UNIVERSTY OF ZAMBIA

Software-as-a-Service in the Banking Sector: An extended Resource Based View of Information Technology

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Abstract

The purpose of this paper it to assess the value of adopting a Software-as-a-Service (SaaS) computing model as a strategic management approach towards sustained competitive advantage in the banking sector. Different management studies posit that a Resource Based View (RBV) strategic management approach improves the competitive advantage of an organization with a bias towards intangible resources as they are less likely to be replicated by competitors. Nonetheless, fewer studies have been directed towards the control of Information Technology (IT) investments as a tangible resource in view of the modern day technological advancements that foster dynamic businesses demands on Information Systems (IS) within the service industry. The methodology adopted for the research will be based on a positivity philosophy. The findings will enhance the existing knowledge on the Resource Based View (RBV) approach to competitive advantage within the service industry based on a non-generalized Information Technology (IT) perspective.

The purpose of the research is to explore the potency of Software-as-a-Service (SaaS) cloud computing model to affect competitiveness in the banking sector based on a Resource Based View (RBV) approach. The findings will expound on the theoretical understanding of how the Software-as-a-Service (SaaS) computing model impacts the service industry's competitive advantage in a Resource Based View (RBV) context of strategic management.

The research further seeks to expound on leaders' correlation of Information Technology (IT) management to overall strategy and sustained competitive advantage of a firm. The objective of the research is to extend a leader's appreciation of the of direct impact Information Technology (IT) infrastructure investments in a service-base industry on strategic management thinking within the context of a Resource Based View (RBV) approach. Researchers on Resource Based View (RBV) approach the Information Technology (IT) resource with minimal consideration of its duality and dynamic nature which are precursors to its elasticity in adapting to business needs. This affects management's ability to correctly translate the Information Technology (IT) resource offering into a pivotal strategic management concern in the service based industry.

Keywords

Software-as-a-Service, Information System, Information Communication Technology, Financial Services, Banking ICT expenditure, Fintech disruption and Resource Based View

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Introduction

The landscape of competitiveness for financial services, has greatly been disrupted by Information Technology (IT) enabling Financial Technology (FinTech) companies to rapidly automate traditional banking services (Vives and Zhinqiang 2021). This amplifies operation and capital investment costs to uneconomical proportions for traditional banks that attempt to withstand the competitive pressure exerted by the agile and flexible Fintechs and the customer need for instant service delivery. Consequently, there is a need for a more flexible, scalable and cost effective alternative to the on-premise infrastructure upgrades that present a high Total Cost of Ownership (TCO) with no guarantee of improved competitive advantage. A considerable amount of research has been undertaken in the business field on Resource Based View (RBV) strategic management approach by different scholars like Jay Barney (1984) and Birger Wernerfelt (1991) but not as much in the Information System (IS) arena with regard to cloud computing technologies' redefinition of competitive advantage within the service industry. Information Technology (IT), in isolation, is not considered as an imperfectly imitable resource by the Resource Based View (RBV) approach. Nonetheless, it complements and sustains the knowledge consisted in the valued intangible resources toward competitiveness. Vinekar and Teng (2012) rightly posits that initial RBV position is faulted in considering Information Technology (IT) as resource with no direct effect on profitability of a company. Wade and Hulland (2004) emphasize that when coupled with other resources and business process implementations, Information Technology (IT) can attract different direct investments and benefits. Noteworthy, also, is an analysis carried out on an investment in IT rather than capital expenditures by Harrah Casinos that secured it a competitive edge over its rival by way of applying subsequently developed knowledge unto profitability (Vinekar and Teng, 2012). These findings directly map to the research question as it explores an alternative view of Information Technology (IT) as a valuable resource in the banking sector.

Additionally, Information Technology investments within the service industry can be imperceptible at start but progressively build-up as innovation alters the business landscape to meet the rapidly changing needs of its customers by way of Information Technology (IT). This presents a need to continuously scale existing Information Technology (IT) Infrastructure as a business matures in adopting newer Information Systems (IS), a costly path in light of the short lifecycle dictated by the technology obsolescence (Sandborn, 2007). Consequently, a gap between knowledge on Software-as-a-Service (SaaS) digital economy disruption and how traditional banking leadership can translate this drive into competitive advantage by a refreshed Resource Based View (RBV) strategic approach to Information Technology (IT) as a valuable resource. Indeed, Strategic management theories have also evolved since the inception of scientific management to adapt to business changes despite the dictates of the Resource Based View (RBV) on value. A more furnished approach for the Software-as-a-Service model in Information Technology (IT) is fostered by its extended effect on organizations. According to Raduan, Jegak, Haslinda and Alimin (2009), this approach inbreeds Knowledge Management (KM) among others that is considered a proponent of sustained competitive advantage via its linkage to efficiency, cost, core competence, dissemination and application (Gupta and McDaniel, 2002). This position declassifies IT as a mere tangible resource with no effectual link to competitiveness. These studies also reinforce another perspective on how IT plugs into creating competitive advantage by way of its dynamic nature.

Software as a service (SaaS), is a cloud computing where software is hosted by a Cloud Service Provider (CSP) for provision to a user as a service translating to no initial Infrastructure costs. Initial server and storage implement costs required to host resource hungry applications easily infringe on organizations budget and makes the SaaS offering that is devoid of upfront costs a more economic option (Han, Y. 2011). Nevertheless, the mix of service options offered and myriad pricing models (Jaatama, 2010) amongst the different CSPs can mean a higher cost for one company than the other.

Key Terms and Definitions

The following key terms and definitions will be used throughout the research;

Software-as-a-Service (SaaS). A model of cloud computing where applications are hosted and abstracted from underlying platforms and infrastructure by a Cloud Service Provider (CSP) and provided to the user as a service

Cloud Service Provider (CSP). A company that offers a cloud compute hosting services, such as SaaS, PaaS or IaaS to individuals or other businesses.

Resource Based View (RBV) A model that perceives resources as key to firm performance and resource with Valuable Rare Costly to Imitate Organized to capture value (VRIO) attributes gain the firm sustainable competitive advantage (Rothaermel, 2012)

Information Technology (IT) The use of computers to develop, process, store, access, and exchange all kinds of electronic data and information. (Wikipedia, 2022, a)

Information Systems (IS) A formal, sociotechnical, organizational system designed to collect, process, store, and distribute information (Wikipedia, 2022, b)

Fintech: Innovative financial solutions enabled by IT and are often used for start-up firms. This also includes the banks and insurers. (Puschmann, 2017)

Literature Review

The section is arranged in four topical sections of Information Technology (IT) and corporate strategy, an extended Resource Based View (RBV) on competitiveness, Information Technology as a dual Resource, Information Technology (IT) Cost management, and disruptive capability of Software-as-a-Service (SaaS).

