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# THE EFFECT OF CLOUD-BASED SOFTWARE AND REAL-TIME DATA ON OPERATIONAL EFFICIENCY AND COST COMPETITIVENESS IN JORDANIAN BANKS

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**Abstract**
Banks in Jordan are under increasing pressure to operate more modernly as digital demands increase. The study explores the impact of cloud-based software and real-time data on operational efficiency and cost competitiveness, and how cybersecurity efficiency moderates the role of cloud adoption in competitive advantage. The study employed a qualitative, conceptual approach that is based on a systematic literature review and analyzes publications dating back to 2011-2024. The results indicate that cloud systems improve operational performance and cost reduction, and cybersecurity complements these advantages to a significant extent. The study recommends that banks invest in scalable ICT infrastructure and cybersecurity to support digital strategies. Theoretical implications bring the Resource-Based View forth by highlighting cybersecurity as a strategic enabler. This study offers efficient recommendations for the digitalization of Jordanian banks and a new framework that is contextualized to the developing economies.

***Keywords****: cloud-based software, real-time data, operational efficiency, cost competitiveness, Jordanian banks.*

## Introduction

In a world where digital transformation is not an option, but an inevitable occurrence, companies are embracing new technologies at a very fast rate in order to compete, to be efficient and relevant. The banking industry, especially, has been overly reliant on the latest technologies that simplify the processes, enhance customer relations, and help to save money. In this respect, the power of cloud-based software and real-time data has become a source of operational excellence and financial sustainability. Banks' capacity to handle large amounts of information, to react quickly to the market and to control the operational expenditure effectively has become a success ingredient in the modern business environment that is highly dynamic. Similar to most other banks in the region, Jordanian banks are under enormous pressure to fit in such trends in the name of modernizing their infrastructure, providing innovative services and keeping abreast with the changing demands of techno-savvy consumers.

Cloud computing, a paradigm shift in information technology, is scalable, flexible and cost effective as it enables businesses to use shared pool of configurable resources on the internet. The emergence of cloud accounting systems has upended the nature of the financial data processing, storage, and analysis. Mell and Grance (2011) identify five fundamental characteristics that are used to describe a cloud computing: on-demand self-service, wide network access, resource pooling, rapid elasticity and measured service. Such characteristics are what render cloud-based solutions not only efficient but also flexible to the changing demands of the modern enterprise. Cloud computing is used in the banking industry to access real-time information and financial

decision-making in addition to improving the agility of the operations (Shivararajappa, 2024). Cloud platform allows banks to combine multiple tasks, including accounting and customer service, compliance or risk management, which makes them less dependent on the on-premises infrastructure, leading to a decrease in capital spending or even cost-effectiveness (Grubisic, 2014).

The competitive advantage acquired due to the use of the cloud is not only related to its technological capabilities but also due to its capability of transforming the way banking was done in the past. Banks no longer have to spend much time and resources on IT personnel, physical storage, and time-intensive software updates (Ionescu et al., 2013). An example of such application is the quicker decision-making process and increased precision of reporting because of access to financial records in real-time, which is essential in a highly regulated business such as banking (Asatiani et al., 2019). In addition, cloud platforms are capable of providing better inter-departmental collaboration and inter-branch collaboration: stakeholders can be provided with current information at the same time. These are major improvements that can be made in the operations and make the environment in which the cost competitiveness becomes attainable and sustainable.

The functionality of the cloud systems is additionally improved through the incorporation of real-time data analytics which offer actionable insights regarding the customer conduct, market patterns, and in-house performance metrics. Cloud platforms incorporate artificial intelligence (AI), big data, and blockchain technologies that can predict analytics, detect fraud, and execute smart contracts (Han et al., 2023; Antwi et al., 2024). As an example, AI can enhance cash flow predictions, and personalized customer services, whereas blockchain keeps data integrity in decentralized, unchangeable registries. These improvements do not only automate the processes but also bring in a greater level of transparency and accountability in their financial reporting.

Nevertheless, even with all the merits, the use of cloud accounting in banking industry is not without difficulties. Issues regarding data security, adherence to regulatory frameworks, and the preparedness of infrastructures, remain a barrier to mainstream adoption. According to Ahmed et al. (2017), companies have to work across multifaceted legal systems and maintain strong cybersecurity measures to safeguard sensitive financial data. This especially applies to Jordan, where there is an internal resistance in many banks to the digital change, lack of adequate IT governance systems and there are overlapping roles and poor accountability systems. According to Almomani et al. (2021), the efficiency of cybersecurity is an essential variable that can adjust the correlation between the use of cloud technology and the competitive advantage, so that the technological benefits are not neutralized by the security risks.

