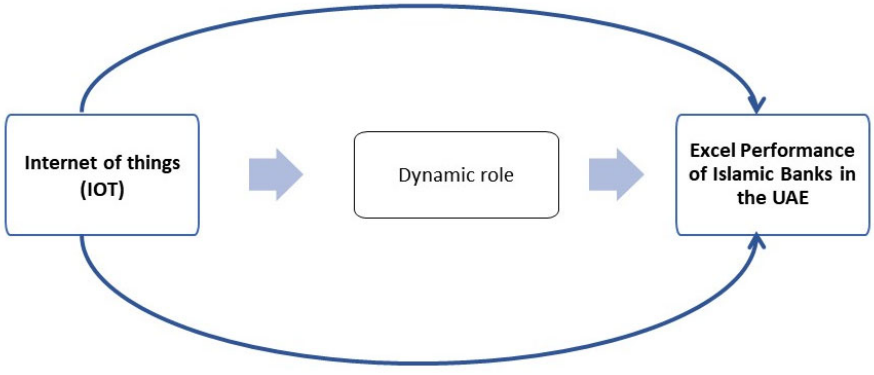

Fig. 1. Theoretical research framework

2.1 Dissecting the impact of the Internet of Things (IoT) on the banking industry's performance

2.1.1. Overview of the Internet of Things (IoT) and its role in lifetime

According to Tareen et al. (2023), in the 1980s a group of college students decided to alter a Coca-Cola vending machine to allow for remote monitoring of its contents, the idea of embedding sensors and intelligence into physical objects was first brought up. However, progress was slow, and the technology was complex. Then in 1999, a whole new world of opportunities opened when Kevin Ashton from Massachusetts Institute of Technology's MIT Auto-ID Labs came up with the phrase "the Internet of Things" (Atalla et al., 2023; Chin et al., 2019; Hassan et al., 2018). He proposed putting radio-frequency identification (RFID) chips on products to follow them through a supply chain (Perumal & Manohar, 2017). After that, over the next decade, as an increasing number of connected devices came to the market, public interest in Internet of Things technology began to grow. According to G. G. L. Singh and Ramakrishnan (2017), Adding new tools, systems, and

previously impractical technologies is now conceivable. Chen et al. (2017) said in their paper that the Internet of Things has grown considerably over the previous 20 years, and it is being used across various sectors. In particular, it's possible to connect almost anything with the Internet of Things (Tzafestas, 2018).

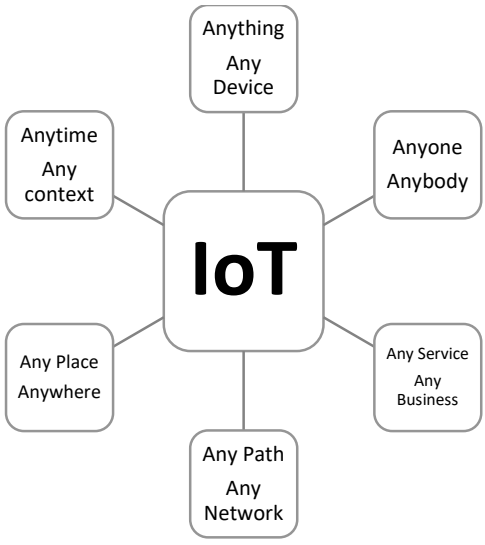

Fig. 2. An overview of the Internet of Things (IoT)

Rawat (2022) said, "IoT is not just a concept; in fact, it plays a significant role in our modern life". Human-human or human-device communication were the only two forms of communication available before the development of the Internet of Things (IoT). Still, when the IoT was invented, it makes machines-machines (M2M) communication feasible and achievable (Ouaissa & Rhattoy, 2019). Also, Gannavaram V et al. (2021) said we have entered a phase in human existence where nearly every individual is interconnected through the Internet. The development of Internet technology has taken place in a new way, where everything on the planet can be connected, and that technology is called the Internet of Things (Ouaissa & Rhattoy, 2019; Salih et al., 2022). The Internet of Things is becoming one of today's most thoroughly researched and aggressively promoted concepts. The Internet of Things (IoT) idea, at its most basic level, defines how "things" may be connected to the Internet and one another, acting on their own in a way that is no longer influenced by humans. This connection enables creating new and innovative applications with interconnected devices, organizations, and users (Hassan et al., 2018). The term "Internet of Things" (IoT) represents a paradigm shift in the field of information technology (S. Kumar et al., 2019). A recent technology explosion positively impacts our lives (Hassan et al., 2018). According to G. G. L. Singh and Ramakrishnan (2017), the goal of the Internet of Things is to turn everyday things into intelligent virtual objects. It's one of the big concepts which is increasing day by day, and it offers infinite opportunities on the Internet of Things (M. Bansal et al., 2021). Whether linked wirelessly or by cables, the number of internet service users and the number of devices with internet services is growing daily (Gannavaram V et al., 2021; Ouaissa & Rhattoy, 2019; Venu et al., 2022). Throughout the IoT, fourth generation (4G) technology has evolved to match the needs of future networks (S. Li et al., 2018), and work continues to advance toward fifth generation (5G) (Farhan et al., 2018; Xiao et al., 2018). Munirathinam (2020) clarified that we live in a world where everything is connected, and everything is digital; the proliferation of smart gadgets and technology now allows people to communicate constantly from anywhere and at any time.

The following four elements are crucial for any IoT application (Kalyanasundaram et al., 2018):

Sensors or devices

An IoT device comprises embedded systems that interact with sensors and actuators and must have wireless connectivity to function. These IoT devices are sometimes called IoT sensors. Sensors gather information about the environment. It might be a single sensor or a group of sensors (referred to as a device). They collect information that will subsequently be utilized. GPS, LDR, temperature sensors, and other types of sensors are examples of sensors (Elijah et al., 2018; N. M. Kumar & Mallick, 2018; Salih et al., 2022; R. Singh et al., 2023).

Connectivity or communication technology

A crucial component of the effective implementation of IoT systems is communication technology. Internet of Things devices need a network connection to send and receive data. The acquired data is then transmitted to a cloud infrastructure. The sensors can be connected to the cloud via various communication and transport methods, including cellular networks, satellite networks, Wi-Fi, Bluetooth, wide-area networks (WAN), and many more. In the IoT system, selecting the most effective networking option (Elijah et al., 2018; N. M. Kumar & Mallick, 2018; Salih et al., 2022; R. Singh et al., 2023).

Data processing

IoT devices process and store data using cloud-based services. After the data has been collected and transferred to the cloud, a software application processes it (Elijah et al., 2018; N. M. Kumar & Mallick, 2018; Salih et al., 2022; R. Singh et al., 2023).

User interface

The Internet of Things uses a user interface to make data and information ready and practical for end users to consume. This could be accomplished by creating a dashboard that displays the processed information or sending out a notification that alerts the user as real-time monitoring occurs. Live system monitoring can be performed with a mobile phone or web browser using the Internet of Things. When a fault occurs in the system, an operator might receive an alert via text or email. To monitor their operations, the user has access to an interface that allows them to review ongoing processes (Elijah et al., 2018).

IoT creates a world that is successfully connected and communicated (R. Kaur et al., 2020). Every aspect of daily life and business benefits from IoT. IoT creates a network by joining many sensors, gadgets, and other intelligent things, and it offers automation services across various industries. By enabling remote control and object sensing efficiency, an economy can be improved. Our daily lives are incorporating promising and quickly expanding IoT technology, which supports the advancement of humanity. The Internet of Things may improve quality of life by presenting opportunities for corporate growth, new and better employment for workers, and industry expansion. Additionally, it can make it possible for objects to communicate with one another, learn where they are in relation to other objects, and get comparative information for local data that has been acquired. Future developments in the Internet of Things will optimize information flow in social and industrial contexts while revolutionizing business and private communication (S. Kumar et al., 2019). Increasing productivity and convenience are why IoT is universally embraced by businessmen and consumers (Nagajayanthi, 2022). The Internet of Things is becoming more cost-effective and diverse in response to the advancements in information and communication technology (Alam, 2022). According to G. G. L. Singh and Ramakrishnan (2017), adopting IoT is advantageous to organizations since it provides various benefits including cost competitiveness and a switch from manual, labor-intensive business operations to automated, technology-aided business processes. As streaming analytics, machine learning, and artificial intelligence continue to advance, we will develop novel and unexpected methods to enhance our workplaces and daily lives (Geng, 2017).

Chen et al. (2017) explained that there has been significant development in the applications of the Internet of Things, and it is incorporated into different areas:

Smartphones

Mobile network operators (MNOs) act as a key connecting layer for IoT devices with the current architecture of the IoT system, ensuring that devices are connected efficiently and adapted to their needs (Ogudo et al., 2019). Smartphones are intelligently connected through the Internet to facilitate communication between systems, people, and devices that can improve specific aspects of business or life (Khajenasiri et al., 2017). Connected low-power devices and the data generated by them are both proliferating, which creates new levels of services to IoT making life comfortable and straightforward. For example, if we talk about how we use our mobile phones, we can use them to communicate with anyone, watch movies, connect to the internet, interact with complete strangers, and so much more (Rawat, 2022).

Smart home

The Internet of Things has altered how an electrical device is operated in a home environment. By utilizing a relay switch, a microcontroller, and a network device, you may link every appliance, including lights, air conditioners, media, security systems, refrigerators, ovens, and so on, to the internet. Even from a distance, the user may operate the appliances using a graphical user interface. A wide range of sensors are produced to incorporate Internet of Things (IoT) based home automation systems (Rawat, 2022). An example would be voice-activated automated lights that turn on when we say "Activate" or detect our presence when we walk by (Ramson et al., 2020).

Smart cars

Because the application of modern IoT technologies to the automotive industry creates a creative potential for the future of mobility, the smart vehicle market on the Internet of Things (IoT) market has grown significantly in recent years (Arena et al., 2020). The smart car is distinguished as a combination of self-driving cars and connected cars (Agriesti et al., 2020; Park et al., 2019). It will be able to not only drive autonomously but also share the network with passengers and allow the usage of its data to devices that are located inside or remotely (Xiao et al., 2018). This will make the driver's life easier and improve road safety (Menarini et al., 2019; Ogando-Martínez et al., 2020). For example, using a smart car, you can reach your destination in the shortest possible time with less congestion route If you are in a hurry or running late (Rawat, 2022).

Healthcare

IoT has had an excel impact on healthcare, enhancing millions of people's lives (Alqahtani, 2022; Javaid & Khan, 2021). It extensively examines the healthcare system and finds sickness. IoT technologies significantly influence high-quality medical equipment, which supports the individualized treatment of the patient's ailment (D. Li, 2019). IoT is the finest method for tracking patients and personnel in the medical profession, cutting down on waiting times. It includes several intelligent medical tools to make the patient stay healthier, including blood-gas analyzers, thermometers, smart beds, glucose meters, ultrasounds, and X-rays. When a gadget or set of instruments is connected to the Internet, new medical applications are made possible, assisting doctors and other healthcare workers in providing patients with the best possible care (Javaid & Khan, 2021; Usak et al., 2020).