Information Technology (IT) and Corporate Strategy

Organizations today can improve their competitive posture through harnessing the possibilities Information Technology (IT) presents if they appropriate matching significance within their most senior echelons of management. Bakos and Treacy (1986) observe that in addition to many executives turning to IT for a competitive advantage, Information Systems directly impact management process, Human resource and overall performance. Corporate strategy is considered the highest of the three levels of strategies within an organization and it deals with how to enhance profitability of different business units as the blanket scope of a firm (Scholes, Johnson and Whittington, 2002). As organizations became more information based, Information Technology (IT) curved its space into the different business processes quickly creating a high dependency on efficient processes attracting a perpetual value-add need and earning the attention of strategic thought to the extent that Bakos and Treacy (1986) state, "the mission and management of the information systems group should be consistent with the firm's dependency on technology and the opportunity for competitive advantage that the technology presents." True to the observation, the mission of any organization is developed by its leaders (Wiki, 2022) and for an Information Technology (IT) aware mission statement, effectual representation of the IT resource or function is paramount at senior management level

In addition to correct placement within the strategic levels, Wu, Straub, and Liang (2015) posit that improved performance is guaranteed when "key IT resources - physical IT infrastructure components, technical and managerial IT skills, and knowledge assets − are aligned with business strategy and when appropriate structures are used to supervise the deployment and effective management of these resources". The effect of Information Technology (IT) on a myriad of business processes cannot be overstated as it presents a need for consideration within the strategy formulation process (Melville Kraemer and Gurbaxani, 2004). Furthermore, unlike firms with very simple and small structures, organizational complexity increases as an organization grows (Quinn, 1980) and access to information relevant for strategic decision making becomes harder. Mintzberg (1979) postulates that as strategic issues can arise from anywhere within the hierarchy, it is prudent that the decision making team is composed of broadly experienced members representative of every level in the structure and process (Fredrickson, 1986). Rivard, Raymond and Verreault (2006) additionally posit that strategic integration between IT processes, IT infrastructure and business strategies affirms the ability of Information Technology's (IT) to reliably support other business strategies in a strategic fit, an overview of which is represented in Figure. 1 below.

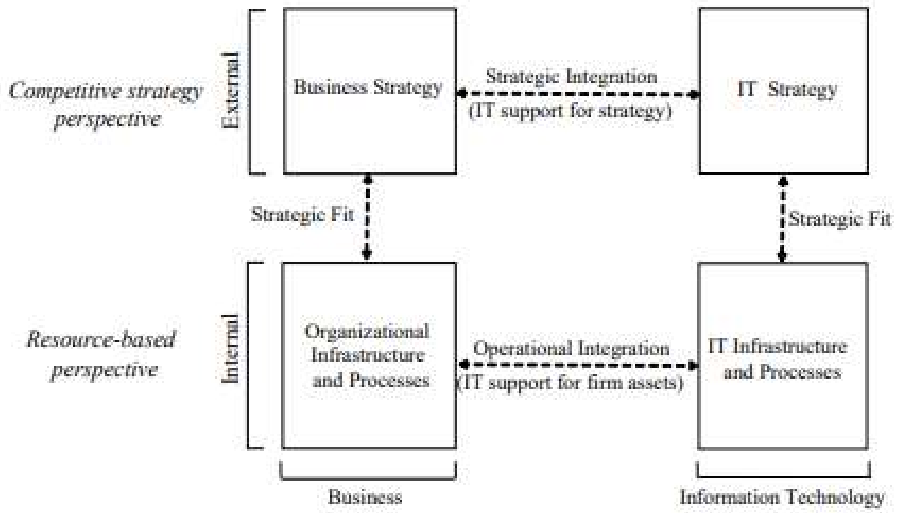


Figure. 1. IT Strategic alignment (Henderson and Vernkatraman, 1999 as cited in Rivard, Raymond and Verreault, 2006)

Similarly, in a study by Tallon (2000) involving 304 business managers with regard to Porter's value chain effect on Small and Medium Enterprises (SME), four corporate goals are identified for IT; market focus, operational focus, a hybrid focus, and unfocused. The study revealed that firms with more strategically aligned IT realized a higher business value. Indeed, for decisions to be undertaken by senior management today without consideration of Information Technology (IT) as a resource and cost center that drives most of the service-based industries could pose a significant risk to their continuity. To this end, the research considers a Resource Based View (RBV) on Information Technology within the context of a service-based industry

An Extended Resource Based View (RBV) on Competitiveness

Competitive advantage based on and altered by a firm's internal strengths is a catalyst to increased dependence on Information Technology (IT) within service-based industries. Postulated as an approach to competitive advantage by scholars like Wernerfelt, Prahalad and Barney, it considers that a firm should look at is resources within to strengthen its competitive posture rather than from without (Barney, 1991). Rothaermel, (2012) portrays a representation of the Resource Based View (RBV) concept in Figure. 2 below

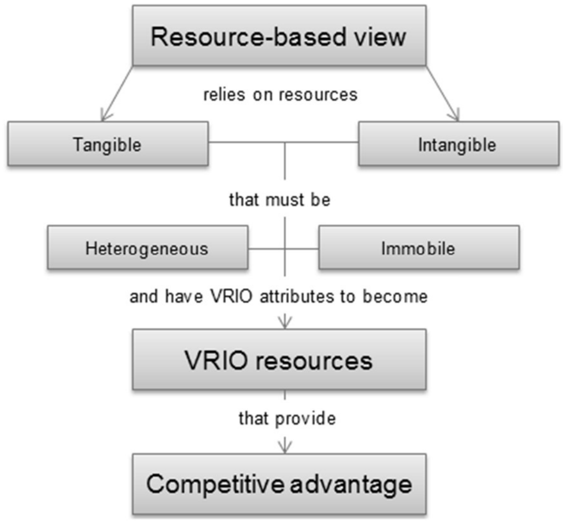


Figure. 2. A Resource Based View layout Rothaermel, (2012).