The banking industry in Jordan has also experienced a major technological change in the recent past especially on the implementation of cloud computing to address the increasing expectations in efficiency and innovation. Nonetheless, there is still a scarcity of literature on the particular effect of cloud-based software and real-time data on the operational efficiency and the cost competitiveness of Jordanian banks. Similar benefits of cloud computing have been studied in the past (Dimitriu and Matei, 2015; Christauskas and Miseviciene, 2012), although not in the context of developing economies that have vastly different digital infrastructure and regulatory settings than those of the West. In addition, there are limited empirical studies that center on the mediating effect of cybersecurity effectiveness in this relationship. This paper will address this gap by exploring how cloud-based software and real-time data impact the productivity and cost efficiency of Jordanian banks. It also seeks to figure out how cybersecurity measure are able to

boost or limit these impacts. In such a way, the research provides useful information to the policymakers, IT managers, and financial institutions who are interested in the modernization of operations and protecting sensitive data. It adds to the body of knowledge by putting into context the technological adoption in the Jordanian banking system and provides a framework that ties cloud computing, cybersecurity and competitive strategy.

**Research Questions**

1. To what extent do cloud-based software and real-time data enhance operational efficiency and cost competitiveness in Jordanian banks?
2. Does cybersecurity efficiency significantly moderate the relationship between cloud accounting adoption and competitive advantage in Jordanian banks?

## Literature Review

### Cloud-Based Software and Real-Time Data in Enhancing Operational Efficiency and Cost Competitiveness in Jordanian Banks

Modern banking systems are changing their operational environment at a rapid pace with cloud-based software and real-time information, which have enhanced operational efficiency, reduced operational costs, and provided quicker decision-making. Considering the situation in Jordanian banks, where digital transformation is being implemented according to the national strategies, such as the Jordan Vision 2025, cloud accounting becomes one of the key drivers of operational efficiency and cost competitiveness. Cloud accounting is the process of storing financial information on remote servers that are available online and allow banks to improve their operations and minimize the use of expensive physical infrastructure (Ahmed, 2020). Such a shift towards cloud-based systems enables banks to view, process, and update financial records in real time and is much more responsive and minimizes the errors introduced by manual processes (Christauskas & Miseviciene, 2012). In addition, by incorporating data analytics in real-time in cloud environments, financial institutions can monitor the trends in the market, the behavior of customers, and the activities within the organization more precisely, which will enable them to make better-informed decisions (Shivarajappa, 2024).

The transition to cloud accounting in Jordan has been slow because of the infrastructural and regulatory barriers but the performance effects have been significant. The effectiveness of the cloud-based accounting is based on the fact that a variety of accounting services are unified under one convenient platform, which includes payroll, budgeting, tax reporting, and compliance. Cloud accounting systems provide the ability of automation and simplification of the financial workflow, thereby being converted into operational redundancy decrease and productivity, as it is noted by Khanom (2017). This is especially necessary in a banking industry where time sensitive activities are vital. Cloud systems also provide error correction and real-time synchronization capabilities, which are not available in traditional accounting systems, as they need physical backups and manual data entry, which improves the accuracy and speed (Gou & Deng, 2023). In addition, cloud systems offer scalability infrastructure whereby banks can be able to scale IT resources in response to business requirements without massive capital expenditure commitments (Ping and Xuefeng, 2011). Cost competitiveness is largely contributed to by this scalability, which helps the banks to neither incur high upfront costs of infrastructure but rather follow a pay-as-you-go model of computing resources (Berman et al., 2012).

This is another important aspect that should be seamlessly integrated with other banking like customer relationship management (CRM) and risk management systems. This interoperability

facilitates efficiency within the departments since it centralizes access to real-time financial and operational information. Cloud-based dashboards enable the bank executives and auditors to observe the performance indicators in real-time and in various locations, hence enhancing decision-making and supervision (Christauskas and Miseviciene, 2012). Moreover, Gou and Deng (2023) point out that cloud networks have the ability to serve an indefinite number of users, which is why they are the most suitable in organizations that have branches in several locations and need to dynamically assign users. To summarize, the efficiency of operations would greatly increase due to the implementation of cloud-based software and real-time data, which would automate routine processes, enhance the accuracy of data, and decrease the need to maintain the IT. At the same time, it enables cost competitiveness by reducing the cost of infrastructure and scalability of financial services- a combination that is becoming increasingly vital to the success of Jordanian banks in a competitive and digitally-oriented environment.

