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Cloud computing-based banking and management control

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Abstract

It is well known that firms nowadays operate in a VUCA (volatile, uncertain, complex and ambiguous) environment urging them to obtain a lasting competitive advantage sourced mainly from a technological innovation in order to ensure their prosperity and sustainability. New technologies play a pivotal role as they offer the potential of increasing efficiency, improving communication, streamlining business processes for more productivity and collaboration, from this perspective, cloud computing is a state-of-the-art technology that can provide valuable insights and support decision-making. It can have a significant impact on how businesses operate and compete in today's fast paced and ever-changing business environment which makes it a source of competitive advantage, yet it raises concerns over data security and cybersecurity as well as it alters the day-to-day operational tasks arising from management control practices.

In this paper we briefly review the literature in order to address and examine the impact of cloud computing technology in the banking sector on management control.

Keywords: Management control; Cloud computing; cloud computing-based banking; Digitalization; Performance

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1. Introduction

Due to internalization and globalization of markets firms nowadays face various new challenges as the evolution of information and communication technologies has brought distances closer, thus reducing the world to a larger market in which information circulates rapidly and easily which made digital transformation nowadays the main concern of companies. Indeed, the use of tools based on new technologies, such as Big Data, artificial intelligence, dematerialized information systems, cloud computing and the Internet of Things, in order to offer innovative products and services has become a necessity to face the competition. They have the potential of being the source of a lasting competitive advantage. However, the use of these new technologies does not only imply the mobilization of new digital tools, but also a broader transformation and impact on business models, business processes and day-to-day operational tasks (Moufakkir & Qmichchou, 2020).

Indeed, the evolution of the internal and external environment pushes companies to adopt a digital transformation in order to differentiate themselves, be more competitive and ensure their sustainability. However, such a transformation requires substantial investments in IT (information technology) infrastructure and commitment to adapt on an organization level.

In fact, according to (Mantouzi & Youssef, 2021) the digital transformation of the controlling function leads to a change in the role of the controller who will focus on more important tasks.

In concordance, (Vasarhelyi, et al., 2015) asserts that the emergence of new information technologies, the abundance of data to be processed in automated ways is expected to change the profession of accountant and auditor. Furthermore, the study conducted by (Pan & Seow, 2016) showed the need for better preparation of accountants in information technologies. Thus, (Murthy, 2016) proposed to analyze the interactions between accounting and information technology.

Exploring the literature reveals that several studies have analyzed the impact that digitalization has on management control. However, the cloud-computing's impact on management control is yet a research gap to some extent.

In the light of these considerations the focus of this paper is to address the research question: **To what extent does cloud computing-based banking play a role of a catalyst in the practices of management control?**

The paper consists of an introduction section followed by theoretical background section. The third section includes the theories about the impact of cloud-computing on management control, the fourth section covers the conceptual model. Finally, the last section is the conclusion.

2. Theoretical background

2.1. Cloud-computing based banking

It is significant to note that information technologies and digitalization have played the role of a catalyst altering company's visions, operations and business models. They have emerged with huge potential of prosperity for firms operating in a business environment that is categorized as VUCA (volatile, uncertain, complex and ambiguous) (Roblek, et al., 2021). They have succeeded to infiltrate most if not all industries. The banking sector was no exception as banks face constant challenges on several fronts, such as daunting data handling and storage that consume massive resources, weak cybersecurity that undermines the ability to protect key customer data and strong competition from high-tech giants that offer more appealing customer experience. Cloud computing is a state-of-the-art technology that is as a lever for competitiveness in the banking sector offering an unparallel level of agility, security, scalability and data handling capacity (Maoyong, et al., 2022).

According to (Maoyong, et al., 2022) Cloud computing is a term that was first coined back in the late 1996 by Compaq Computer as a term that indicates Internet Business referring to virtual data resources, the early 2000s mark the development of the term, first by Amazon web services in 2006, followed by IBM's Enterprise Cloud Solutions in 2007, then by Google's App Engine in 2008, followed by Alibaba Cloud in 2009 and then Microsoft's Azure in 2010. These events were the cause of cloud computing market value arising by more than 20% per year since 2014, reaching more than 100 billion US Dollars in 2019, Cloud computing is a model for delivering information technology services that allows

users to access software applications, hardware, storage, technology processes directly from the internet through web-based tools as opposed to a direct connection to a server which allows the users to benefit from more flexible and scalable access to computing resources, storage, databases, networking, analytics and intelligence (Murah, 2012).