According to Barney, 1991, for a resource to be considered of relevance to sustained competitive advantage, it must be positive to all Value Rarity Imitable Organization (VRIO) framework components else it only offers temporary competitive advantage. In addition to Information Technology (IT) being considered as a tangible resource without potential of delivering sustainable competitive advantage, the VRIO framework further underplays its imitability in case of firms with equal access to capital (Barney, 2001).
Contrary to this position from different scholars in the past, Information Technology (IT) has since greatly evolved through increased innovation and gained significant relevance with the dawn of the information age. Industries within this category offer non-tangible 'products' like financial services, customer care, hospitality, air ticketing, software development and more. These are not capital intensive to setup yet they can generate a lot of information that requires proper management. In fact, Castells (2010) in his definition of an information economy states that more than before, competitiveness for firms relies on knowledge, information and processing technology as well as its management. Whenever an enterprise can generate more economic value than its competitor, it has a competitive advantage according to Barney (2001). This prompts for a different perspective on the value creation capability of Information Technology (IT) in the view of the increased reliance on information to improve the competitiveness of a firm within the service-based industry context today.

Barney (2001) further observes that a juxtaposition of the Resource Based View (RBV) with neoclassical microeconomic reveals a change in argument on the effect of the law on elasticity of supply when it comes to resources whose capabilities can only be developed over long periods of time. The complexity emerging from the interplay between Information Technology (IT) other resources within a firm creates a path dependence that can affect its supply to give advantage to the organization that already has that maturity by increasing the cost for those that desire it based as defined by the law of elasticity of supply. Wade and Hulland (2004) relatedly refer to the IT resource as an Information System (IS) resource and further segment it into three categories of outside-in resources which tackle market responsiveness, inside-out resources addressing infrastructure, effective operations as well IT skills, and thirdly, spanning resources like planning and change management. These jointly expand Information Technology (IT) touch points within a Resource Based View (RBV) and positively redefines the perspective through which IT is considered to translate into business value and sustained competitive advantage, thus a need to further breakdown IT as a resource.

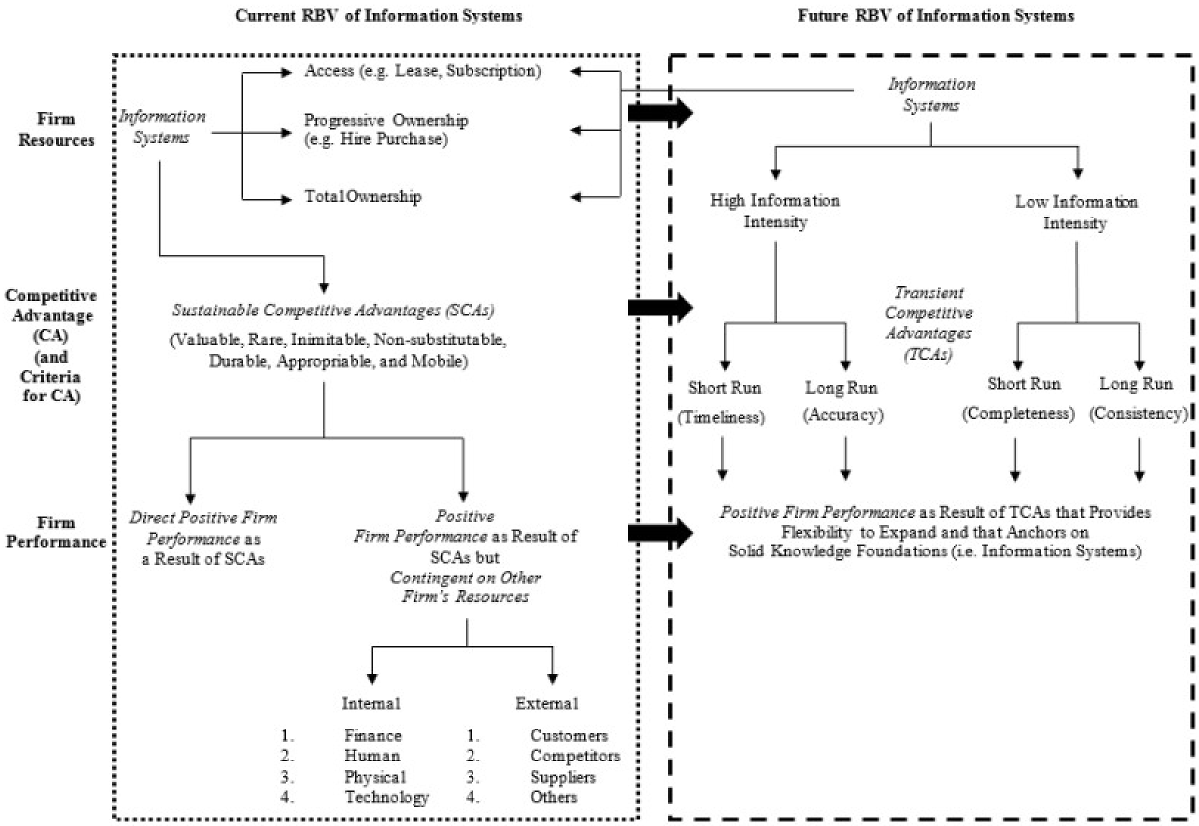


Figure. 3. Current and Future RBV of IT (Gupta, Tan, Ee and Phang, 2018)

In contrast, competitive advantage is not infinitely sustainable. In fact, Gupta, Tan, Ee and Phang (2018) state that “Marshallian quasi-monopoly and equilibrium argument that competitive advantage will continue to emerge but eventually become obsolete over time” and thus captures the Resource Based View (RBV) as an evolving theory that suggests Information Technology’s Sustainable

Competitive Advantage (SCA) will translate to Transient Competitive Advantage (TCA) over time to conform to Marshallian quasi-monopoly as represented in Figure. 3 above.