**The Moderating Role of Cybersecurity Efficiency in the Cloud Accounting–Competitive Advantage Relationship**

Although cloud accounting can be of great benefit in terms of operational and financial benefits, the ability to enhance competitive advantage depends greatly on the effectiveness of the cybersecurity policies. The efficiency of cybersecurity is a moderating variable that will or will not allow the advantages of the implementation of clouds to be experienced in Jordanian banks, where sensitive financial information is handled digitally and accessed remotely. Cybersecurity is the system of practices, technology, and procedures that aim to prevent illegal access, attacks, or damage to computer systems and information (Abdel-Gawad, 2020). Due to the storage of data on third-party servers in the cloud-based systems, the anxiety about data breaches, compliance with regulations, and vulnerability of the system is particularly high in the banking industry (Al-Samhan, 2020). Subsequently, cybersecurity is not merely a technical need but an enabling strategy that secures confidence and guarantees digital transformations in banking sustainability.

Over the past few years, the threats posed by cyber threats have grown significantly because of the global interdependence and the high prevalence of the use of digital platforms. Cyber-attacks are ranked among the top threats to the financial system these days, and they have national security and economic stability implications (Abdel-Gawad, 2020). Since cloud technologies are being used by Jordanian banks, the practice of cybersecurity should be solid enough to offer data integrity, confidentiality and availability. The possible benefits of cloud systems, like real-time access, scalability of operations, and low costs, would be undermined without effective cyber controls. Almomani et al. (2021) noted that successful cybersecurity builds trust in cloud systems, therefore, supporting its presence in the establishment of competitive advantage. This is especially significant in the preservation of customer loyalty, regulatory adherence, and anti-financial fraud.

The efficiency of cybersecurity also determines the ability of the banks to scale their operations with regard to the cloud. Provided by Khalifa (2019), cybersecurity implies not just the use of technology but also governance systems that adjust the digital strategies to the organizational objectives. This two-fold attention is essential in risk mitigation and in ensuring that the move to cloud computing does not present new weaknesses to banks. As an illustration, the adoption of multi-layered security measures, such as the encryption of data, firewalls, and intrusion detection systems, will allow Jordanian banks to have a safe cloud infrastructure (Steingartner et al., 2021). Additionally, the preparedness to counter cybersecurity attacks promotes resilience amid disruptions, where banks continue to provide their services and maintain their competitive advantages.

Cybersecurity also plays a moderating role in strategic alignment. Cybersecurity policies are also part of the competitive advantage drivers as they assist in improved risk management and decision-making when incorporated into cloud adoption strategies. In this regard, cybersecurity is not only a security-related feature but also an additional value-added element enhancing the advantages of cloud technologies (Khalifa, 2019). As banks in the Jordanian context are facing the challenges of both technological change and compliance with regulatory requirements, cybersecurity productivity is needed to guarantee that cloud accounting can make a significant contribution to the competitive positioning. To sum up, the operational efficiency and cost competitiveness of cloud-based software and real-time data is substantially supported, but the cybersecurity infrastructure strength is the one that identifies the sustainability and strategic effectiveness of such digital initiatives in Jordanian banks.

## Methodology

### Research Design

The research design was a qualitative, conceptual design based on a comprehensive systematic literature review. The study sought to develop a conceptual framework that explores how the ICT infrastructure contributes to competitive advantage using the use of cloud-based accounting systems in Jordanian banks. The paper also examined the moderating role of cybersecurity efficiency in this relationship. The design suits well to study given theories, frameworks, and available empirical information to integrate the information and develop new theoretical relations between given constructs.

### Sample of the Study

This literature-based research used peer-reviewed journal articles, professional reports, and policy documents concerning ICT infrastructure, cloud accounting, cybersecurity, and competitive advantage in the banking sector as the population to use. The sources were chosen within credible academic databases such as Scopus, ScienceDirect, SpringerLink and Google Scholar.