IoT networks are expected to become very dense due to the rapid proliferation of IoT devices (Alam, 2022). Developing virtual IoT is the key to achieving satisfactory returns for companies. As IoT gains momentum, we are moving towards a world where everything is connected (Nagajayanthi, 2022). Consequently, the IoT will benefit not only us individually but also society as a whole (Rawat, 2022).

2.1.2. Internet of Things in the Banking Sector

The banking industry has changed due to the digital revolution (Gąsiorkiewicz & Monkiewicz, 2022). Traditional banks have had to reevaluate their methods of operation and services during the past 20 years to adapt to these developments (JABBAR, 2023). IoT is one of the vital drivers for a bank's implementation of its digital transformation. Soori et al. (2023) clarified in their research that cities are increasingly developing methods for minimizing the amount of work done while improving the efficiency and quality of the work completed. The Internet of Things (IoT) is an automation and analytics system that uses sensors, networking, artificial intelligence, cloud communications, and other technologies to create whole systems for products or services (Nagajayanthi, 2022). Several industries (domestic and commercial) are using the Internet of Things (IoT) to improve productivity, increase safety, monitor resources, and provide ease of living (Qureshi et al., 2022). Financial institutions are one of them. The Internet of Things refers to these Internet-based architectures that facilitate the exchange of services, data, and information between billions of devices (Khajenasiri et al., 2017). Budida and Mangrulkar; Nagajayanthi; Shammar and Zahary (2017; 2022; 2019) said that by facilitating connection with and among smart things, the IoT has the ability to give this process a new dimension and realize the concept of "anytime, anywhere, any media, anything" communications. Many banks are putting this technology into use to better serve their customers and expand the market for their sector (Melnychenko et al., 2020). In the banking sector, IoT offers a variety of innovative and significant applications, and there will be plenty more innovations in the future (Javaid et al., 2022; Khanboubi et al., 2019). According to Kotb Abdelrahman Radwan et al.; Zafar and Sulaiman (2023; 2019) Islamic banks strive to fulfill a developmental, humanitarian, and social mission, and their main goal is to raise money in line with Islamic law's norms and regulations while making the most efficient use of available resources to create an Islamic society. Through IoT, systems will be adaptive with customized features, responsive with increased efficiency, and procurable with optimal price.

2.1.3. Excel performance of banking services

The extensive use of digital technologies by every sector of society has significantly impacted the development of the country and the state (Winarsasi et al., 2023). Financial institutions work very hard to smarten finance in line with the current global trend so that they can gain from digitization. To improve client services, the financial industry is using financial technology (Fintech), which uses several disruptive modern technologies, including AI, 5G/6G, Blockchain, Metaverse, IoT, etc. (Bhat et al., 2023). Kotb Abdelrahman Radwan et al.; Zafar and Sulaiman (2023; 2019) investigate that Islamic Banks facilitate trade exchange, encourage investment, and promote economic and social development in a way that does not conflict with the requirements of Islamic Sharia, the Islamic Bank conducts all the fundamental functions of the advanced banking business using the most recent methods and techniques. Banking service facilities aim to assist customers with their financial transactions (Cahyaningtyas & Fauza, 2023). Technological advancements facilitate fast, efficient, and barrier-free information delivery, particularly when it comes to distance. In particular, the banking industry continues to innovate in terms of providing services to meet the needs of its clients in accordance with the times; this is particularly evident in the provision of service facilities in banks and Islamic banks in the UAE (Boukhatem & Ben Moussa, 2018; Cahyaningtyas & Fauza, 2023; Umamaheswari et al., 2023).

2.1.4. Excel performance of banks using the Internet of Things

Singh and Ramakrishnan (2017) pointed out that because companies invest a significant amount of money in employing new technologies, they need to assess their technology adoptions. the advancement of contemporary technology banks and banking have significantly reduced the distance between consumers of the service, increased interbank competition, and so contributed to the quantitative and qualitative growth of financial services (Cahyaningtyas & Fauza, 2023). Also, Bhat et al. (2023) said in their research that banks use contemporary information and communication technology to get a competitive edge in the market by offering their clients secure, dependable, and superior services at affordable prices. Data and information related to clients are now a crucial part of production in the digital age, and mastering them is essential in

many industries, specifically in the banking industry because there are so many clients who need to retain their data and information in a secure manner (Serrado et al., 2020).

2.2. The implications of using the Internet of Things in UAE Islamic Banks

Numerous aspects of our financial lives are impacted by the Internet of Things. By utilizing the information and sensors collected from Internet of Things devices, banks and Islamic banks can offer excellent banking and financial services (Srinadi et al., 2023). The Internet of Things connects the virtual and physical worlds. We may argue that the Internet of Things is a unique technology in the world that can help other technologies in achieving their accuracy and completeness at capacity (Monsone & Jósvai, 2019). The rise in transactions made through digital banking is evidence of how much technology has changed the financial industry (Cahyaningtyas & Fauza, 2023). The quick increase in digitization has given rise to a wide range of technical possibilities that have already begun to progressively change the main economic sectors and society. Digitalization has enabled several economic sectors to enhance and better use limited resources, systems, or processes (Rawat, 2022). In this digital era, data and information have become a critical branch of production, and mastery of data and information is essential (Winarsasi et al., 2023) especially in the banking sector because there are a s vast number of clients that need to maintain their information and data in a safe way, and by using the internet of things in banks and Islamic banks in the UAE it will enhance their excel performance and this will incredibly reflect on their customer service in all aspects. According to Shamsudheen et al. (2021), the performance of the UAE's Islamic banks demonstrates the resilience and strength of the country's overall economy and banking industry. This reflects the rise in consumer demand for financial services that adhere to Shariah, especially in light of Dubai's ambition to become the world's center for Islamic finance.

2.3. The Dynamic Role of the Internet of Things (IoT) on the excel performance of Islamic banks in UAE.

First, recognize the fraudulent activity. Fraudulent activity is widespread in the financial industry. Over the previous ten years, these incidences have increased. A method to stop this scam is to use IoT in banking (ENNAFIRI et al., 2023). Customer service is the second dynamic role. It is one of the main applications of IoT technology. IoT collects user information and keeps track of users' different online activities. The customer service benefits from having such knowledge are significant. That data may be used by banks to offer their customers individualized customer care (Bhat et al., 2023). Data analytics is the third dynamic role, and it's the IoT's most significant addition to any industry's capability for analysis. It can be used by banks for processing and collection of data client data. Therefore, IoT significant extensive data analytics attempts to help businesses, associations, and other organizations to analyze data better and, as a result, make effective decisions (Marjani et al., 2017). Improved Security, the banking industry's most important factor, is another dynamic function. It is mainly based on the confidence that customers have in a bank's capacity to protect their investments. IoT technology can potentially strengthen a bank's security system's foundational architecture (Malti Bansal et al., 2020). Automation is the final dynamic function. Automated systems can boost productivity in the banking sector (Umamaheswari et al., 2023). Banks may use the IoT system to their advantage and develop automated systems to do routine tasks. Additionally, IoT systems can increase the efficiency of smart devices (Eltresy et al., 2020; Xiao et al., 2018). Consequently, as several technologies emerge, the Internet of Things (IoT) can be used to recognize, configure, and transform financial data, resulting in higher productivity, more business value, and lower costs. Islamic banks and banks are working to integrate and develop the Internet of Things into their systems in industrialized nations like the United Arab Emirates. This is the actual event that we saw. A prime example of this is the Emirates Islamic Bank, which in 2021 earned the award for most outstanding digital innovation in the Islamic banking industry among many other prizes for innovation (Emirates Islamic, 2021), this confirms that the Internet of Things has a dynamic effect on boosting the performance of Islamic banks' work. Another proof that the Internet of Things plays an active role is the mission of the first Islamic bank in Dubai may be summed up in a few words. This goal, "to be the most progressive Islamic financial institution in the world," is closely related to what DIB has developed into in the present and according to awards given in the region, Dubai Islamic Bank is the best Islamic bank (chilwan, 22-May-2023). In order to provide a brighter future for the next generation, DIB strives to provide exceptional service and a distinctive client experience (Dubai Islamic Bank, 2023; Jalloul, 2021). It's expected that there will be an enormous growth in the number of linked devices that come under the Internet of Things (IoT) umbrella (Soori et al., 2023), which is strong evidence that the IoT is playing a crucial and dynamic role in our time.

2.4. Resource-Based View (RBV)

The Resource-Based View (RBV) is a theoretical framework in business management that asserts that companies achieve and maintain a competitive edge by effectively utilizing resources and capabilities that are valuable, rare, and inimitable (Kshetri, 2008). The theory posits that businesses should prioritize cultivating and administrating internal resources, skills, and competencies to attain exceptional performance. The Resource-Based View (RBV) places significant emphasis on the internal environment of a corporation, highlighting the critical importance of resources such as human capital, technology, and organizational structure in the attainment of sustained competitive advantage (Fernando et al., 2019).

2.4.2. IoT-Enabled Valuable Resources: Data Analytics

As data volume, velocity, and variety continue to grow, techniques and technologies for storing, analyzing, and visualizing that data have evolved significantly (Mikalef et al., 2018). Analyzing large amounts of structured, unstructured, and semi-structured data requires technologies and tools that can transform them into a more comprehensible data format (K. Kaur et al., 2021; Marjani et al., 2017). Data analytics is the IoT's most significant addition to any industry's capability for analysis. It can be used by banks for processing and collection of client data (Nadikattu, 2020). Marjani et al. (2017) said that with big data, it takes a lot of resources to integrate data analytics and IoT, and IoT can provide an excellent and reasonable solution. Also, mentioned that for effective communication among various deployed applications, IoT services provide the appropriate resources and intensive applications of the platforms. With this technological combination, IoT can be implemented in a more effective way (Marjani et al., 2017). As a result, IoT extensive data analytics attempts to help businesses, associations, institutions like Islamic banks, and other organizations to analyze better to analyze data better and, as a result, make effective decisions to provide better and more reliable financial guidance and services to their customers (Marjani et al., 2017; Nadikattu, 2020; Srinadi et al., 2023).