Information Technology as a dual Resource

According to Canada statistics (2020) for 2022, financial institutions are among the largest consumers of Information Technology (IT) and reveal that most depend on it for over 70.7% for just the software and companywide computer networks. Acquisition of Information Technology (IT) by a firm does not directly improve its competitiveness independently, rather, a combination with other internal resources sets its imitability platform to collectively contribute unto competitiveness. Vinekar and Teng (2012) define Information Technology in the context of business value as “most organizational and managerial IT applications and systems, including organizational IS such as Business Intelligence (BI) and Enterprise Resource Planning (ERP), IT infrastructure, Enterprise architecture, end-user computing, customer interfaces, and standalone application.” These IT capabilities have to leverage the other resources (Ravichandran and Lertwongsatien, 2002) like expertise and labor to gain a competitive edge (Bharadwaj, 2000). The tangible and intangible extents that Information Technology spans create a unique duality that makes it both a dynamic and strategic resource. A firm’s focus therefore, on IT investments like Knowledge Management (KM), Information Systems (IS), and IT management builds imitable skills that afford it the benefits of available to skilled firms accessing lower cost of capital than less skilled firms (Barney, 2001). Harnessing this duality posits a case for increased competitiveness.

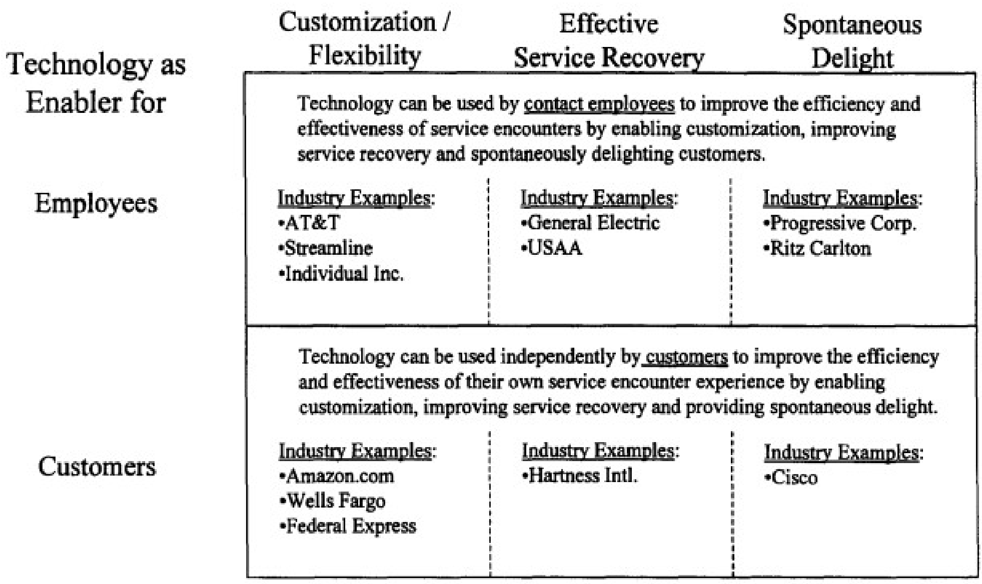


Figure. 4 Technology Infusion Matrix (*adapted from Bitner, Brown and Meuter, 2000*)

According to Bitner, Brown and Meuter (2000), this driving force creates service encounters that tag on the ability of Information Technology (IT) to; customize service offerings, recover from service failures and spontaneously delight customers. The authors further propose a Technology Infusion Matrix (TIM) as seen in Figure. 4 above that alludes to improved employee efficiency by way of applying Information Systems (IS) to manipulate amassed information through service encounters to create improved customer satisfaction, a competitive advantage in a digital market-space. Contrary to the claim that service-based industries are the better beneficiary, the study further reveals that product-based industries are also subjected to customer service competition and service offerings. Seeing what Information Technology (IT) as a resource contributes to competitiveness, a question arises on the counter effect of its cost. Wu, Straub, & Liang (2015) base on a strategic model in Figure. 5 below posit that systems are a core component of intellectual capital are effectual in its translation into core competence. This means, sustained competitive advantage based on the distinctiveness of a firms' capabilities in a Resource Based View (RBV) is a mix of variable constructs, one of which is IT/IS whose strategic management of thereof can affect its competitive posture.

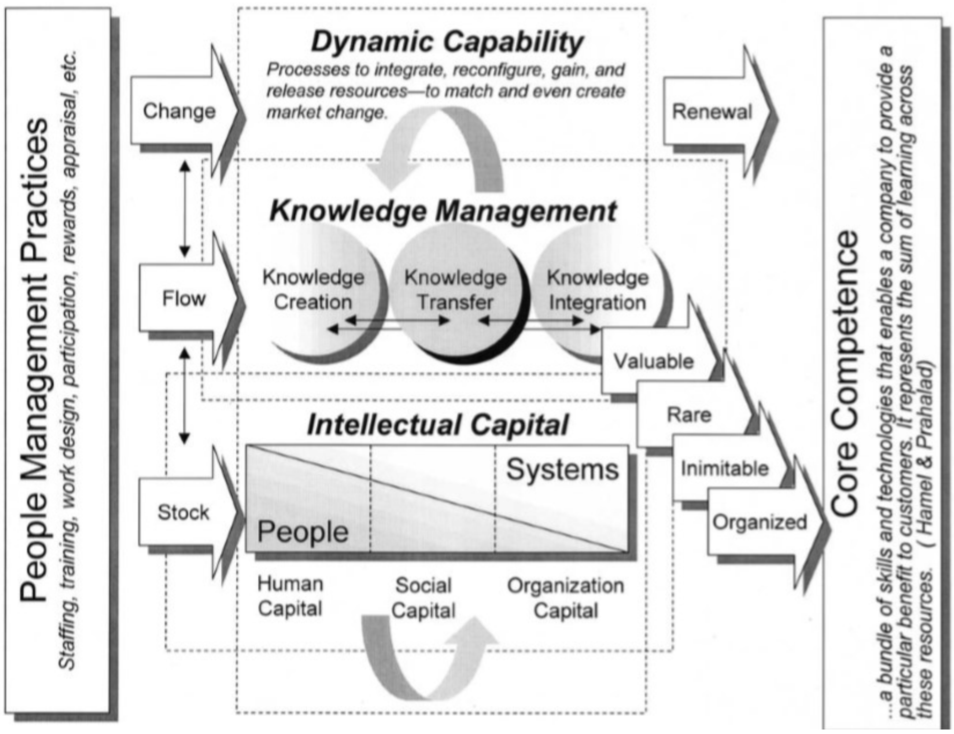
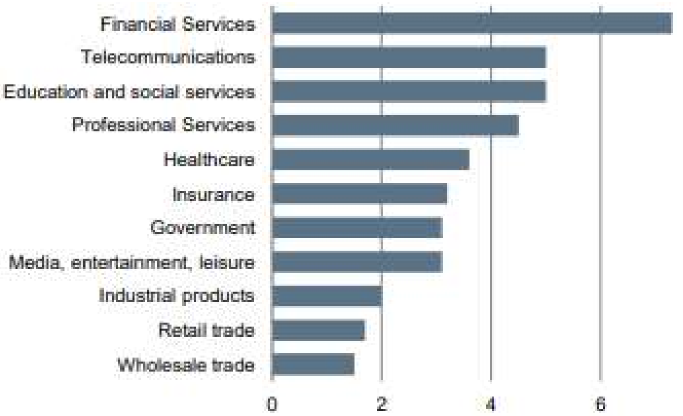