Inclusion criteria required that sources:

- Were published between 2011 and 2024,
- Addressed cloud computing, ICT, and cybersecurity in the banking or financial sector,
- Focused on themes of efficiency, innovation, cost-competitiveness, or strategic advantage, and
- Were published in English.

The exclusion criteria were outdated technical papers and unrelated industry reports that did not contribute to the theoretical or conceptual contribution.

### Data Collection Procedure

To be consistent and comprehensive, a structured literature search protocol was used. Such keywords included cloud accounting, ICT infrastructure, competitive advantage in banking, cybersecurity efficiency, and digital transformation in banks in different combinations. The documents that were chosen were thoroughly reviewed, annotated and coded based on the relevance to the research questions and conceptual model development.

The final review contained the academic literature and the institutional reports. These sources were used as the basis of deriving repeated themes, associations among variables and background information that would be used in relation to the banks in Jordan.

**Data Analysis**

The gathered data were measured through thematic synthesis and conceptual mapping. The prominent concepts of the literature were summarized into themes that were consistent with constructs of the study:

1. Banking ICT infrastructure,
2. Applications and cloud accounting capabilities,
3. Indicators of competitive advantage (e.g. cost efficiency, agility, innovation) and Cybersecurity as a moderating capability.

A conceptual model was based on these themes and refined to explain how ICT infrastructure, as a part of cloud-based systems, can positively contribute to competitiveness, and how the efficiency of cybersecurity can affect this relationship.

**Results**

**ICT Infrastructure in Banking**

ICT infrastructure in banking is not just a backbone in this context of digital transformation, but it forms the basis of modern financial services delivery. Banks both in developed and developing economies, such as Jordan, are under the influence of well-established ICT systems to handle transactions and store sensitive financial information, to interact with customers and, more and more importantly, to underpin cloud-based services. Banking ICT infrastructure comprises high-speed internet, safe data storage, organizational software systems, cloud computing services, firewalls, authentication measures, and integrated financial technologies. As banks move toward adopting cloud accounting solutions, the role of ICT becomes even more pronounced. Ahmed (2020) states that cloud systems require a robust ICT infrastructure to perform effectively and offer real-time access to financial information and the ability to be connected with the wider enterprise systems.

Jordan banking industry, which is in tandem with the Jordan vision 2025, is in the process of incorporating ICT in order to make its financial services to be updated and competitive both regionally and internationally. Legacy systems have long limited responsiveness and scalability; however, new investments in ICT infrastructure have opened opportunities for agile service delivery and financial inclusion. As Al-Naqdi (2020) notes, this shift is largely driven by the need to improve operational continuity, security, and customer-centric services. ICT systems would also be needed to support advanced analytics, international financial standards compliance, and integrative auxiliary banking functions like risk management systems and customer relationship management systems.

**Cloud Accounting Functionalities and Applications**

Cloud accounting is a financial technology advancement, as it has become possible with good ICT. It gives the banking institutions a chance to operate their financial transactions and records using the capabilities of web-based platforms on remote servers. Christauskas and Miseviciene (2012) point out that cloud accounting solutions have been designed to support the following features: real-time processing, multi-user support, remote access, automatic backup, and easy integration with other digital applications. These capabilities decrease dependency on on-premise hardware and provide cost flexibility in financial processes. According to Ping and Xuefeng (2011), cloud accounting is the virtual accounting system facilitated by cloud computing, which is provided so whereby one can access accounting services from any device which is connected to the internet.

Cloud accounting systems such as Xero, QuickBooks Online, and Sage are the new generation accounting systems that have features of dashboards, payroll processing, inventory management, bank reconciliations, and automated reporting; hence, they are very effective in handling bank operations. In the case of Jordanian banks, these systems, as Ma et al. (2021) describe, not only simplify financial activity but also make accessible information in time, which contributes to strategic decision-making. According to Jaiswal and Jaiswal (2019), cloud accounting eases the management of multi-currency and multi-entity operations that are useful in international banking operations.

Besides, new intelligent automation in cloud accounting systems, the use of AI to detect anomalies, predictive analytics, and real-time dashboards, improves internal control and governance. These tools guarantee accuracy in reporting and decrease manual activity, which, as Qunying (2019) claims, is a transition to old-fashioned accounting to cloud-enhanced efficiency.