H_{1a}: *The incorporation of Internet of Things (IoT)-enabled Data Analytics (RBVDA) makes a substantial contribution to valuable resources, resulting in a beneficial influence on the Excel Performance of Islamic Banks in the United Arab Emirates (EPIBU).*

2.4.3. IoT-Enabled Valuable Resources: Customer Services

The quality of customer service plays a critical role in any endeavor, whether it's cultural, scientific, commercial, or otherwise. So, providing excellent customer service enhances an organization's reputation and profitability (Aziz & Andriansyah, 2023; Nasereddin & FAQIR, 2019; Zouari & Abdelhedi, 2021). Customer service is one of the main applications of IoT technology. IoT collects user information and keeps track of users' different online activities. That data may be used by banks to offer their customers individualized customer care (Bhat et al., 2023). Many advantages can be gained from IoT that can valuable the resources in UAE Islamic banks, such as the ability to save time, decrease total costs, improve communication, and increase the efficiency of automation and control, which in turn leads to better customer service and better performance for UAE Islamic Banks (Al-Ansari & Aysan, 2022; Aziz & Andriansyah, 2023; Nasereddin & FAQIR, 2019). Zouari and Abdelhedi (2021) said that to remain competitive and meet the expectations of digital consumers in the future, Islamic banks must enhance their service quality standards.

H_{1b}: *The incorporation of Internet of Things (IoT)-enabled Customer Services (RBVCS) makes a substantial contribution to valuable resources, thus resulting in a favorable influence on the Excel Performance of Islamic Banks in the United Arab Emirates (EPIBU).*

2.4.4. IoT-Enabled Rare Resources: Automation System

IoT is viewed as a dynamic global network infrastructure with self-configuring capabilities (Ahmad et al., 2021). IoT enables devices to be connected from the physical world of operations technology (OT) to applications in the digital world of information technology (IT) (Rehman et al., 2019). Automation systems can improve compliance processes, reduce costs, and increase the overall effectiveness of regulatory compliance by automating, streamlining, and enhancing compliance processes with technology (Li et al., 2023). Automated systems can boost productivity in the banking sector (Umamaheswari et al., 2023). Banks may use the IoT system to their advantage and develop mechanical systems for routine tasks. Jamaruddin and Markom (2020) said that by automating information collection with sensors and analyzing data in real-time, smart systems can assist Islamic finance transactions. Alshubiri and Al Ani; Nasereddin and FAQIR (2023; 2019) stated in their research that with the high level of competition between companies, the IoT industry began to expand to take a place within the business and government sectors, which they have enough resources to implement it. IoT can improve performance and quality of work and facilitate businesses by increasing efficiency through automation and process control, allowing UAE Islamic banks to gain a competitive advantage.

H_2: *The utilization of distinctive Internet of Things (IoT) enabled automation systems (RBVAS) represents a scarce resource within the market, offering a competitive edge that has a favorable impact on the Excel Performance of Islamic Banks in the United Arab Emirates (EPIBU).*

2.4.5. IoT-Enabled Inimitable Resources: Recognize Fraudulent Activities (RFA)

Improved Security is the banking industry's most important factor. It is mainly based on customers' confidence in a bank's capacity to protect their investments. IoT technology can potentially strengthen a bank's security system's foundational architecture (Bansal et al., 2020). Aziz and Andriansyah (2023) stated in their research that it is crucial to protect banking consumers from fraud and manage risk because the current banking sector has a variety of obstacles related to these issues. One of the best ways to do this is by investing appropriate resources in the most recent technological advances. Security measures in modern banking have shifted to encryption, multi-factor authentication, and biometrics, instead of traditional methods (Bagana et al., 2021; Liang & Liang, 2023). With these advanced IoT security protocols, customers can expect

enhanced protection from cyber threats and unauthorized access, which contributes to a higher level of trust when conducting digital financial transactions (Aziz & Andriansyah, 2023) resulting in a favorable effect on the performance of Islamic banks in the United Arab Emirates (UAE).

H_3: *The integration of Internet of Things (IoT) technology with unique fraud detection capabilities (RBVRFA) enhances reliability and customer satisfaction levels, thereby positively impacting the performance of Islamic banks in the United Arab Emirates (UAE).*

2.5. Fraud Triangle Theory

Donald R. Cressey's Fraud Triangle Theory postulates that the occurrence of fraud is contingent upon the convergence of three key factors: pressure, opportunity, and rationalization (Cressey, 1973). According to Albrecht et al. (2008), the proposition is made that individuals are more likely to engage in fraudulent behavior when they face financial pressures or incentives, perceive a low danger of detection, and canto rationalize their fraudulent conduct to ethically rationalize their fraudulent conduct ethically. This theoretical framework facilitates comprehension of the factors that can contribute to the involvement of individuals or organizations in fraudulent behaviors, hence supporting the formulation of approaches to prevent and identify fraud.

2.5.2. Negative Impact of IoT-Enabled Opportunity for Fraud: Recognize Fraudulent Activities (RFA)

The Internet of Things (IoT) is a phenomenon in which connected machines are embedded with a plethora of wireless technologies (Agiwal et al., 2019; W. Z. Khan et al., 2019). The IoT produces an abundance of personally identifiable information, ultimately leading to unprecedented security and privacy risks (W. Z. Khan et al., 2019). Due to the lack of proper authentication and authorization procedures, IoT's security and privacy aspects may raise serious concerns (Zubaydi et al., 2023). Even when right adequate authentication tools are used, hackers constantly strive to find new ways to intercept IoT connections, since IoT protocols work at different layers, making them a favorite target for hackers (W. Z. Khan et al., 2019; Noor & Hassan, 2019). There are several unique challenges associated with securing IoT systems, such as unreliable communications, hostile environments, inadequate data, and privilege protection, all of which leads to security issues at different levels (Chen et al., 2018). In light of the severe consequences resulting from the growing number of attacks on IoT networks, UAE Islamic banks need to design more secure IoT systems to prevent adverse effects, which ultimately yield a favorable impact on the operational efficiency of Islamic banks in the United Arab Emirates (UAE).

H_{4a}: *Posits that the implementation of Internet of Things (IoT) technologies within Islamic banks operating in the United Arab Emirates (UAE) leads to an escalation in fraudulent activities, thereby exerting a detrimental impact on the Excel Performance of Islamic Banks in the United Arab Emirates (EPIBU).*

2.5.3. Positive Impact of IoT-Enabled Opportunity for Fraud: Recognize Fraudulent Activities (RFA)

Brusseau (2023) described that implementing advanced technologies plays a critical role in identifying fraudulent activity by constantly analyzing financial transactions and preventing financial and reputational damage. Effective risk management and anti-fraud detection systems have a significant impact on finance. They help users stay informed about their money management measures and enable them to manage their finances efficiently. As a result, these user requirements can be realized with the help of IoT-based systems and other technologies (Aziz & Andriansyah, 2023; Bisht et al., 2022). When implementing Internet of Things applications like artificial intelligence (AI), these systems produce alarms when suspicious behaviors are discovered by continuously analyzing transaction patterns and financial data, helping institutions to reduce fraud risks and inefficiencies (Aziz & Andriansyah, 2023; Dayyabu et al., 2023). As a result, Islamic banks operating in the United Arab Emirates (UAE) are better able to spot fraudulent activity because of the integration of Internet of Things (IoT) technologies, which positively affects their overall performance, efficiency, and profitability.

H_{4b}: *The integration of Internet of Things (IoT) technologies in Islamic banks operating in the United Arab Emirates (UAE) improves their ability to detect fraudulent activities, thus leading to a favorable impact on the Excel Performance of Islamic Banks in the United Arab Emirates (EPIBU).*

2.6. Islamic Banking Theories

Theoretical frameworks in Islamic banking highlight the importance of aligning financial activities with the core principles of Islamic law, also known as Sharia (Iqbal & Molyneux, 2005). The framework emphasizes the principles of risk-sharing, asset-backed financing, and the prohibition of interest (Riba), so ensuring that transactions adhere to ethical standards, promote transparency, and contribute to a fair distribution of wealth (Chong & Liu, 2009). The primary objective of Islamic Banking Theories is to develop a stable and sustainable financial system by focusing on socio-economic justice and community welfare (Khan & Bhatti, 2008).

2.6.2. IoT-Enabled Sharia-Compliance: Sharia principles

Aziz and Andriansyah (2023) stated in their paper that regulatory compliance is a multifaceted domain that demands precision, timeliness, and adaptability, particularly in finance sectors where regulations are complex and constantly changing. Aziz and Andriansyah (2023) also said that it takes considerable time and resources to ensure compliance using traditional manual or automated methods. There is a great deal of opportunity for Islamic financial technology such as IoT to flourish in the Islamic world since it can facilitate innovation and provide financial services at affordable prices (Hassan et al., 2020; Hidajat, 2020). In addition, Islamic financial technology is transparent, easy to use, and accessible, which can ease customer confidence quickly, especially for Muslim investors since it adheres to Sharia rules, values, and ethics which makes Islamic Finance a worthwhile investment (Alam et al., 2019; Amilahaq et al., 2021; Haqqi, 2020; Saba et al., 2019) so the use of Internet of Things (IoT) technology In the United Arab Emirates (UAE) improve adherence to Sharia laws, which will lead to increase the overall effectiveness of Islamic financial institutions.

H_5: *The integration of Internet of Things (IoT) technology in accordance with Sharia Principles (IBTSP) has a positive impact on the credibility of Islamic banks, leading to a beneficial effect on the Excel Performance of Islamic Banks in the United Arab Emirates (EPIBU).*

2.6.3. IoT-Enabled Risk-Sharing: Automation System (AS)

IoT technology offers real-time monitoring and data analysis, enhancing transparency in risk-sharing mechanisms (Birkel & Hartmann, 2020; Bodemer, 2023; Yüksel et al., 2023). Therefore, the risk-sharing process is fair and based on accurate, up-to-date information, in accordance with Islamic finance's principles of fairness (RAI, 2023). By analyzing data from IoT devices in real-time, Islamic banks can assess risks more accurately (Li et al., 2023). Through this enhanced risk assessment, Islamic banks can manage risks efficiently, allocate resources appropriately, and make informed decisions aligned with Sharia principles, leading to a more equitable financial system (Kamdzhalov, 2020). Also, the Internet of Things helps Islamic banks collect extensive data about customer behavior and preferences, based on this data Islamic banks can tailor risk-sharing mechanisms and financial products to meet the specific needs of their customers while maintaining fairness and complying with Islamic principles (Shaikh, 2023). Customers are more likely to trust and have confidence in a bank and its operations when they perceive that their financial transactions and risk-sharing arrangements are conducted fairly and transparently (Khattak & Khan, 2023). Islamic banks in the UAE can enhance market competitiveness by efficiently utilizing IoT for risk-sharing. Emphasizing the fairness and transparency of their risk-sharing mechanisms can attract customers who seek ethical and just financial solutions (Tiran, 2023). These positive impacts can improve Islamic banks' overall performance and competitive position in the UAE.