The banking industry however has always been a late responder in regards to adopting new technologies and that is because of concerns about reliability and regulatory issues. These concerns that the financial sector regulators had were quickly put at ease thanks to Amazons demonstrating that hundreds of millions of customers operate safely online simultaneously.

Exploring the literature shows that a growing number of researchers have looked at the advantages and success factors and effects of using cloud computing services which refers to the use of cloud computing technology to provide banking services. However, according to (Maoyong, et al.,2022) moving to clouds at a full scale is not an easy task as there are a number of challenges that banks face. Security and privacy however are the protagonist risks. The Chinese banking industry on the other hand is the first and most developing hub for cloud computing as this technology allows for increased flexibility and scalability in banking operations, as well as improved security and accessibility for customers. The Chinese government has boosted the adoption of cloud computing in the banking industry throughout the country's Internet Plus strategy which is an action plan unveiled in 2015 by the government, it represents a new economic form that fully utilizes the Internet to optimize the allocation of production resources in terms of innovation and integration, incorporates the depth of internet innovation in economic society across a variety of fields, fosters real economy innovation and productivity, and develops a new and more extensive form of economic development model that utilizes the internet as the primary facility and implementation tool.

The study conducted by (Maoyong, et al., 2022) have concluded that banks that adopt cloud computing are found to have lower cost efficiency and increase of operational risk but they facilitated pervasive synergy gains in controlling operational risk. In addition to that they manage to score higher profit efficiency.

2.2. Management control and its functional tasks

Management control is an information channeling system offering reports on the company's activity through cost analysis and the cross-checking of information collected from operational staff and the various departments, with the aim of establishing a model to the operation of the company which results in performance measurement indicators or KPIs (Key Performance Indicators) (Boutgayout & El Ghazali, 2020). Furthermore, as per (Scapens & Jazayeri, 2003) Advances in information technology have been noted as a key force in changing management accounting.

Above all, the practice of management control as in all fields, is actual, and that the role of management controller can only be expanded and developed in accordance with the banking industry due to the unique nature of service and product (banking transactions such as cash flow management, lending, investment etc.) its role can expand and develop according to the banking sector.

2.2.1. Cost analysis and determination of standards

The correct diagnosis and the mastery of the company's activity are two key factors that must be worked on upstream to achieve the ultimate objective of management control, which is synonymous with optimizing the performance of the company. Thus, this point consists in identifying on one hand the internal environment of the firm, an action which results in the analysis of costs based on management accounting, a method of calculation adapted to the mode of exploitation of the company, and possibly an information system, on the other hand the relevance of this analysis and to supplement by the interactions with the external environment of the company. This thus makes it possible to identify the key standards impacting its operation, and results from this a force of proposal of the procedures and internal rules to ensure the coherence of the exploitation compared to its environment (Boutgayout & El Ghazali, 2020).

2.2.2. Determination of KPI performance measurement indicators

The organization defines its objectives in a SMART way (specific, measurable, achievable, realistic and time-bound). A logic thus making it possible to design measurement indicators upstream represented in the form of information or a set of information contributing to the assessment of a situation. The reading of this situation is often

translated into the form of dashboards ensuring continuous monitoring of achievements and evaluating variations in indicators and critical aspects of the business to be able to make decisions.

The identification of performance measurement indicators varies according to the activity of the company and its environment. These indicators represent the critical parameters on which the proper management and efficient operation of the firm is based. Proper identification of indicators makes it easier to monitor the achievement of objectives and provide corrective measures in the event of default and decision-making (Boutgayout & El Ghazali, 2020).

2.2.3. Budgeting

This digital transformation also impacts the planning and budgeting process (Warren, et al., 2015), which constitutes the traditional basis of accounting and management control, which is strongly criticized because it requires considerable time and does not allow rapid adaptation. environmental changes. However, despite the many criticisms of budgets many companies are exercising their traditional budgeting practices.

2.2.4. Deviations measurement and analysis

The importance of management control lies in its usefulness for measuring deviations; discrepancies which are identified, analyzed and interpreted on the basis of previously identified indicators. The purpose is to be able to question the level of achievement of objectives and put in place corrective measures to rectify failures and anomalies (Boutgayout & El Ghazali, 2020).