Figure. 5. A strategic HRM model for system role in core competence (Wu, Straub, & Liang (2015)

Information Technology (IT) Cost management

Information Technology in all its dimensions can be expensive and poor cost management of its life cycle can negatively affect a firm's efficiency and or competitive advantage. A study conducted by Brynjolfsson (1993) distinctively alludes that despite a strong relationship of Information

Technology (IT) to productivity, there is also an offset correlation with profitability. As earlier highlighted, Information Technology (IT) can be looked at in terms of Infrastructure, Information Systems (IS) as well as IT Human Resource (HR). To place the IT cost in a broader perspective, secondary data reviewed from Deutsche Bank (DB) research reveals the spectrum of IT costs in relation to other operational capital expenses. A study by Mai, Speyer and Hoffmann (2012), it is observed that financial service firms spend at least 7.3% of their revenues on IT costs while other industries average at 3.7% (Figure. 6), making the leading consumer of Information Technology (IT) services.



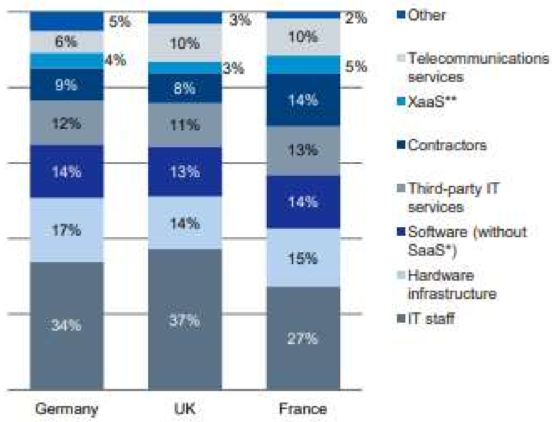


Figure. 6 IT Expenditure as % Revenues across industries and Industry % Spend. (*Mai, Speyer and Hoffmann, 2012*)

Additionally, IT staff costs account for 26% of banks' IT budget in the Germany, whereas UK banks spend 37% of their IT expenses on IT staff. IT costs account for a large share of the total cost base in transaction banking. The author further posits that the IT budget is just but a factor towards achieving good business performance, efficient IT management is crucial. Mai, Speyer and Hoffmann further postulate that the greater cost for IT is the staff or human resource with up to 37% in UK which is an operational cost and presents itself throughout the lifecycle of the Information Technology (IT) solutions adopted. However, depending on the industry's maturity and investment need (Vinekar and Teng, 2012) to retain Sustainable Competitive Advantage (SCA), IT capital investments in assets like hardware infrastructure can be a lot higher than all the other IT costs at inception. Undoubtedly, this goes to show that when not managed well, these costs can invisibly chip away at the profitability of a firm whether directly or indirectly. Consequently, this validates the need to consider more industry efficient ways to manage the IT cost components like present Software-as-a-Service (SaaS) especially in the service industry given its nature.

Disruptive Nature of Software-as-a-Service (SaaS)

Cloud computing is highly disruptive in nature and has shifted a lot of power to customers to redefine the rules of competitive advantage. In fact, Lynn, Mooney, Rosati, and Cummins (2019) denote a rise of a new era of Financial Technology (Fintech) companies founded upon reliable access to the internet through cloud computing sending disruptive ripples within the banking industry. To deny this wave as a traditional bank and hold onto the old model of Information Technology (IT) asset acquisition can easily erase a company's profitability (Gupta, G., Tan, Ee, and Phang, 2018), thus the need for inward review on IT resource optimization to improve competitive advantage that this paper endeavors to explore in greater detail. Cloud computing offers a range of subscriptions tailored to help mitigate the different Information Technology (IT) related costs in organizations and Software-as-a-Service (SaaS) carries a greater appeal for the service-based industry, specifically the banking sector. Described as a "the delivery of a service or capability over the network" by Bozzelli, (2009) there are majorly three delivery models:

Table. 1.
Public Cloud Service Offerings (Bozzelli, 2009)

	Cloud Subscription	Package Definition
1	Software-as-a-Service (SaaS)	Application services delivered over the network
2	Platform-as-a-Service (PaaS)	A software development framework and components all delivered on the network
3	Infrastructure-as-a-Service (IaaS)	An Integrated environment of computer resources, storage and network fabric delivered over the network

The author further observes that regardless of where a firm stands today, Information Technology (IT) is fast evolving and it is only a matter of time before all the features will be accessible primarily through the public cloud as represented in Figure. 8 below.

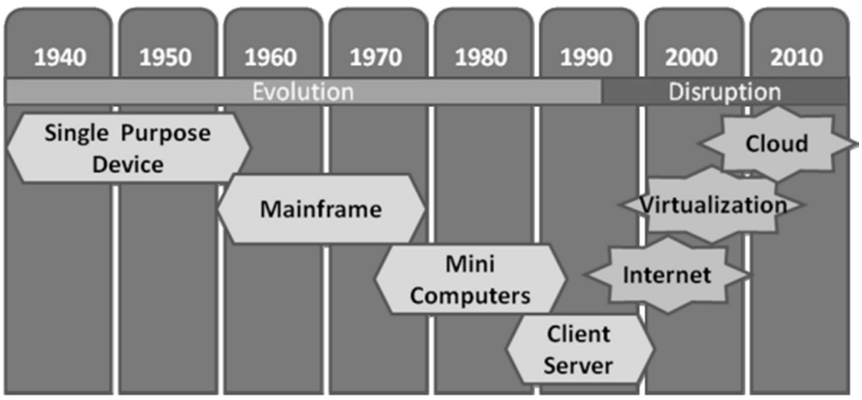


Figure. 7. Disruption and Evolution of computing form 1940 – 2010 (Bozzelli, 2009)