H_6: *The utilization of Internet of Things (IoT) technology to enhance risk-sharing mechanisms (IBTAS), in accordance with the principles of Islamic banking, promotes financial fairness and consumer confidence, resulting in a favorable impact on the Excel Performance of Islamic Banks in UAE (EPIBU).*

2.6.4. IoT-Enabled Asset-Backed Finance: Data Analytics (DA)

IoT enables real-time tracking and monitoring of assets, providing stakeholders with transparent and accurate information about the assets' condition, location, and usage (Ray, 2023; Sermuksnyte et al., 2021). This transparency is consistent with the core principles of Islamic finance, which place an extreme value on the transparency and fairness of financial transactions (Khattak & Khan, 2023; RAI, 2023). This level of transparency not only benefits the banks themselves but also provides greater assurance to investors and other stakeholders (Iskamto & Juariyah, 2023; Ray, 2023; Shaikh, 2023). Moreover, IoT technologies increase operational efficiency in UAE Islamic banks' asset-backed finance practices by automating processes, enhancing risk assessments, ensuring Shariah compliance, and optimizing resource utilization, all of which make a financial ecosystem more efficient and productive (Khattak & Khan, 2023).

H_7: *The utilization of Internet of Things (IoT) technologies in facilitating asset-backed finance (IBTDA) enhances transparency and operational efficiency, thereby exerting a favorable influence on the Excel Performance of Islamic Banks in UAE (EPIBU).*

3. Methodology

3.1. Research Design and Approach

The study utilizes a quantitative methodology, employing Partial Least Squares Structural Equation Modeling (PLS-SEM) as the principal analytical technique. The research is based on a Combined Model that integrates the Resource-Based View (RBV), Islamic Banking Theories, and Fraud Triangle Theory to provide a thorough comprehension of the dynamic impact of Internet of Things (IoT) technologies on the performance of Islamic banks in the United Arab Emirates (UAE).

3.2. Sampling Technique

The research employs a stratified random sampling methodology to achieve a thorough and inclusive representation of different demographic groups present in the community. The study's target audience encompasses individuals who are employed, hold managerial positions or are clients of Islamic banks in the United Arab Emirates (UAE). Data was collected by distributing an online survey randomly across these groups.

3.3. Sample Size and Response Rate

The first sample had a total of 504 participants. A total of 407 fully completed responses were obtained from the sample, with a response rate of roughly 80.75%, indicating a strong level of participation. The elevated response rate contributes to the enhanced validity and reliability of the findings obtained from the survey.

3.4. Data Collection Methods

Data collection was conducted via a carefully designed and organized online survey. The survey comprised a total of 44 questions, which were further categorized to assess both the independent and dependent variables. In this study, the independent variable was evaluated through four questions, whereas the dependent variable was measured using eight questions. Both variables were assessed using a 5-point Likert scale, with response options ranging from 1 (Strongly Disagree) to 5 (Strongly Agree).

In addition, the study moreover included demographic data encompassing gender, age range, education level, occupation, type of banking services utilized, frequency of banking transactions, experience with IoT devices, length of time Islamic banking services, and role in the banking sector (if applicable).

3.5. Study Model: Combined Model

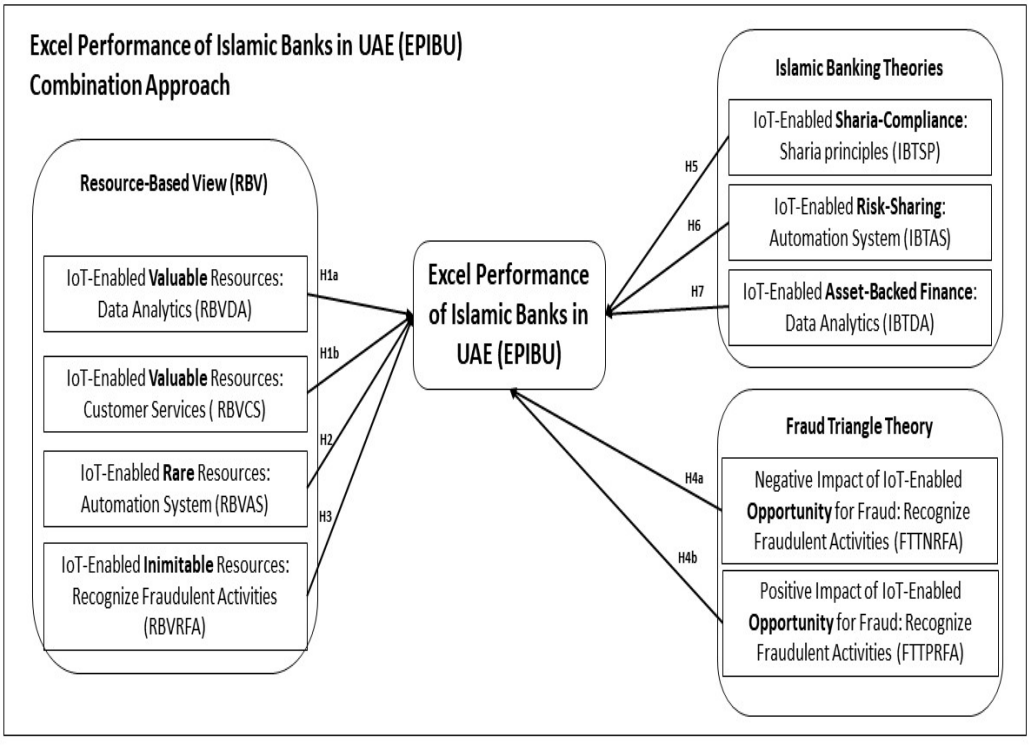

Fig. 3. Model of Study

3.5.2. Resource-Based View (RBV) Model:

- IoT-Enabled Valuable Resources: Data Analytics (RBVDA)
- IoT-Enabled Valuable Resources: Customer Services (RBVCS)
- IoT-Enabled Rare Resources: Automation Systems (RBVAS)
- IoT-Enabled Inimitable Resources: Recognize Fraudulent Activities (RBVRFA)

3.5.3. Islamic Banking Theories

- IoT-Enabled Sharia-Compliance: Sharia Principles (IBTSP)
- IoT-Enabled Risk-Sharing: Automation System (IBTAS)
- IoT-Enabled Asset-Backed Finance: Data Analytics (IBTDA)

3.5.4. Fraud Triangle Theory

- Negative Impact of IoT-Enabled Opportunity for Fraud: Recognize Fraudulent Activities (FTTNRFA)
- Positive Impact of IoT-Enabled Opportunity for Fraud: Recognize Fraudulent Activities (FTTPRFA)

3.5.5. Dependent Variable

- Excel Performance of Islamic Banks in UAE (EPIBU)

3.6. Pilot Study

A preliminary investigation was undertaken with a sample of 19 participants to assess the dependability of the survey instrument. The reliability tests conducted on all constructs resulted in scores exceeding 82%, demonstrating good reliability for the survey.

Variables	Questions Number	Cronbach's Alpha
RBVDA	4	0.844
RBVCS	4	0.829
RBVAS	4	0.887
RBVRFA	4	0.871
IBTSP	4	0.901
IBTAS	4	0.836
IBTDA	4	0.912
FTTNRFA	4	0.883
FTTPRFA	4	0.906
EPIBU	8	0.927

3.7. Ethical Considerations

The study was conducted with full attention to ethical criteria to uphold the research's integrity and maintain the participants' confidentiality. All participants were provided with explicit guarantees that their responses would be kept confidential and anonymous. In published reports or analyses, respondents' personal identity information would not be associated with their responses.

Additionally, the participants were duly notified that their participation in the survey was completely optional, and they were given the freedom to withdraw from the study at any moment without incurring any negative repercussions.

4. Data Analysis

4.1. Data Cleaning and Pre-Processing

Before executing the Partial Least Squares Structural Equation Modeling (PLS-SEM), the dataset underwent a comprehensive cleaning and pre-processing phase. This encompassed a range of activities.

4.1.2. The process of eliminating incomplete or inconsistent responses

A critical step in data analysis involves the identification and management of outliers. These data points, which deviate significantly from the overall pattern, can substantially impact the results and conclusions drawn from the analysis. Therefore, it is crucial to carefully examine the data for outliers and take suitable measures to handle them.

The selection of PLS-SEM as the analytical technique was based on its robustness in handling intricate interactions and its capacity to address multicollinearity issues across variables. Additionally, this tool can incorporate both formative and reflecting elements, rendering it very suitable for the design of this study.

4.1.3. The process of assigning codes to questions and variables

The independent and dependent variables and the survey questions were coded in a manner that facilitated analysis. The questions pertaining to the independent variable "IoT-Enabled Valuable Resources: Data Analytics" were assigned the codes RBVDA1, RBVDA2, RBVDA3, and RBVDA4. The variable under study, Excel Performance of Islamic Banks in the United Arab Emirates (EPIBU), was categorized into eight distinct codes ranging from EPIBU1 to EPIBU8.

After data cleaning and pre-processing, the authors used SmartPLS software (version 4.0.5.9) to conduct PLS-SEM analysis. The coded inquiries and variables were methodically entered into the software. The selection of the SmartPLS software was based on its demonstrated capability to effectively handle intricate interactions among variables, effectively manage multicollinearity issues, and accommodate the inclusion of both formative and reflective constructs. The aforementioned analytical tool proved to be highly effective in facilitating the execution of sophisticated statistical tests essential for either confirming or disproving the hypotheses in the study.

4.2. Demographic Analysis

Table 1 thoroughly examines the participants' demographic characteristics, encompassing factors such as Age Range, Education Level, and Occupation, among other relevant qualities. The table provides an in-depth analysis of several metrics linked to banking, focusing on participants' preferences in banking services, frequency of transactions, familiarity with IoT devices, duration of involvement with Islamic banking, and their responsibilities within the banking sector.

4.2.2. Demographic Insights

Upon examination of the age distribution of the participants, it is evident that a significant proportion, amounting to 44.5%, belong to the age range of 25-34 years. This is closely followed by individuals within the 35-44 years category, comprising 41.5% of the respondents. The younger age group of 18-24 comprises a lesser proportion, at 10.1% of the total. In contrast, a minimal percentage of 3.9% falls within the age range of 45-54 years. Upon further examination of their educational credentials, it is noteworthy that a substantial majority of individuals, 78.6%, have obtained a Bachelor's degree. Additionally, a notable proportion of 14.5% have pursued and attained a Master's degree, while an additional 6.1% have completed a Doctorate program. A minuscule proportion, just 0.7%, had achieved a college education level. When evaluating the work situation of the participants, it is evident that the majority (75.7%) are gainfully employed. The remaining individuals fall into many categories, including students (9.8%), jobless (3.9%), or those who have specified their occupation as 'Other' (10.6%).