2.2.5. Business performance optimization

Management control is designed to be a force of proposal, to bring innovation and solutions to facilitate the management of the company, the decision-making aid and to achieve its ultimate goal which consists in ensuring the performance of business with an effective and efficient manner. Thus, this process made up of all the steps explained above must lead to concrete solutions, particularly in terms of optimizing the performance of the company. This logic allows us to move from a classic conception of management control to a more modern version which is oriented towards performance management (Boutgayout & El Ghazali, 2020).

2.3. The impact of digitalization on management control

The literature has numerous studies examining the impact of digital transformation on management control. A recent study conducted by (Mantouzi, et al., 2021) has examined the impact of digital transformation on management control and concluded that the effective management of such IT investments can lead to a change in the methods and practices used by the company. In addition, the digitization of the management control function will improve the quality of information and ensure its availability and rapid circulation, which will lead to an improvement in the decision-making process. The employees also participate in the definition of these innovative practices that ensure organizational performance.

Moreover, (Boutgayout & El Ghazali, 2020) in their study have concluded that the new reality of digital transformation requires the management controller to acquire new skills, in particular in data analysis, machine learning, and cloud computing, a new field of study based on new technologies and artificial intelligence. In this regard, we will see the emergence of a new role of management controller, whose duty is to maintain the company's viability and performance. However, this role will be correlated to technology in the sense that management controller will develop into an expert technician and counselor in information technology, ensuring upstream the right choice of technology and software most suited to the activity of the company to implement and control the data passing through this system to verify its veracity and quality. This task comes under a new science "know your data"; to arrive at the end with relevant and precise analyzes based on a variety of sources of information.

Furthermore, a study conducted by (Strauss, et al., 2015) exploring the effects of cloud technology on management accounting and decision making have brought new insights on how the role of the management accountant has not changed much as a result of cloud technologies, but it requires them to be well-placed to work with technical experts or cloud service providers to ensure data security issues are addresses, and that the right information gets to the right person at the right time and in the right format, this raises a new key role which is controller of information.

3. Theories about the impact of cloud-computing on management control

3.1. Resource based view

The RBV (Resource Based View) theory finds its origins in the works of (Bernard, 1938, Selznick, 1957, Chandler, 1957). The resource-based approach considers that companies have a certain number of resources allowing them to obtain a competitive advantage originating from superior performance, the development of the company depends on a better use of resources available to it. This theory provides a solid basis for analyzing the influence of ICT (Information and Communication Technology) resources on business performance (Santhanam & Hartono, 2003). The work on the RBV had as its first objective the identification of the resources based on the IS and particularly interesting for the development of the competitive advantage of the company, to then evaluate their relationship with the performance. As (Powell & Dent-Micallef, 1997) explained that ICT resources alone do not allow the construction of a competitive advantage. To this end, companies must take advantage of the complementarities between the various resources, in particular human resources. (Ravichandan & Lertwongsatien, 2002) demonstrated that the relationship between ICT resources and performance depends on key skills. (Merchant, et al., 2000) proposed a new multidimensional construct " information orientation ". Along the same lines (Bharadwaj, 2000) introduced the concept of "information technology capability" which represents the ability to mobilize a combination of resources including information systems. In more recent works (Mithas, et al., 2012) showed a positive empirical relationship between profitability and investments in information technology.

3.2. Technological, Organizational and Environmental framework

TOE (Technological, organizational and environmental) framework of (Tornatzky & Fleischer, 1990) analyzes the influencing factors in regards to the implementation of innovation in firms from three different perspectives, technology, organization and environment in which the firm operates (Baker, 2012, Oliveira & Martins, 2011). It suggests that a firm's technology, organization and environment are all interrelated and that they all impact the firm's performance, as they shape the competitive dynamics of industries and influence the adoption and diffusion

of new technologies. In sum, the framework posits that the success or failure of a technology and the trend of its adoption is not only determined by technical feature and its potential but it is also dependant on the organizational structure and the environment elements.

In the context of cloud computing-based banking, the TOE framework would suggest that the bank's cloud-computing technology, organization (structure and processes), and environment (regulation and competition) all interact to shape the bank's performance.

3.3. Contingency theory

As per (Parker, et al., 2017) technology is a means to reduce uncertainty and increase competitiveness for organizations. Therefore, the effects of technology on the employee depend on strategic decisions that fit the organizational environment best. The contingency theory suggests, that the effects of technology depend on the uncertainty and competitiveness in the external environment and may increase or decrease employee's flexibility and opportunities for decision-making and self-organization.