This leads to the question of what subscription is most suited in managing IT costs within the financial services sector. Preceding chapters capture that Information Technology (IT) Infrastructure and IT Staff costs take the bigger portion of a firm's budget and therefore the adopted subscription should address these both. A cost comparative study by Han, (2011) for adoption of different subscriptions postulates that Software-as-a-Service (SaaS) attracts the lowest cost and eliminates both the need for many ICT personnel as well as acquisition of physical Infrastructure unlike Platform-as-a-Service (PaaS) that still relies on the customer's technical expertise to handle configuration and management of their development environments as well as operating systems. Han further notes that the public cloud architecture prioritizes availability and thus data is replicated over more than two sites for continuity in the event of service failure. The costs to achieve a similar design on-premise is astronomical and does not invalidate the need to invest in on-premise infrastructure without risking service availability, a state detrimental to any firm's competitive posture.

Software-as-a-Service (SaaS) subscription as described in Table 1 delivers a holistic offering with a reduced Total Cost of Ownership (TCO), diminished IT refresh costs, increased agility, a pay-per-consumption cost model and simplified management. However, the question of the security risks presented with the adoption of clouding computing (Han, 2011) cannot be ignored and clear data governance policies should be in place to mitigate this. It is thus paramount to further explore the extent to which adoption of this model in a service-based industry can improve Sustained Competitive Advantage (SCA) as a resource in an extended Resource Based View (RBV) approach.

The exploratory approach to the literature review topically examines the factors to be considered for the research in respect to technology and relevant management theory. The literature explored so far reveals that most of the research carried out on the topic is quite historical, stretching back as early 1940 for the management theorems while the technology studies that are short of recent developments within the computing field of Information Technology (IT). Indeed a lot of disruptive transformation has taken place within the computing space and there is still need for research on the new and enabling efficiencies it presents on the subject of sustainable competitive advantage within the service-based industry by way of effective IT cost management in strategically adapting the Software-as-a-Service compute model

Research Design and Methodology

This section details the intricate considerations undertaken in building a research design suited for the study herein. The proposed design is chronologically broken down into four subsections of research questions and objectives, research philosophy, research design, and methodology and research strategies.

Research Questions and Objectives

The research seeks to address the question: Is Software-as-a-Service (SaaS) adoption a competitive advantage in the banking sector disrupted by Fintechs? The aim of the research is to add to the current knowledge base (Newman, Ridenou and Newman, 2003) of strategic management thought on Information Technology (IT) and its role towards competitive advantage within the financial services industry. The key objectives are to identify the impact of the dynamic nature of Information Technology (IT) on firm profitability and to correlate efficient IT lifecycle cost management with improved competitive advantage

Research Philosophy

Alavi and Carlson (1992), postulate the philosophy of positivism as best suited for Information Systems (IS) research and as such, however, a positivism philosophy is adopted for this research. The research scope encompasses the strategic and business management continua that is a product of theories based on outcomes from philosophies relatable to a range of disciplines (Starbuck, 2003). Positivism refers to a scientific method based on a rationalistic philosophy (Mackenzie and Knipe, 2006). A precursor to the positivism epistemology is the realism ontology (Mojitha, 2021) that depends on objectivism to study the Software-as-a-Service computing model in the context of the service industry. Although Information Technology (IT) can be exclusively perceived scientifically based on realism, the nature of this research specifically considers it within the context of strategic business management that infuses an aspect of subjectivism as presented by the human component of Information Systems (IS) (Hirschheim, 1985; Baskerville and Myers 2004).

Research Design

The research will use a descriptive design with a deductive approach to theory development. According to Carter, Lubinsky and Domholdt (2011), research is referenced as descriptive “if it either provides a snapshot view of a single sample measured once or involves measurement and description of a sample several times over an extended period.”

The research seeks to correlate the growth of Traditional bank investment in Fintech Cloud Datacenter compute workload trends to help answer the research question, is Software-as-a-Service

(SaaS) adoption a competitive advantage in a banking sector disrupted by Fintechs? Information Technology (IT) practice and the Resource Based View (RBV) approach to competitiveness. It should also be noted that research problem is known from inception and thus the flexibility to need for a descriptive approach (Madhu, 2021) as it allows for quantitative analysis the of findings.

Research Strategies

According to Somekh and Lewin (2005), methodology is both "the collection of methods or rules by which a particular piece of research is undertaken" and the "principles, theories and values that underpin a particular approach to research." Alluding to the description, a qualitative methodological choice is adopted with a longitudinal time horizon. For the research strategy, consideration is taken for the archival research strategy given the limitation to secondary data. In addition, this will allow for triangulation, a form of "convergent validation," (Campbell & Fiske, 1959) that enables application of dissimilar findings from disparate data source in answering one research question. (Fielding, 2012). Quantitative analysis will be used as the data is numerical alongside Microsoft excel to analyze the derived dataset from secondary external sources and thus answer the research question. The research will also apply purposeful non-random probability sampling to secure datasets from credible public cloud proprietors and business advisory audit firm reports. A longitudinal time-horizon will also be applied in collecting the data for at minimum, a period not less than 4 years.

Critical Evaluation of Secondary Data

Secondary data as defined by Krishnaswami and Satyaprasad (2010) is considered to be data is "collected and compiled for another purpose". The application of secondary data sources in research, thus presents a different risks like researcher bias and credibility for which it has to be intricately evaluated before use. This section of the paper will critically evaluate the secondary data sources in light of the quality, dependability, accuracy, applied classifications and objective or purpose and currency. These will be explored within two main groupings of data pertinence and data quality.