4.2.3. Banking & Transactional Behavior

Concerning the frequency of their financial transactions, a significant majority of individuals engage in banking activities daily, accounting for 52.6% of the population. A significant proportion of individuals, specifically 31.7%, engage in transactions on a weekly basis, whereas a smaller percentage of 15.2% conduct transactions on a monthly basis. A significantly small proportion of individuals (0.5%) partake in financial activities with infrequency. In relation to their banking service preferences, a significant majority of 81.3% exhibit a preference for Internet banking. In contrast, it is noteworthy that a considerable proportion of individuals, specifically 15.7%, employ a combination of traditional and online banking techniques. Conversely, a relatively small percentage of 2.9% continue to rely on traditional banking services to entirely rely on traditional banking services entirely.

4.2.4. Experience with IoT and Islamic Banking Services

The data provides insight into the level of knowledge that the respondents have with Internet of Things (IoT) devices. The data reveals that a substantial majority, precisely 76.9%, of the participants can be classified as novices in the field of IoT, indicating that their level of familiarity with IoT devices is likely limited to fundamental interactions. A minority subset, including 12.3% of the respondents, reported no prior usage of Internet of Things (IoT) devices. In contrast, a smaller proportion of 4.9% identified themselves as having an intermediate level of familiarity with IoT devices, while 5.9% claimed to possess advanced skills in this domain. Shifting our focus to their engagement with Islamic banking services, a significant proportion of individuals have utilized these services for a duration of 1-3 years (39.3%) and 4-6 years (39.8%). A portion of the population has just initiated their engagement with a duration of less than one year (8.4%), while a smaller subset has demonstrated long-term loyalty by maintaining a client relationship for a period of seven years or more (12.5%).

4.2.5. Roles within the Banking Sector

Among the participants who provided information about their positions within the banking industry, a majority (64.6%) classified themselves as consumers. A smaller portion of the workforce functions in the capacity of employees, comprising 26.4% of the total. The remaining individuals can be classified as investors, 5.3% of the total, or they can be categorized under various other roles, accounting for 3.7% of the total population. It is noteworthy to mention that a substantial

proportion of the data (39.6%) related to this particular segment was not available due to the fact that information was only requested from participants for whom this category was applicable.

Table 1
Demographic Analysis

variables	Options	Frequency	%	variables	Options	Frequency	%
Age Range	18-24	41	10.1	Frequency of Banking Transactions:	Daily	214	52.6
	25-34	181	44.5		Weekly	129	31.7
	35-44	169	41.5		Monthly	62	15.2
	45-54	16	3.9		Less Often	2	0.5
Education Level	College	3	0.7		Never used	50	12.3
	Bachelor's Degree	320	78.6	Experience with IoT Devices:	Beginner	313	76.9
	Master's Degree	59	14.5		Intermediate	20	4.9
	Doctorate Degree	25	6.1		Advanced	24	5.9
Occupation:	Employed	308	75.7	Length of Time Using Islamic Banking Services:	Less than one year	34	8.4
	Unemployed	16	3.9		1-3 years	160	39.3
	Student	40	9.8		4-6 years	162	39.8
	Other	43	10.6		Seven years or more	51	12.5
Type of Banking Services Used:	Traditional Banking	12	2.9	Role in the Banking Sector (if applicable):	Customer	159	64.6
	Online Banking	331	81.3		Employee	65	26.4
	Both	64	15.7		Investor	13	5.3
					Other	9	3.7
					Missing	161	39.6
Total		407	100.0	Total		407	100.0

4.3. Coefficients of Outer loadings

The examination of external loadings within the Partial Least Squares Structural Equation Modeling (PLS-SEM) framework provides additional support for the dependability and accuracy of the latent variables in the study. All the manifest variables exhibited loadings that exceeded the commonly accepted criterion of 0.7 (Hair et al., 2021), providing strong evidence for the reliability and validity of the measurement model. Table 2 shows that RBV Model constructs, such as IoT-Enabled Valuable Resources: Data Analytics (RBVDA) and Customer Services (RBVCS), as well as Rare Resources: Automation Systems (RBVAS) and Inimitable Resources: Recognize Fraudulent Activities (RBVRFA), demonstrated outer loadings between 0.885 and 0.933, indicating their accurate representation of the underlying variables. In a similar vein, the constructs of Islamic Banking Theory, namely IoT-Enabled Sharia-Compliance: Sharia Principles (IBTSP), Risk-Sharing: Automation System (IBTAS), and Asset-Backed Finance: Data Analytics (IBTDA), exhibited significant outer loadings ranging from 0.874 to 0.922.

Table 2
Outer loadings analysis

Relationship	loading	Relationship	loading	Relationship	loading	Relationship	loading
EPIBU1 ← EPIBU	0.861	FTTNRFA4 ← FTTNRFA	0.839	IBTDA3 ← IBTDA	0.908	RBVCS2 ← RBVCS	0.899
EPIBU2 ← EPIBU	0.898	FTTPRFA1 ← FTTPRFA	0.908	IBTDA4 ← IBTDA	0.915	RBVCS3 ← RBVCS	0.909
EPIBU3 ← EPIBU	0.891	FTTPRFA2 ← FTTPRFA	0.88	IBTSP1 ← IBTSP	0.912	RBVCS4 ← RBVCS	0.884
EPIBU4 ← EPIBU	0.892	FTTPRFA3 ← FTTPRFA	0.896	IBTSP2 ← IBTSP	0.91	RBVDA1 ← RBVDA	0.923
EPIBU5 ← EPIBU	0.902	FTTPRFA4 ← FTTPRFA	0.884	IBTSP3 ← IBTSP	0.898	RBVDA2 ← RBVDA	0.912
EPIBU6 ← EPIBU	0.886	IBTAS1 ← IBTAS	0.905	IBTSP4 ← IBTSP	0.892	RBVDA3 ← RBVDA	0.885
EPIBU7 ← EPIBU	0.885	IBTAS2 ← IBTAS	0.922	RBVAS1 ← RBVAS	0.909	RBVDA4 ← RBVDA	0.916
EPIBU8 ← EPIBU	0.905	IBTAS3 ← IBTAS	0.874	RBVAS2 ← RBVAS	0.912	RBVRFA1 ← RBVRFA	0.907
FTTNRFA1 ← FTTNRFA	0.932	IBTAS4 ← IBTAS	0.89	RBVAS3 ← RBVAS	0.933	RBVRFA2 ← RBVRFA	0.912
FTTNRFA2 ← FTTNRFA	0.948	IBTDA1 ← IBTDA	0.912	RBVAS4 ← RBVAS	0.91	RBVRFA3 ← RBVRFA	0.894
FTTNRFA3 ← FTTNRFA	0.783	IBTDA2 ← IBTDA	0.901	RBVCS1 ← RBVCS	0.886	RBVRFA4 ← RBVRFA	0.899

Similar to the RBV Model and Islamic Banking Theories, the Fraud Triangle Theory exhibits notable validity. The variables FTTNRFA (Negative Impact of IoT-Enabled Opportunity for Fraud: Recognize Fraudulent Activities) and FTTPRFA (Positive Impact of IoT-Enabled Opportunity for Fraud: Recognize Fraudulent Activities) exhibited outer loadings between 0.783 and 0.948, highlighting their significant contribution to the model. Additionally, it is worth noting that the dependent variable, Excel Performance of Islamic Banks in the United Arab Emirates (EPIBU), had remarkably high outer loadings, with values ranging from 0.861 to 0.905. The presence of solid indicators across all observed variables serves to validate the internal consistency and reliability of the constructs being examined in the study. This establishes a solid basis for conducting additional analysis of the structural model and testing of hypotheses.

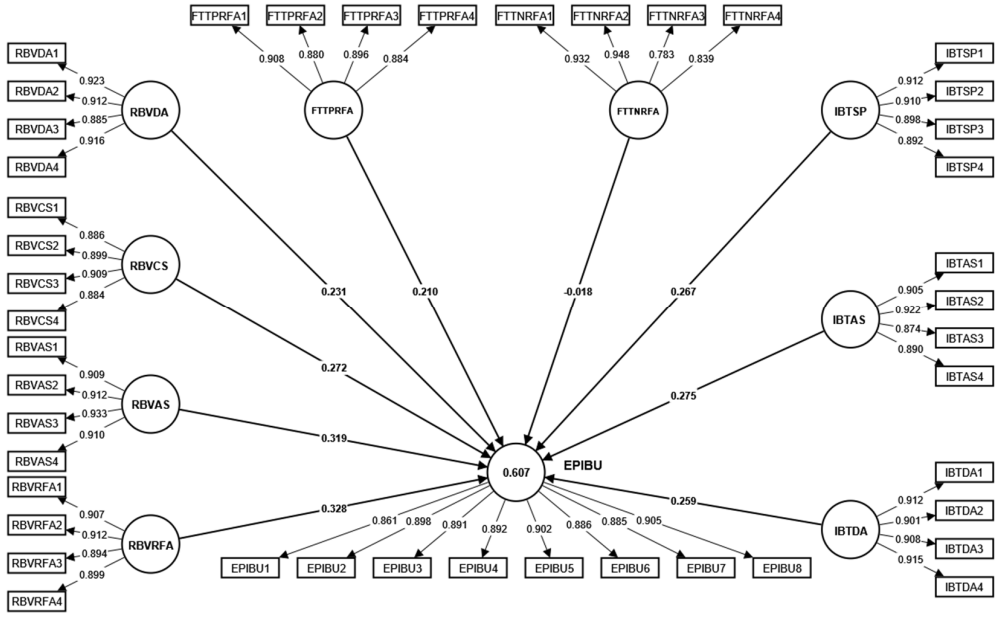

Fig. 4. Pls-Sem Model

4.4. Quality Criteria Analysis

The Quality Criteria Analysis involves the evaluation of various essential indicators to determine the strength and applicability of a statistical model. The measures mentioned above encompass the R-square, which quantifies the proportion of variance accounted for by the model; the F-square, employed to assess the magnitude of the relationship between latent variables; Construct Reliability and Validity, which appraise the internal consistency and accuracy of the constructs within the model; Discriminant Validity, which verifies that unrelated concepts are statistically distinct; and lastly, Collinearity Statistics such as the Variance Inflation Factor (VIF), which indicate whether multicollinearity among predictors is impacting the model's estimates. Each of these indicators offers distinct perspectives on the model's quality, aiding in validating its strengths and detecting potential faults.

4.4.2. R-square

Table 3 shows that the R-square and adjusted R-square values of the model are 0.607 and 0.598, respectively. This data provide some explanation for the diversity in the Excel Performance of Islamic Banks in the United Arab Emirates. The model offers an explanation for approximately 60.7% of the variance observed in the dependent variable. The proximity of the R-square and modified R-square values provide additional evidence supporting the continued relevance of the predictors incorporated in the model, as well as their significant role in elucidating the observed fluctuations in the dependent variable.