In sum, Contingency theory posits that the design and implementation of management control systems should be tailored to the specific needs and characteristics of the organization.

According to this theory, the type of technology used, the complexity of the organization, and the level of uncertainty, are all important factors that must be considered when designing management control systems. In the context of technology, the contingency theory suggests that the more advanced and sophisticated the technology, the more it can support and enhance management control tasks.

For example, the use of advanced data analytics and automation technologies can enable management to access real-time data

The before mentioned theories about cloud-computing banking's impact on management control has prompted us to formulate the following hypotheses:

Hypothesis 1: The business environment urges banks to adopt new technologies such as cloud-computing.

Hypothesis 2: The adoption of cloud-computing technology requires a substantial investment.

Hypothesis 3: The cloud-computing technology in the banking sector provides a valuable support and have a positive impact on the management control functional tasks.

Hypothesis 4: The cloud-computing based banking has a positive impact on information’s quality.

Hypothesis 5: The cloud-computing based banking has a positive impact on information’s availability

4. Conceptual model

Our model consists of five variables. In fact, the business environment is in a constant mutation urging companies to adapt fast to ensure their sustainability, precisely with the technological changing aspects. However, the process of adopting the latest technologies such as cloud-computing could have a huge impact on the organizational level, processes and functional day-to-day operations prompting firms to change their organizational structures. Thus, the environmental variable influences the adoption of cloud-computing technologies.

The digitalization and technology adoption requires commitment for often substantial investments, as the case for cloud-computing technology. Such investments have the potential of changing the ways employees perform their work. More specifically, adopting such technology could have a significant and positive impact on how management controllers perform by providing access to real-time data and analytics. Which will allow them to make more informed decisions and respond quickly to changes in the market or in their own operations. It can also automate many routine tasks, which can free up management resources and reduce the risk of errors.

In the light of these considerations, we can stipulate that cloud-computing based banking could lead to an organizational change, which will result in better overall company’s performance.

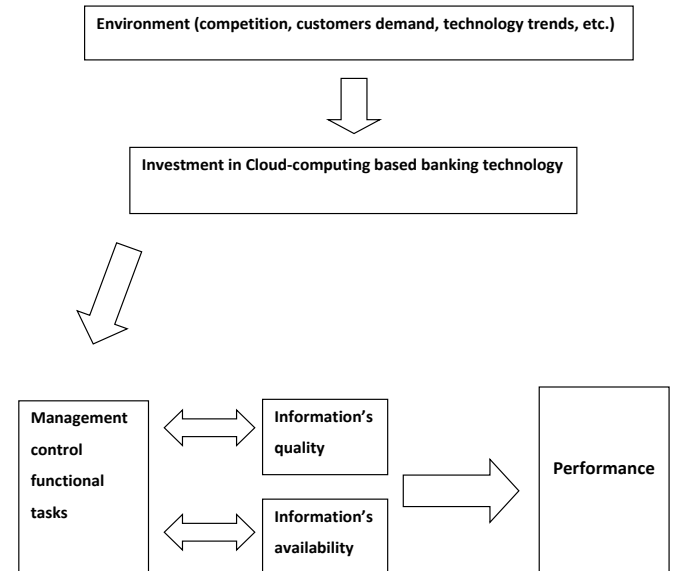


Fig 1 : Conceptual model

(Source : author)

5. Conclusion

The key success factor in an information-based age is the ability to both find the right information at the right time and to use it as a decision-making tool. The review of the literature reveals that cloud technology has penetrated the management controlling systems to some extent, altering the functional tasks of management control and providing a timely access to quality information. Given that cloud technologies are expected to grow over time and its adoption will expand over most if not all industries due to being a source of competitive advantage. Our paper is an exploratory study assessing the impact of cloud-computing based banking on management control, it enriches the literature by exploring and synthesizing the literature in terms of cloud-computing technology and management control, and develop a conceptual model in order to have a better understanding of the relationship and interactions between cloud-computing and management control.

Nevertheless, it is still a research gap to the extent where more variable could be examined, geographical and industry-based approaches could bring more insights. in the light of these considerations this paper opens a path for empirical quantitative research on Moroccan banks.

Furthermore, the validation of our model requires conducting an empirical study, by collecting data on the implementation of cloud-computing based banking systems

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