**Competitive Advantage Indicators (e.g., Cost Efficiency, Agility, Innovation), and Cybersecurity as a Moderating Capability**

In the banking industry, competitive advantage is normally evaluated using various indicators, among which are cost efficiency, flexibility and ability to innovate. Cost efficiency is the capacity to minimize the operational expense without compromising or deteriorating the quality of the service. Cloud accounting also makes it cost-effective by cutting down the IT infrastructure expenses, decreasing the maintenance fees, and minimizing the necessity to have big in-house accounting units (Abdel Sadiq, 2019). A shift to pay-per-use models, as noted by Rashid and Chaturvedi (2019) will give banks in Jordan a more considered resource allocation and will enable them to expand or retrench operations at any given time.

Agility—defined as the ability to quickly respond to market changes—is another key advantage of cloud-based systems. Real-time access to financial data enables faster decision-making and improves responsiveness to regulatory or customer demands. The integration capabilities of cloud accounting with CRM, compliance, and analytics platforms make it easier for banks to pivot operations when required (Abdel-Gawad, 2020).

The third pillar of competitive advantage is innovation. Cloud accounting systems can be innovative because they unlock financial and human resources and redirect them toward research and development, customer service, or digital transformation (Al Habashneh et al., 2023). As banks become more automated in carrying out routine tasks, they are able to invest in new resources in the creation of new financial products and services.

Cybersecurity has a modulating role that is critical in all three indicators. The basis of trust is the cloud-based operations based on a secure digital environment. Al-Samhan (2020) and Abdel-Gawad (2020) claim that cybersecurity ensures data integrity, protection against unauthorized entry, and contributes to compliance requirements. The cybersecurity role is not peripheral but core in the age where cyber threats are listed among the top risks in the world (Al-Abedallat,2017). Effective cybersecurity systems maximize the use of clouds in maintaining continuity, fraud prevention and customer confidence.

**Impact of Cloud-Based Software and Real-Time Data on Operational Efficiency and Cost Competitiveness in Jordanian Banks**

The use of cloud-based accounting software deployed as cloud-based and provides real-time data functionalities, can make the operations of the banks in Jordan competitive in relation to their efficiency and affordable prices. Cloud systems automate different aspects of invoicing,

reconciling, and reporting, which reduces the number of errors committed by people and improves the accuracy of the data (Thakker and Japee, 2023). The automation saves on financial operations turnaround time and improves internal auditing and compliance operations.

The immediate access to the data enables strategic financial predictions and real-time monitoring of the performance. Managers will be able to produce financial reports in real time, evaluate their liquidity position and change operations as necessary. Suicimezov and Matei (2012) suggest that this capability to take action on the basis of up-to-date information provides a competitive advantage to the banks in volatile financial contexts.

The banks in Jordan are used to traditional systems, and it is not that easy to implement uniformity with cloud accounting. Nevertheless, bigger organizations started to achieve high-cost reductions and performance enhancements by using cloud-based systems (Al Habashneh et al., 2023). Such systems minimize infrastructure overheads, including servers and in-house maintenance teams, and also reposition the accounting role more to strategic functions.

According to Government Digital Transformation (2025), the banking sector in Jordan is slowly adapting to the global digital standards because of policy-led initiatives and economic drivers. The adoption of cloud makes the work easier and also enhances financial inclusion, where the banks are able to provide services to even those areas that have not been well served by the banks using mobile and web-based systems.

**Moderating Role of Cybersecurity Efficiency in the Relationship Between Cloud Accounting Adoption and Competitive Advantage in Jordanian Banks**

The mediating factor of the efficiency of cybersecurity is central to the interpretation of how the adoption of cloud accounting can lead to a competitive advantage for the banks in Jordan. And lack of adequate cybersecurity can outweigh the benefits of cloud systems, real-time access, saving costs, scalability, etc., to risks, including data breaches, service failures, and reputational damage (Ahmed, 2020).

Cybersecurity guarantees that financial information held and sent through the cloud systems is secure, and hence the form of assurance to the customers, regulators and stakeholders. Khalifa (2019) highlights that cybersecurity includes not only the protection against the outside environment but also the ability to guarantee the continuation of activities, adherence to legal regulations, and credibility of the institution. Jordanian banks can establish a safe environment that could enhance the success of their digital transformation through the adoption of governance models that align cybersecurity strategies with the business objectives (Steingartner et al., 2021).

In that regard, cybersecurity can be viewed as a moderator, i.e. it does not directly affect competitive advantage; however, it enhances the positive impact of cloud accounting on it.