Table 3
R-Square

	R-square	R-square adjusted
EPIBU	0.607	0.598

4.4.3. F-square

Using f-square (f^2) values inside the model provides valuable metrics for assessing the magnitude of each independent variable's impact on the dependent variable, EPIBU. The comprehension of the independent variables produced from the Resource-Based View (RBV) Model, Islamic Banking Theories, and Fraud Triangle Theory is contingent upon the recognition of these values, as they play a pivotal role in determining both the statistical significance and practical significance. Table 4 shows that variables RBVRFA, which exhibits an f^2 value of 0.266, and RBVAS, which indicates an f^2 value of 0.254, manifest a moderate to large effect size. This underscores their noteworthy influence on the Excel Performance of Islamic Banks in the UAE.

Table 4
F-square

	FTTNRFA	FTTPRFA	IBTAS	IBTDA	IBTSP	RBVAS	RBVCS	RBVDA	RBVRFA
EPIBU	0.001	0.109	0.191	0.168	0.179	0.254	0.184	0.131	0.266

In contrast, specific factors such as FTTNRFA, with a f^2 value of 0.001, exhibit a considerably lesser effect size. This implies that their impact on the dependent variable is minimal to modest in magnitude. The comprehensive comprehension derived from the analysis of f^2 values is not only crucial for the interpretation of the existing model but also highly helpful for informing the design and emphasis of future research endeavors. This study aids in the identification of key characteristics that should be incorporated into future models to enhance the predictive accuracy of Excel Performance in Islamic Banks operating in the United Arab Emirates.

4.4.4. Construct Reliability and Validity

Table 5 presents essential metrics for evaluating the reliability and validity of constructs inside the model that examines the Excel Performance of Islamic Banks in the United Arab Emirates (EPIBU) as the dependent variable. The metrics encompassed in this analysis consist of Cronbach's Alpha, Composite Reliability (both rho_a and rho_c), and the Average Variance Extracted (AVE). Cronbach's Alpha coefficients indicate that the values for all constructs surpass the frequently advised criterion of 0.7 (Hair et al., 2021), indicating a significant level of internal consistency within each construct. The EPIBU has the highest value of 0.963, whereas the FTTPRFA has the lowest value of 0.915. Both composite reliability metrics, namely rho_a and rho_c, are also above the required threshold of 0.7 (Hair et al., 2021). The rho_a and rho_c values exhibit very high levels in the model. The constructs in question all surpass the suggested AVE threshold of 0.5 (Hair et al., 2021), demonstrating robust convergent validity. The highest average value estimate (AVE) is seen in RBVAS, with a value of 0.839, whereas the lowest AVE is found in FTTNRFA, with a value of 0.771.

Table 5
Reliability and Validity

Constructs	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
EPIBU	0.963	0.963	0.968	0.792
FTTNRFA	0.933	0.72	0.93	0.771
FTTPRFA	0.915	0.933	0.94	0.796
IBTAS	0.921	0.938	0.943	0.807
IBTDA	0.93	0.933	0.95	0.827
IBTSP	0.925	0.929	0.946	0.815
RBVAS	0.936	0.938	0.954	0.839
RBVCS	0.917	0.927	0.941	0.8
RBVDA	0.93	0.939	0.95	0.826
RBVRFA	0.925	0.928	0.947	0.816

In general, the statistics demonstrate a considerable degree of construct dependability and validity for the constructs encompassed within this model. The authors propose that the instruments employed to assess each construct exhibit internal consistency and accurately capture the underlying variables they are designed to examine. Including this aspect enhances the model's reliability and reinforces its ability to effectively analyze the Excel Performance of Islamic Banks in the United Arab Emirates.

4.4.5. Discriminant Validity

The Heterotrait-Monotrait Ratio (HTMT) is a contemporary methodology for evaluating discriminant validity within structural equation modeling frameworks. The metric quantifies the ratio between the mean heterotrait-heteromethod correlations and the mean monotrait-heteromethod correlations. Typically, a discriminant validity of less than 0.85 or 0.90 indicates sufficient evidence (Hair et al., 2021).

Table 6 shows that the HTMT matrix indicates that all values are notably lower than the widely acknowledged threshold of 0.85. This observation indicates favorable discriminant validity for the components inside the model assessing the Excel Performance of Islamic Banks in the UAE (EPIBU).

The HTMT value of 0.033 observed between the EPIBU and FTTNRFA constructs indicates a high level of discriminant validity. This finding shows that these constructs are highly dissimilar from one other inside the model.

The structures EPIBU and FTTPRFA have an HTMT value of 0.197, suggesting that they are different entities inside the model.

The constructions pertaining to Islamic Banking Theories (IBTAS, IBTDA, IBTSP) have HTMT values ranging from 0.258 to 0.31 in relation to EPIBU. This finding implies satisfactory discriminant validity, indicating that the constructs under investigation effectively assess their intended attributes and are distinct from the construct of EPIBU.

Regarding the constructs derived from the Resource-Based View (RBV) model, namely RBVAS, RBVCS, RBVDA, and RBVRFA, their HTMT values with respect to EPIBU range from 0.202 to 0.381. Despite RBVRFA having the highest HTMT value of 0.381, it remains below the established threshold, confirming discriminant validity.

Table 6
The Heterotrait-Monotrait Ratio (HTMT) Correlations

	EPIBU	FTTNRFA	FTTPRFA	IBTAS	IBTDA	IBTSP	RBVAS	RBVCS	RBVDA	RBVRFA
EPIBU										
FTTNRFA	0.033									
FTTPRFA	0.197	0.024								
IBTAS	0.31	0.054	0.049							
IBTDA	0.258	0.018	0.044	0.042						
IBTSP	0.297	0.062	0.057	0.044	0.064					
RBVAS	0.361	0.029	0.066	0.057	0.031	0.031				
RBVCS	0.293	0.058	0.048	0.043	0.075	0.056	0.043			
RBVDA	0.202	0.06	0.079	0.027	0.061	0.022	0.111	0.071		
RBVRFA	0.381	0.05	0.093	0.067	0.058	0.039	0.04	0.035	0.13	

In general, the observed low HTMT values indicate a clear distinction and divergence among the constructs used in the model. This supports the model more, demonstrating its effectiveness in evaluating different dimensions of the Excel Performance of Islamic Banks in the UAE.

4.4.6. Collinearity Statistics (VIF)

The Variance Inflation Factor (VIF) is a statistical metric employed to identify and quantify the extent of multicollinearity in multiple regression models. A Variance Inflation Factor (VIF) value beyond 5 or 10 is commonly seen as suggestive of the presence of multicollinearity. However, it is essential to note that these thresholds may differ among disciplines and the characteristics of the model under consideration. The presence of multicollinearity is considered undesirable due to its potential to complicate the assessment of the individual effects of predictors on the dependent variable.

In the present model, table 7 shows that all variables exhibit Variance Inflation Factor (VIF) values that fall below the generally referenced criteria of 5 or 10 (Hair et al., 2021). This finding indicates that multicollinearity in your model is not a substantial worry, which is a favorable result.

The dependent variable, Excel Performance of Islamic Banks in UAE (EPIBU), has VIF values ranging from 3.204 to 4.268, significantly lower than the multicollinearity threshold.

The Fraud Triangle Theory constructs. Namely FTTNRFA and FTTPRFA, exhibit VIF values ranging from 2.648 to 3.557, indicating the absence of multicollinearity concerns.

The constructs of Islamic Banking Theory, namely IBTAS, IBTDA, and IBTSP, exhibit VIF values ranging from 2.797 to 3.476, further suggesting the absence of any substantial multicollinearity.

The structures of the Resource-Based View (RBV) Model, namely RBVAS, RBVCS, RBVDA, and RBVRFA, have VIF values ranging from 2.829 to 4.243, suggesting that there are acceptable degrees of multicollinearity present.

Table 7
The Variance Inflation Factor (VIF)

Indicators	VIF	Indicators	VIF	Indicators	VIF	Indicators	VIF
EPIBU1	3.204	FTTNRFA4	3.557	IBTDA3	3.466	RBVCS2	2.956
EPIBU2	4.03	FTTPRFA1	2.855	IBTDA4	3.382	RBVCS3	2.991
EPIBU3	3.78	FTTPRFA2	2.874	IBTSP1	3.239	RBVCS4	2.865
EPIBU4	3.893	FTTPRFA3	3.147	IBTSP2	3.307	RBVDA1	3.547
EPIBU5	4.207	FTTPRFA4	2.648	IBTSP3	3.173	RBVDA2	3.521
EPIBU6	3.659	IBTAS1	3.059	IBTSP4	2.899	RBVDA3	2.963
EPIBU7	3.672	IBTAS2	3.354	RBVAS1	3.406	RBVDA4	3.402
EPIBU8	4.268	IBTAS3	2.797	RBVAS2	3.523	RBVRFA1	3.158
FTTNRFA1	3.507	IBTAS4	3.015	RBVAS3	4.243	RBVRFA2	3.299
FTTNRFA2	3.347	IBTDA1	3.476	RBVAS4	3.365	RBVRFA3	3.026
FTTNRFA3	3.342	IBTDA2	3.067	RBVCS1	2.829	RBVRFA4	3.194

In general, the VIF values indicate that the model is appropriately stated, and that each independent variable provides distinct information in explaining the dependent variable. This strengthens the reliability and credibility of the obtained results.

4.4.7. Model Fit

Undoubtedly, the model fit indices play a crucial role in assessing the soundness and reliability of the given model.

Table 8
Model Fit

	Saturated model	Estimated model
SRMR	0.031	0.031
d_ULS	0.976	0.976
d_G	0.647	0.647
Chi-square	1584.287	1584.287
NFI	0.901	0.901

Table 8 shows that Standardized Root Mean Square Residual (SRMR) is a statistical measure used in academic research. A model fit can be considered satisfactory when the SRMR value is below the usually recognized criterion of 0.08 (Dash & Paul, 2021), as evidenced by an SRMR value of 0.031. Two less frequently employed fit indices, namely the Unweighted Least Squares Discrepancy (d_ULS) and the Geodesic Discrepancy (d_G), indicate a well-fitted model based on their respective values of 0.976 and 0.647. The chi-square value of 1584.287 is a statistical measure used to assess the null hypothesis that the observed and calculated covariance matrices are equal. Typically, researchers choose lower chi-square values; nevertheless, it is essential to acknowledge that the size of the sample influences the chi-square statistic. It is necessary to take into account the associated p-value in order to have a more full picture. The Normed Fit Index (NFI) score of 0.901 exceeds the commonly accepted threshold of 0.9 (Dash & Paul, 2021), indicating robust evidence supporting the adequacy of the model in fitting the observed data. Finally, the model fit indices provide evidence that the model is appropriately defined and resilient, thereby affirming the credibility of the study's results.