Data Pertinence

Purpose

The objective of this research is to primarily answer the research question; is Software-as-a-Service (SaaS) adoption a competitive advantage in a banking sector disrupted by Fintechs? Key dependent variables required for effective data analysis are Traditional Data Center Compute Workloads, Cloud Data Center Compute Workload, Fintech & Traditional Bank Merger Investments while the independent variables include Year, EMEA, APAC and Americas. The secondary data sources explored are mapped to financial services sector in developed countries as well and align with the research study to aid the development of an answer to the research question. A combination of which contribute key variables to the narrative of financial institutions heavy reliance and expenditure on Information Communication Technology (ICT) in delivering their services (ACET16, 2020)

Methodology

Data used in this section is sourced from with authorization from the Cisco Global Cloud Index (GCI) 2021 and Deloitte financial advisory report 2020. Cisco Global Cloud Index (GCI) authorizes full use of the report (GCI, 2016) and maintains all confidentiality in sharing the methodology. The data in report is sourced from Gartner, IDC, Synergy, Juniper Research, and Ookla for traffic modeling and data center verification across six regions of Asia Pacific, Central and Eastern Europe, Western Europe, Middle East and Africa, North America, and Latin America. Deloitte on the other hand uses data from Pitchbook, Deepdive, CapitalIQ and Crunchbase within sound ethical boundaries. One dataset extends to 2021 form 2016 while another runs from 2014-2020. Data for the years 2021, 2014 and 2015 is excluded to help clean it for analysis. Also, Eastern Europe and North America as early adaptors to SaaS are excluded to avoid divergent results from the outlier effect

Key search words used in exploring different secondary data sources included cloud computing, SaaS, Information System, Information Communication Technology, Financial Services, Banking ICT expenditure, Fintech disruption and RBV. A source aligned with the. Based on the classification of either tracking, lagging or resisting countries by (Gartner, 2022).

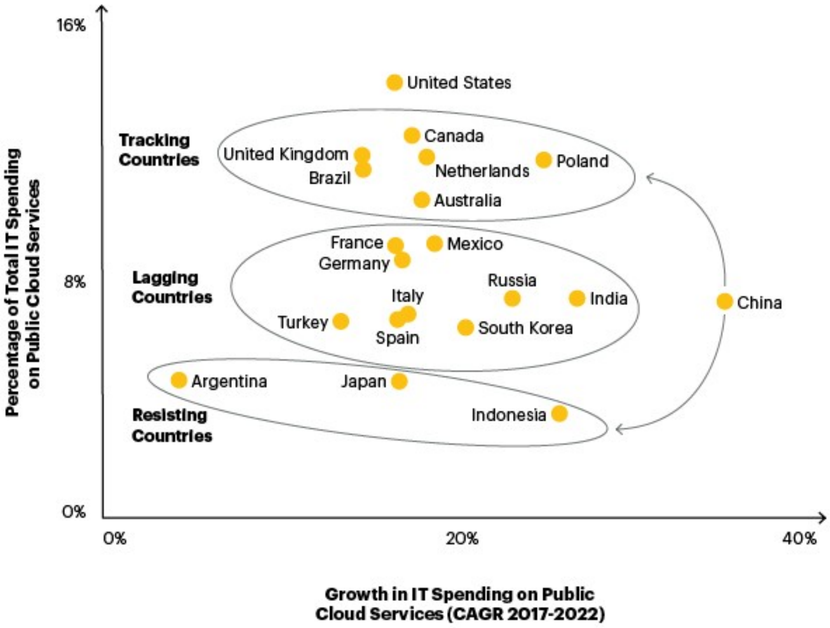


Figure. 8. Countries in categorized IT Cloud spending categories (Gartner, 2022)

For a realistic sample the research uses non-probability convenient sampling to only include regions with nations that area within the mid-section as those at the either extremes present unnecessary outliers in Cloud IT expenditure representation above (Figure. 9).

The GCI methodology applies industry-standard of National Institute of Technology (NIST) to define key terms as below:

Cloud Data Centers: These are operated by service providers as well as private enterprises. However, with a slight variation from the NIST definition in how private and public clouds are defined GCI (2016).

Compute Workload: A set of virtual or physical computer resources that is assigned to run a specific application or provide computing services for one or many users and spans from a lightweight SaaS application to a large computational private cloud database application. Cisco GCI applies a derived compute workload formula:

Average Workload and Compute Instance Density = (Total Physical Servers*Virtualization Rate (% of Physical servers are virtualized) *VM density (Average VMs per virtualized physical server)) +Non-virtualized Physical Servers)/Total Physical Servers.

The scope of the research is limited to the Software-as-a-Service (SaaS) public cloud computing model and the financial service industry investment trend. Data collected from two sources is used to build one dataset is classified into independent and dependent variables the coding as below

Table. 2
Dataset Variables

Independent Variables	Dependent Variables
Period	Traditional Data Center Compute Workload - **1**
Europe Middle East & Africa	Cloud Data Center Compute Workload - **2**
Central and Eastern Europe	Fintech & Traditional Bank Merger Investments - **3**
Latin America	

Findings and Analysis

The data collected from the two secondary sources is combined into one dataset and analyzed as below using the inferential statistical method of correlation as it is suited for quantitative analysis. However, as correlation is a derivative of the also the mean, descriptive statistical analysis is used to fetch the same for an appreciation of the data shape.

Table 3.
Skewness, Kurtosis and Correlation of Variables in research

Variables	κ	β2	1	2	3
1. Traditional DC Compute Workload	0.80	-1.57	-		
2. Cloud DC Compute Workload	0.21	-0.66	-0.03	-	
3. Fintech & Traditional Bank Merger Investments	0.01	-1.37	0.37	0.27	-

A look at the Kurtosis β2 reveals that $\beta 2 < 3$ and this means the data distribution is less outlier prone. Although this is ok, a change in preceding years is possible as the trends of these statistics are later affected by COVID-19.

Correlation Analysis

rxy – the correlation coefficient of the linear relationship between the variables x and y is represented as:

$$r_{xy} = \frac{\sum(x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum(x_i - \bar{x})^2 \sum(y_i - \bar{y})^2}}$$

Where;

xi – the values of the x-variable in a sample

$\bar{x}$ – the mean of the values of the x-variable

yi – the values of the y-variable in a sample

$\bar{y}$ – the mean of the values of the y-variable

The correlation between Traditional Data Center Compute Workload - **1** and Cloud Data Center Compute Workload - **2** variable is -0.03.

This means that they two variables are negatively correlated and move inversely. As the Traditional Data Center Compute Workload - **3** goes down, the Cloud Data Center Compute Workload- **2** goes up (Appendix A.). This is due to the fact that Software-as-a-Service (SaaS) which is the bedrock for Fintech innovation is 100% resident on public cloud infrastructure and as traditional banks accelerate to join the platform for faster Time-To-Market (TTM), they transfer Datacenter compute burden from their Traditional Datacenters to the Public Cloud Datacenters. This is however a weak correlation >-0.5 as there are other possibilities as to why Traditional Datacenter compute workloads could reduce like due to decommission of a service, optimization activities by the IT human resource and more.