Highly efficient cybersecurity banks have less intrusion, a better data reliability level, less fraud potential, and an overall competitive performance. Contrary to this, banks with poor cybersecurity may be impacted to the extent of creating inefficiencies and losing money and customer confidence.

Implementation of cybersecurity will also enable it to comply with international data protection regulations such as GDPR and ISO/IEC 27001, which is increasingly becoming essential to cross-border banks in Jordan. Abdel-Sadiq (2020) and Al-Khaled (2018) explain that cybersecurity is related to national security and financial stability, particularly in financial institutions. A bank with great capability to withstand cyber threats will find it easier to lure customers, form partnerships, and retain a consistent market stance. Thus, cybersecurity should not be considered an optional investment in order to maximize the returns of cloud accounting adoption. The better

the cybersecurity infrastructure employed by the bank, the more chances it has to transform the cloud-based capabilities into real competitive advantages.

## Discussion

### The Extent to Which Cloud-Based Software and Real-Time Data Enhance Operational Efficiency and Cost Competitiveness in Jordanian Banks

The research results indicate that a cloud-based software solution and real-time data play a critical role in improving the operational efficiency and cost competitiveness among banks in Jordan. As Ahmed (2020) emphasizes, accounting implemented on the cloud enables many banking tasks, such as payroll, budgeting, and reporting, thus enabling the work with financial data in real-time and allowing its processing. This real-time feature not only decreases the number of mistakes made by manual means but also enhances the speed of financial predictions and decision-making (Christauskas and Miseviciene, 2012; Suicimezov and Matei, 2012). These findings also coincide with the Resource-Based View (Barney, 1991; Wernerfelt, 1984) that highlights that technology-based resources, such as cloud platforms, may act as strategic resources, whereby banks become able to achieve sustained competitive advantages due to improved internal capabilities.

Operatively, cloud-based accounting eliminates unnecessary processes and can be automated, thereby decreasing the occurrence of human error and improving the quality of the information (Thakker & Japee, 2023). It is especially applicable to the case of Jordan because traditionally, the sector needed to use outdated legacy systems that were unable to interconnect and grow (Al-Naqdi, 2020). Also, cloud systems promote agility by supporting central access to data between different departments that allow banks to respond rapidly to regulatory requirements or to the requirements of customers (Gou and Deng, 2023; Shivarajappa, 2024). Such improvements are indicative of what is outlined by Ping and Xuefeng (2011) and Grubisic (2014) as the transition of heavy financial systems based on hardware to lean and virtualized architecture that allows banks to scale services at lower costs of the infrastructure.

Cost competitiveness is also enhanced by minimizing capital costs on physical IT infrastructure as the banks shift towards pay-as-you-go cloud services (Berman et al., 2012). This enables Jordanian banks to invest finances more strategically and adaptively, especially in the fluctuating economic situation (Rashid and Chaturvedi, 2019). Financial performance can be improved by maximizing expenditure and operations, and this is inherent in the strategic objectives of Jordan Vision 2025 and the RBV itself prioritizing maximization of resources (Penrose, 1959; Porter, 1985).

Therefore, based on the literature and in the framework of the RBV, the study draws the conclusion that the combination of cloud software and real-time data not only streamlines banking processes but also promotes increased competitiveness by ensuring efficiency in operations and financial sustainability.

### The Moderating Role of Cybersecurity Efficiency in the Relationship Between Cloud Accounting and Competitive Advantage in Jordanian Banks

The study shows that cybersecurity efficiency is a major moderator in improving the positive relationship between cloud accounting adoption and competitive advantage among Jordanian banks. Though cloud systems are rightful to cost-saving and real-time benefits, the mentioned benefits are conditional on the presence of well-built cybersecurity infrastructures. Almomani et al. (2021) state that in the absence of proper cybersecurity practices, the risk of breaches, loss of data, and disruption of services increases, which may compromise the count of trust and

operational stability that cloud systems are supposed to guarantee. Thus, cybersecurity is not a predictive factor of competitive advantage itself but a vital capacity that increases the positive impact of digital transformation.