4.5. Path Coefficients analysis

In examining the association between several independent factors and the dependent variable EPIBU (Excel Performance of Islamic Banks in UAE), Table 9 shows numerous noteworthy statistical measures emerge. The T-statistics and P-values play a crucial role in assessing the significance of each association. T-statistics measure statistical significance, with larger values (often exceeding 1.96 for a 95% confidence range) indicating that the coefficient is statistically significant. For instance, the variables FTTPRFA, IBTDA, IBTSP, RBVCS, RBVDA, and RBVRFA have significant T-statistics, ranging from 12.839 to 18.766, indicating substantial support against the null hypothesis. Additionally, these findings are supported by P-values of 0, providing further evidence of their statistical importance. The observed variables exhibit a considerable and statistically significant influence on the EPIBU. In contrast, the variables FTTNRFA and IBTAS exhibit T-statistics below the threshold (1.148 and 1.851, respectively) and P-values exceeding 0.05 (0.251 and 0.064, respectively). These results indicate that the influence of these factors on EPIBU lacks statistical significance. The variable RBVAS exhibits the lowest T-statistic of 0.325 and the highest P-value of 0.745, indicating its status as the least significant predictor within the present model. The insights mentioned above play a crucial role in comprehending the aspects that significantly influence the performance of Islamic Banks in the United Arab Emirates, as measured by EPIBU.

Table 9
Path Coefficients Analysis

Hypothesis	Paths	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values	significance
H1a	RBVDA → EPIBU	0.231	0.231	0.033	7.034	0	Supported
H1b	RBVCS → EPIBU	0.272	0.27	0.031	8.843	0	Supported
H2	RBVAS → EPIBU	0.319	0.319	0.032	9.863	0	Supported
H3	RBVRFA → EPIBU	0.328	0.328	0.03	10.837	0	Supported
H4a	FTTNRFA → EPIBU	-0.018	-0.015	0.034	0.536	0.592	Not Supported
H4b	FTTPRFA → EPIBU	0.21	0.21	0.029	7.202	0	Supported
H5	IBTSP → EPIBU	0.267	0.265	0.031	8.506	0	Supported
H6	IBTAS → EPIBU	0.275	0.275	0.033	8.38	0	Supported
H7	IBTDA → EPIBU	0.259	0.259	0.032	7.983	0	Supported

4.5.2. H1a: IoT-enabled Data Analytics (RBVDA) → EPIBU

The findings provide robust evidence favoring the stated hypothesis, as indicated by a statistically significant t-value and a p-value of zero. This implies that the utilization of IoT-enabled Data Analytics (RBVDA) has a substantial impact on the availability of valuable resources, thereby leading to a beneficial effect on the performance of Islamic Banks in the United

Arab Emirates (UAE). Integrating data analytics within the Internet of Things (IoT) framework is perceived as a crucial factor in enhancing the efficacy of Islamic banking operations.

4.5.3. H1b: IoT-enabled Customer Services (RBVCS) → EPIBU

The data provides substantial support for this idea as well. The utilization of Internet of Things (IoT) technology in customer services has been observed to have a notable beneficial influence on the Excel Performance of Islamic Banks in the United Arab Emirates (UAE). The statistical data supports the notion that the Internet of Things (IoT) has a significant role in improving customer service, which is a crucial criterion in evaluating banking performance.

4.5.4. H2: IoT-enabled Automation Systems (RBVAS) → EPIBU

The hypothesis is substantiated by a significant t-value and a p-value of zero, suggesting that incorporating distinctive automation systems confers a competitive edge to Islamic banks in the United Arab Emirates (UAE). Automation is expected to streamline operations and improve efficiency, thereby making a beneficial contribution to the performance of banks.

4.5.5. H3: IoT-enabled Fraud Detection (RBVRFA) → EPIBU

Once again, the evidence clearly supports this hypothesis. The findings indicate that the utilization of Internet of Things (IoT) technology, which can identify instances of fraudulent behavior, contributes to the overall improvement of Islamic banking institutions in the United Arab Emirates (UAE). The capacity to remember fraudulent actions is expected to enhance both dependability and client contentment.

4.5.6. H4a: IoT Increases Fraudulent Activities → EPIBU

The hypothesis lacks support, suggesting that the installation of IoT does not hurt the rise of fraudulent operations in Islamic banks in the UAE. The study effectively challenges the idea that the integration of IoT technology automatically results in increased security vulnerabilities, specifically in the context of fraudulent activities.

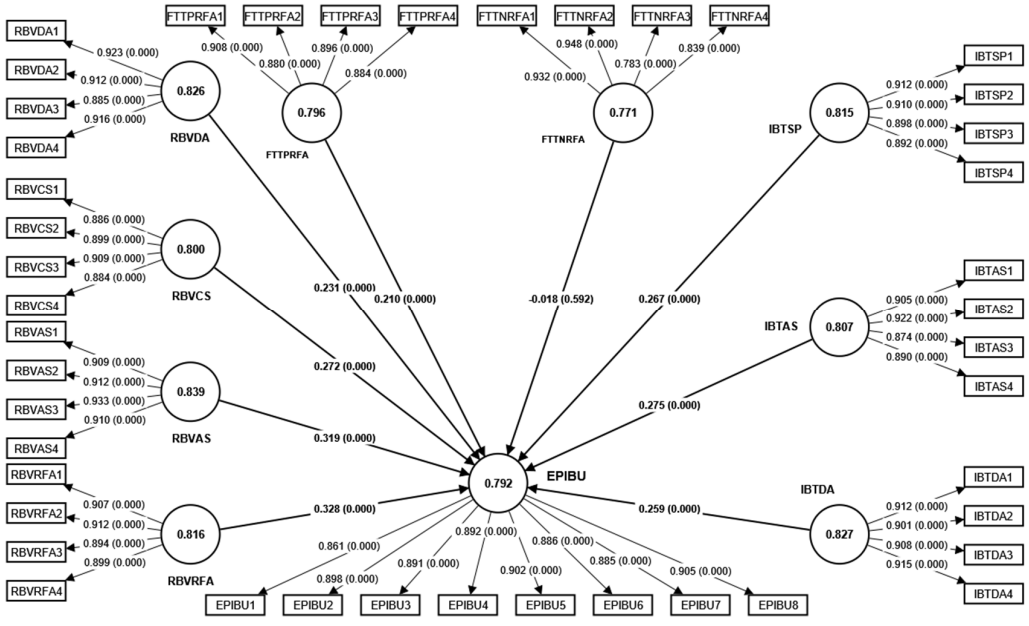

Fig. 5. Bootstrapping for Path Coefficients Analysis

4.5.7. H4b: IoT Improves Fraud Detection → EPIBU

The hypothesis presented in this study is strongly substantiated by empirical evidence indicating that the utilization of Internet of Things (IoT) technology has the potential to enhance Islamic banks' ability to identify instances of fraudulent activity. Consequently, this improvement in fraud detection capabilities is expected to favorably impact the overall performance of Islamic banks. This discovery is consistent with hypothesis H3 and contradicts the rationale presented in hypothesis H4a.

4.5.8. H5: IoT in Accordance with Sharia Principles (IBTSP) → EPIBU

The hypothesis is substantiated, suggesting that utilizing IoT technology to conform to Sharia standards positively impacts the Excel Performance of Islamic Banks in the United Arab Emirates. This phenomenon may be attributed to an increased level of confidence and trustworthiness among customers.

4.5.9. H6: IoT Enhances Risk-Sharing (IBTAS) → EPIBU

The hypothesis is found to be supported, indicating that the utilization of Internet of Things (IoT) technology, which promotes risk-sharing procedures, has a beneficial influence on the performance of Islamic banks. This might potentially enhance financial equity and bolster customer trust.

4.5.10. H7: IoT in Asset-Backed Finance (IBTDA) → EPIBU

The premise as mentioned earlier is substantiated by the evidence, indicating that the utilization of Internet of Things (IoT) applications in asset-backed finance contributes to improving transparency and operational efficiency within Islamic banks. Consequently, this enhancement has a favorable impact on the overall performance of these financial institutions.

In brief, the available empirical evidence predominantly substantiates the impact of IoT technologies on augmenting diverse aspects of Islamic banking performance in the United Arab Emirates (UAE), albeit with the notable exclusion of their potential to amplify fraudulent operations.

5. Discussion

The examination of the incorporation of Internet of Things (IoT) technology into different domains of Islamic Banking in the United Arab Emirates has revealed a complex and diverse environment. This discourse examined the notable impacts that Internet of Things (IoT) technology could potentially have in multiple domains, encompassing data analytics, customer services, automation systems, fraud detection, adherence to Sharia rules, risk-sharing mechanisms, and asset-backed finance.

The study showed that the implementation of IoT-Enabled Valuable Resources: Data Analytics (RBVDA) and IoT-Enabled Valuable Resources: Customer Services (RBVCS) had a noteworthy and favorable influence on the Excel Performance of Islamic Banks in the United Arab Emirates (EPIBU). The findings are in accordance with the fundamental principles of the Resource-Based View (RBV) paradigm, which posits that resources possessing value should play a role in attaining a durable competitive advantage. The findings suggest that the integration of valuable Internet of Things (IoT) enabled resources in the domains of data analytics and customer services can have a substantial positive impact on the performance of Islamic banks operating in the United Arab Emirates (UAE) market.

In the context of the Resource-Based View (RBV) framework, it is essential to highlight the impact of IoT-Enabled Rare Resources: Automation Systems (RBVAS) on the Excel Performance of Islamic Banks in the United Arab Emirates (EPIBU). The evidence supports the fundamental principles of the Resource-Based View (RBV) framework, which asserts that limited resources might provide a competitive edge. The impact of automation technology in boosting performance within the Islamic banking sector in the United Arab Emirates is of considerable importance, as evidenced by the supportive data supplied.

Furthermore, the study also identified the significance of IoT-Enabled Inimitable Resources: Recognize Fraudulent Activities (RBVRFA), which further supports the RBV model. Based on the resource-based view (RBV) perspective, resources that possess characteristics of being difficult to replicate are likely to confer a durable competitive advantage. In the context of EPIBU, the distinctive fraud detection capabilities facilitated by Internet of Things (IoT) technology have had a notable and positive impact. This implies that the performance of Islamic banks in the United Arab Emirates (UAE) may be positively influenced by their investments in distinctive and difficult-to-replicate Internet of Things (IoT) assets, namely in the domain of fraud detection. The findings support the initial proposition of the Resource-Based View (RBV) model, providing empirical support for the beneficial impact of valued and inimitable resources on organizational performance.

The findings of this study present varied outcomes on the application of the "Opportunity" component of the Fraud Triangle Theory to Islamic banks in the United Arab Emirates (UAE). The possibility for fraudulent behavior is posited by the original Fraud Triangle Theory, which suggests that the convergence of Opportunity, Pressure, and Rationalization contributes to this phenomenon. Hypothesis H4a indicated that adopting Internet of Things (IoT) technology may lead to an increase in fraudulent activities, consequently impacting the operational efficiency of Islamic banks in an adverse manner. Nevertheless, the study's empirical data did not support this hypothesis, indicating that the incorporation of IoT does not intrinsically enhance possibilities for fraudulent activities. As a result, this finding deviates from the initial theoretical proposition in this regard.

On the other hand, there was high support for Hypothesis H4b, which examined the utilization of Internet of Things (IoT) technology to identify fraudulent activity. The research revealed that integrating Internet of Things (IoT) capabilities can effectively mitigate the potential for fraudulent actions by augmenting the bank's capacity to identify and prevent fraudulent behaviors. This assertion is consistent with the Fraud Triangle Theory, which posits that the risk of fraud can be reduced by implementing technological protections that restrict chances for fraudulent activities. In this particular scenario, the incorporation of Internet of Things (IoT) technology demonstrated advantageous outcomes, so substantiating the corresponding feature of the initial theory that diminishing "Opportunity" can indeed yield a favorable influence on organizational performance.

The study outcomes provide strong empirical evidence in favor of specific components within the framework of Islamic Banking Theories. The findings of the study on Sharia Principles (IBTSP) demonstrate the favorable outcomes associated with incorporating Internet of Things (IoT) technology in a manner that conforms to Sharia law. This integration enhances the reputation and effectiveness of Islamic banks. The initial theories of Islamic banking suggest that the observance of Sharia norms is expected to positively impact performance. Similarly, in the context of Asset-Backed Finance: Data Analytics (IBTDA), the utilization of Internet of Things (IoT) technology has demonstrated the ability to improve transparency and operational efficiency, thereby exerting a favorable impact on the performance of banks. This aligns with the principles of Islamic Banking Theories, which promote transparent financial practices supported by tangible assets, aiming to enhance operational efficiency and foster client confidence. Hence, these empirical findings substantiate the first Islamic Banking Theories, illustrating the advantageous influence of adhering to Sharia principles and engaging in asset-backed financial operations facilitated by Internet of Things (IoT) technologies.

In a similar vein, it can be observed that the risk-sharing mechanism, referred to as the IoT-Enabled Risk-Sharing: Automation System (IBTAS), within the framework of Islamic Banking Theories (IBT), did have a substantial influence on the Enhanced Performance Indicator of Islamic Banking Units (EPIBU). This asserts that risk-sharing systems have the potential to bolster customer trust and improve financial performance.

6. Conclusion

The investigation into the incorporation of Internet of Things (IoT) technology in several sectors of Islamic Banking in the United Arab Emirates (UAE) yields valuable findings, confirming the influential impact of IoT in improving the operational efficiency of Islamic banks in the area. The empirical evidence strongly supports the notion that IoT-enabled resources have a significant positive effect in various domains, including data analytics, customer services, automation systems, and fraud detection. The lack of evidence supporting the expected negative impact of IoT on the rise of fraudulent activities strengthens the argument for the security measures associated with the integration of IoT technology in the banking industry. The study is following the Resource-Based View (RBV) framework, emphasizing the improvement in the Excel Performance of Islamic Banks in the UAE (EPIBU) by strategically integrating precious, rare, and inimitable Internet of Things (IoT)-enabled resources.

Moreover, the study's results closely correlate with the principles of Islamic Banking Theories, highlighting the significant impact of integrating the Internet of Things (IoT) with Sharia Principles. This integration has been found to improve asset-backed finance and risk-sharing mechanisms. The substantial empirical evidence supporting the significant hypotheses strengthens the belief in the positive influence of the Internet of Things (IoT) on Islamic banks in the United Arab Emirates (UAE). This evidence offers a strategic plan for these banks' performance to utilize technology to enhance different aspects of banking performance to effectively utilize technology to enhance different aspects of banking performance effectively. Furthermore, this approach is in line with the core principles of Islamic banking and ensures the implementation of strong measures to prevent fraudulent activities. This results in enhancing the overall efficiency, efficacy, and reputation of Islamic banks in the United Arab Emirates within the growing global banking environment.

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Appendix 1:

s	Questions
RBVDA1	To what extent do you concur with the notion that the integration of data analytics and the Internet of Things (IoT) yields useful resources within Islamic banks in the United Arab Emirates (UAE)?
RBVDA2	To what extent is there agreement regarding the improvement of banking decisions through the utilization of IoT-driven data analytics?
RBVDA3	To what extent do you concur with the proposition that the involvement of the Internet of Things (IoT) in data analytics engenders a useful customer relationship?
RBVDA4	To what degree do you concur with the proposition that the utilization of data analytics, facilitated by the Internet of Things (IoT), distinguishes the bank from its rivals?
RBVCS1	To what extent do you concur with the notion that the integration of Internet of Things (IoT) technology in customer services yields useful resources within Islamic banks in the United Arab Emirates (UAE)?
RBVCS2	To what extent do you concur with the notion that consumer services propelled by the Internet of Things (IoT) enhance the caliber of banking decisions?
RBVCS3	To what extent do you concur with the notion that the involvement of the Internet of Things (IoT) in customer services engenders a meaningful and advantageous customer relationship?
RBVCS4	To what extent do you concur with the notion that the utilization of client services, facilitated by the Internet of Things (IoT), distinguishes the bank from its rivals?
RBVAS1	To what extent do you concur with the notion that the implementation of automation systems facilitated by the Internet of Things (IoT) is infrequent within the Islamic banking sector of the United Arab Emirates (UAE)?
RBVAS2	To what extent do you concur with the notion that the scarcity of Internet of Things (IoT)-based automation systems confers a competitive advantage?
RBVAS3	To what extent is it agreeable that the incorporation of rare automation features enhances the operational efficiency of banks?
RBVAS4	To what extent do you concur with the notion that the presence of these infrequent automation attributes engenders obstacles for potential competitors seeking to enter the market?
IBTSP1	To what extent do you concur with the notion that Internet of Things (IoT) technology facilitate enhanced adherence to Sharia laws within the banking sector?
IBTSP2	To what extent do you concur with the notion that Internet of Things (IoT) enabled resources facilitate real-time monitoring of Sharia compliance?
IBTSP3	To what extent do you concur with the proposition that the Internet of Things (IoT) has a role in enhancing the efficacy of the Sharia auditing process?

IBTSP4	To what extent do you concur with the notion that Internet of Things (IoT) technology facilitate the development of Sharia-compliant financial innovations?
IBTAS1	To what degree do you concur with the notion that Internet of Things (IoT) technology facilitate enhanced risk-sharing mechanisms that align with the principles of Islamic banking?
IBTAS2	To what extent do you concur with the notion that the Internet of Things (IoT) offers enhanced prospects for transparent risk-sharing?
IBTAS3	To what extent do you concur with the notion that the Internet of Things (IoT) enables a greater degree of equitable distribution of risk among its participants?
IBTAS4	To what degree do you concur with the notion that risk assessment technologies based on the Internet of Things (IoT) exhibit efficacy in the context of Islamic risk-sharing contracts?
IBTDA1	To what extent do you concur with the notion that the Internet of Things (IoT) amplifies the capacity of financial institutions to partake in asset-backed financing?
IBTDA2	To what degree do you concur with the notion that Internet of Things (IoT) technologies contribute to the evaluation of assets in real-time for contracts within the realm of Islamic finance?
IBTDA3	To what degree do you concur with the notion that asset tracking facilitated by the Internet of Things (IoT) contributes to the effectiveness of asset-backed finance?
IBTDA4	To what degree do you concur with the notion that Internet of Things (IoT) technologies enhance the accessibility and transparency of asset-backed financing?
FTTNRFA1	To what extent do you concur with the notion that the implementation of Internet of Things (IoT) technologies in Islamic banks in the United Arab Emirates (UAE) introduces novel prospects for fraudulent endeavors?
FTTNRFA2	To what extent is it agreed that the incorporation of the Internet of Things (IoT) has facilitated the exploitation of weaknesses in the banking systems of Islamic banks in the United Arab Emirates (UAE) by fraudulent actors?
FTTNRFA3	To what degree do you concur with the notion that the integration of Internet of Things (IoT) technology has rendered the fraud detection procedure more intricate within Islamic banks in the United Arab Emirates (UAE)?
FTTNRFA4	To what extent do you concur with the notion that the implementation of Internet of Things (IoT) technology in the banking sector has unwittingly heightened the vulnerability of client data to fraudulent operations among Islamic banks in the United Arab Emirates (UAE)?
FTTPRFA1	To what extent is it agreeable that the implementation of IoT technologies in UAE Islamic banks may effectively mitigate fraudulent activities by means of improved detection mechanisms?
FTTPRFA2	To what extent is it agreeable that the implementation of Internet of Things (IoT) technology can augment the perceived risk for possible perpetrators of fraudulent activities within the financial systems of Islamic banks in the United Arab Emirates (UAE)?
FTTPRFA3	To what extent is it agreeable that the efficacy of IoT-enabled fraudulent activity detection systems is sufficient in lowering the danger of fraud within Islamic banks in the United Arab Emirates (UAE)?
FTTPRFA4	To what extent do you concur with the notion that the Internet of Things (IoT) has notably enhanced the expediency and precision of fraud detection among Islamic banks in the United Arab Emirates (UAE)?
EPIBU1	To what extent is it agreed that the integration of Internet of Things (IoT)-enabled Data Analytics (DA) has enhanced the overall performance of Islamic banks in the United Arab Emirates (UAE)?
EPIBU2	To what extent can it be argued that the integration of Internet of Things (IoT) technology in Customer Services (CS) has played a role in enhancing the dependability and credibility of Islamic banking services in the United Arab Emirates (UAE)?
EPIBU3	To what extent can it be argued that the implementation of unique automation systems enabled by the Internet of Things (IoT) has provided Islamic banks in the United Arab Emirates (UAE) with a competitive advantage?
EPIBU4	To what extent is there agreement regarding the impact of IoT-enabled fraud detection capabilities (RFA) on the enhancement of customer satisfaction and trust in Islamic banks in the United Arab Emirates (UAE)?
EPIBU5	To what degree do you concur with the notion that the utilization of Internet of Things (IoT) technology has resulted in enhanced adherence to Sharia rules, thus bolstering the general efficacy of Islamic financial institutions in the United Arab Emirates (UAE)?
EPIBU6	To what extent do you concur with the notion that the implementation of Internet of Things (IoT) technology has effectively enhanced risk-sharing procedures, thus bolstering the competitive advantage of Islamic banks inside the United Arab Emirates (UAE)?
EPIBU7	To what extent can it be argued that the implementation of Internet of Things (IoT) technologies has resulted in heightened levels of transparency and operational efficiency in asset-backed finance practices specifically within Islamic banks operating in the United Arab Emirates (UAE)?
EPIBU8	To what extent can it be argued that the implementation of Internet of Things (IoT) technologies has resulted in both detrimental and beneficial consequences in terms of fraud risks, ultimately yielding a favorable effect on the operational efficiency of Islamic banks in the United Arab Emirates (UAE)?