The theoretical view provided by Khalifa (2019) underpins this moderating effect because cybersecurity can be treated as a strategic enabler that fits organizational digital objectives to the risk mitigation objectives. The efficiency of cybersecurity guarantees adherence to national and international data regulations (Abdel Sadiq, 2020), which is crucial to gain the trust of customers and credibility in institutions in the highly regulated banking market. Furthermore, according to Al-Samhan (2020), the resilience of the operations is heightened when proactive cybersecurity systems are in place to suppress fraud and access to uninterrupted access to key financial information stored in the cloud.

Another critical finding related to the efficiency of banks in the domain of cybersecurity is that such banks can better enhance their capacity to scale up cloud services without jeopardizing the integrity of the systems. This corresponds to the theoretical framework that emerged in the course of the literature review, which frames cybersecurity as an intervening variable between the ICT-enabling cloud adoption and the strategic outcomes of agility and innovation (Steingartner et al., 2021; Al Habashneh et al., 2023). By integrating cybersecurity at the level of their digital governance frameworks, Jordanian banks will be in a better position to enhance responsiveness to external threats against maintaining the integrity of cloud-based operations, a synergy that directly contributes to sustainable competitive advantage.

In conclusion, the research confirms that the effect of cloud accounting on the competitive advantage is moderately high due to the efficacy of cybersecurity. The results strengthen the thesis that the process of technological innovation should be supported with strategic risk management systems that would guarantee that the process of digital transformation will result in observable organizational gains. It also expands the use of the Resource-Based View by demonstrating that intangible capabilities, including cybersecurity preparedness, can add value to the value of tangible technological resources, namely cloud infrastructure.

## Conclusion

This study aimed to investigate the impact of cloud-based software and real-time data on the efficiency of operations and the cost competitiveness of the banks in Jordan, and assess the moderating impact of the efficiency of cybersecurity on the relationships between utilizing the cloud accounting software and the competitive advantage. The research provides a contextual view of the operation of these technological innovations in the specific banking sector in Jordan in response to the increasing demand in the financial sector to be transformed digitally.

It utilized a qualitative, conceptual research design as it was based on the systematic review of literature obtained with the help of reputable academic sources like Scopus, ScienceDirect, and SpringerLink. The literature review involved peer-reviewed articles, institutional reports and policy documents that were published within the period of 2013-2024. Inclusion criteria were concentrated on studies touching on cloud computing, ICT infrastructure, cybersecurity and competitive advantage in the banking industry.

The significant results of the research prove that cloud-based software and real-time data can contribute significantly to the efficiency of operations through automatization of accounting and manual errors reduction, as well as quick financial forecasting (Ahmed, 2020; Christauskas & Miseviciene, 2012; Thakker & Japee, 2023). Real-time data access allows increasing the agility

of financial decision-making and compliance with regulatory requirements (Shivarajappa, 2024), and cloud infrastructure helps to achieve cost competitiveness by minimizing capital investment in IT and the promotion of scalable and pay-as-you-go service models (Berman et al., 2012; Rashid and Chaturvedi, 2019). The findings confirm the Resource-Based View (RBV), which postulates that the strategic utilization of valuable, rare and non-substitutable resources contributes to the development of competitive advantage (Barney, 1991; Penrose, 1959).

A second critical finding is the moderating role of cybersecurity efficiency. The article reveals that the positive effects of a shift to the cloud can be facilitated by the implementation of efficient cybersecurity scenarios that ensure the integrity of data, eradicate breaches, and foster customer confidence among the banks (Almomani et al., 2021; Abdel-Gawad, 2020). Cybersecurity does not produce a competitive advantage directly but contributes to the reliability and scalability of cloud systems, which is consistent with the point made by Khalifa (2019), according to which cybersecurity is a strategic enabler in the digital transformation. It is a connection to the RBV that shows how intangible resources, including cybersecurity preparedness, may enhance the worth of the physical technological capabilities.

The theoretical ramifications of such results are the necessity to see cybersecurity not as a discrete risk-reduction instrument but as a mediator that preconditions the achievement of cloud accounting in promoting a competitive advantage. In practice, the research encourages Jordanian banks to invest in ICT infrastructures, change their legacy systems, as well as integrate cybersecurity measures into their digital strategies to make them resilient and sustainable.

In spite of these contributions, the study has limitations in that it is conceptual and it has used secondary data. The lack of primary data limits the extent of generalizing the results on all banks in Jordan. Also, there is no longitudinal analysis to provide information about long-term performance change after the adoption of the cloud.

The future studies must use quantitative, empirical, or mixed-method designs to find out these relationships in reality. This field can be further enlightened through studies that are able to capture changes over time and compare regional practices. Moreover, the analysis of regulatory and organizational obstacles may provide information about the issues of digital transformation.

The novelty of this study is that it combines cloud accounting, real-time data, and cybersecurity as part of a conceptual model specific to the Jordanian banking industry, a developing economy, where such comprehensive analyses are still not widespread. It adds to the RBV theoretically and to the banking innovation strategies in Jordan and other markets, in general.

**Limitations of the Study**

Although this study offers valuable insights related to the importance of cloud-based software, real-time information, and cybersecurity effectiveness in terms of operational efficiency and competitive edge in Jordanian banks, it is necessary to mention several limitations. First, the study incorporated a qualitative conceptual design based on literature and not an investigation. Consequently, the results are based on the already published research and theoretical views instead of the initial information recorded by banking institutions. This restricts the generalization of the results to the operational environments of the individual banks within Jordan.

Second, the research is constrained by both the accessibility and the breadth of the published literature, especially as far as the Jordanian situation is concerned. The majority of the current literature on cloud computing and cybersecurity has been in developed economies or banks in general regional aspects. There might therefore be institutional, cultural or regulatory dynamics in Jordan that are not adequately reflected in this review.

Third, the research failed to conduct a comparative or longitudinal study to quantify the performance changes before and after cloud adoption. In its absence, it is difficult to evaluate how cloud accounting and maturity in cybersecurity affect competitiveness over the long term.

**Recommendations for Future Research**

To address these limitations, the future study should employ a quantitative or mixed-methodology empirical design, which will require the collection of primary data among the IT managers, cybersecurity experts and executives of Jordanian banks. This will allow more precise quantification of cloud adoption results and cybersecurity performance and can be used to test the proposed conceptual model in real-life scenarios.

Moreover, longitudinal research is recommended to monitor the way the process of integration of cloud-based technologies changes with time and how cybersecurity practices evolve with the emergence of new threats. A comparative study between Jordan and other developing economies would also be of assistance in putting the findings in perspective and determining the best practices in the region.

Lastly, researchers need to investigate the financial, human, and regulatory constraints that influence cloud adoption at the organizational level and small- and medium-sized banks in particular that might not be as well-equipped as larger institutions. Research into the relationship between digital literacy, institutional preparedness and national policy regimes relating to the rate and outcome of digital change would further develop this area.

**Implications**

**Theoretical Implications**

The results of the given study are an extension of the Resource-Based View (RBV) since they managed to show that technological capabilities (like cloud accounting) and intangible assets (like having efficient cybersecurity) should coexist to generate sustainable competitive advantage in the banking industry. Although cloud-based solutions are efficient and more economical, they can be maximally effective only in the case of effective cybersecurity governance (Khalifa, 2019; Almomani et al., 2021). This supports the notion that the digital resources should be scarce, unique and non-renewable, and safeguarding them should be done in order to maintain their competitive edge (Barney, 1991; Penrose, 1959).

Also, the research suggests a combined conceptual framework that places cybersecurity not only as a risk-reduction role but as a moderator of value-generation. The view discusses the theoretical aspect of the topic by proposing that competitive advantage in digital banking does not merely depend on technological adoption, but on the orchestration of technological and governance capacities.

**Practical Implications for Banks and Policymakers**

In the case of Jordanian banks, the research observes that these banks are urgently required to invest in a secure and scalable ICT infrastructure to facilitate the adoption of cloud-based accounting systems. Banks ought to focus on the shift of old systems to the cloud platform that will make it easier to exchange data in real time and make decisions. In addition, they need to institute cybersecurity structures in all levels of the digital transformation to reduce risks and ensure corporate survival.

Policymaking In terms of policies, regulators and the state have to come up with explicit policies and incentives on digital transformation, especially in matters of data protection regulations and cybersecurity preparedness. The competitiveness of the banking sector can be accelerated by

strengthening the national cyber laws, enhancing funding to digital training programs, and encouraging the use of clouds in the banking sector through public-private collaborations.
Lastly, this study suggests that cybersecurity training and the development of leaders should be considered a priority. Cyber risk is not merely a technical challenge; it is also a cultural and structural transformation, which needs to be aware of and addressed by the top management. Those institutions which take the initiative to align their digital strategies with effective cybersecurity policies will find it easier to be on the frontline in a more digital financial environment.

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