For the Cloud Datacenter Center Compute Workload - **2** and Fintech & Traditional Bank Merger Investments - **3** variables, correlation is 0.27.

This is a positive correlation as both variables increase in the same direction although without causation. As the traditional banks adopt the Fintech templates of using Software-as-a-Service (SaaS) to remain competitive, they either takeover/merge with the Fintechs thus increasing their investment spend but also, that could infer more compute workloads to the Cloud datacenter which is the better path for the traditional bank and a slightly stronger and more reliable correlation than the former.

Fintech & Traditional Bank Merger Investments - **3** and Traditional Data Center Compute Workload - **1** correlation of 0.37.

This means there is a positive correlation between the variables. Only this time the approach is from the decreasing angle. This is due to the big change in the Investment amount in the year 2020 that saw a strong decline in investment from the First world region of Europe (Deloitte, 2020). This creates an outlier even though 90% of the variable data points reveal an increase in investment pattern that should be biased towards a negative correlation.

Finally, from the analysis above, there is a weak correlation between variable **2** and **3** and thus the answers yes to the research question, is Software-as-a-Service (SaaS) adoption a competitive advantage in a banking sector disrupted by Fintechs? The steady variable increase in investment over the four year period (2016 -2020) considered in the study that remains on the same directional path with increased Cloud Datacenter compute workloads affirms that there is an inevitable push to the cloud for traditional banks as they continue to merge with Fintechs as early adopters (See Appendix Table. 7) of SaaS and this together with the

Data Quality and Ethical Implications

Accuracy

As considered in the methodological approach, data used herein is gathered from government bureaus of statistics, Information system journals and peer reviewed papers. The secondary data from government bureaus like statistic Canada appends an accuracy index represented with (A) as accurate, (B) as very good, (C) as good, (D) as acceptable, (E) as use with caution and (F) as too unreliable to publish (Statistics, 2019). It also further observed from the different books, journals and whitepapers (ACET16, 2020; Neil, R. 2011; Walterbusch, Martens and Teuteberg,2013) that the authors qualified their data by sourcing it from established audit firms like Deloitte and Ernst and Young as well as vendors like Schneider Electric who are reputable market leaders of their spaces (Gartner, 2020) . Furthermore, other sources Cisco GCI, ProQuest and EBSCO have been used to access either only peer reviewed scholarly articles, journals or books that have been subjected to professional scrutiny before publishing (John and Sons 2022). It thus can be estimated that the literature materials are considerably accurate and the data applicable for the research.

Reliability and Dependability

Data applied in the research is a combination of two datasets. One is from a credible Audit company and another from Cisco, a reliable cloud and networks technology proprietor that both apply different methodologies in building their respective findings. Nevertheless, the resources applied in this study are considered to be dependable.

Limitations

The data sources applied in the collection process disclose only a high level methodological detail for their audience since they build from multiple sources both as primary and secondary data. They are bound by different ethical requirements and Non-Disclosure Agreements (NDAs) as it is company based data that easily translates to legal action if abused. Unlike Social Science data and other qualitative data collected by governments who have authority over the population and economy, the sources are private entities that define more abrasive terms of access. Consequently some of the statistical data, though global might not be adequately representative of the preferred sample size for the research. Nonetheless, the Data collected was triangulated with other cloud computing and audit industry leader's projections like Price Water Coopers (PWC) and different Amazon (AWS) financial service case studies for reliability and they had common although not amalgamated positions.

Cloud computing datasets developed more than a decade ago are not reliable and can affect the margin of variation or correlation in the findings as Information Technology (IT) software and hardware rate of change is high by nature (Baumann, 2017). Unfortunately, the older datasets have more granular statistics and those after 2018 have less, a phenomenon only attributable to instituting the UK General Data Protection Regulation (GDPR) Act 2018. While most of the older ones are deprecated, private entities like IDC, Statista, IBISWorld, Accenture and Mckinsey that invest extensively in Information Communication Technology (ICT) and business research do not have open access to their datasets. This makes access to full datasets that allow for flexible and extended analysis hard. These limitation thus confine the study to only correlation analysis in answering the research question.

Conclusion and Recommendations

Customer expectations have been reshaped by Fintechs (Deloitte, 2020) and now demand similar user experience from traditional financial services. Responsiveness is paramount since the rules for competition in the digital era expect banks have to continuously modify their strategies to match up with consumer service expectations and increased supply of technology (FSB, 2019). The power lies in a quick Time-To-Market (TTM) accelerated by numerous tools and Application Programmable Interfaces (API) within the cloud, Software-as-a-Service platform. The research findings posit that maintaining a classical Resource Based View (RBV) of Information Technology (IT) that classifies it as a mere tangible resource of no competitive value undermines the capacity of technology advancement to redefine competitiveness. Indeed, neither the extent of technology's capabilities at this point were determinable nor the very evolution its nature. The banking industry setup and service oriented nature of business that is always client facing pushes the need for robust, scalable, quick and dynamic solutions to the limits which can solely be addressed by Software-as-a-Service (SaaS). SaaS is currently the last stage of Cloud service offerings and it reduces a bank's operational and overhead Information Technology (IT) costs immensely while elastically reducing total Time-to-Market (TTM), a synergy towards improved competitiveness. The model relieves banks of the tangible, replicable and yet costly aspects of Information Technology (IT) by availing affordable Pay-Per-Use (PPU) offerings which enable Information Technology (IT) to act as an intangible enabler to the more inimitable resources like organizational knowledge, know-how, staff skills and process. It is this dynamic nature of Information Technology (IT) that speaks to its relevance in present day banking environments whose competition is driven by rapidly changing service demands. Software-as-a-Service (SaaS) thus presents a two faceted contribution to the competitive advantage of a company; first in reducing cost on IT Infrastructure lifecycle management, and in increasing efficiencies of the intangible resources which are factors that affect sustained competitive advantage of an organization in a Resource Based View (RBV) approach.

Furthermore, cloud computing at inception was thought of as a sales platform for IT services than it was considered to be technologically driven according to (Jaatama, 2010). However, this has since changed to affect the licensing models for technology giants like Microsoft, Oracle and Azure to strictly avail their market leading options as a cloud only subscription for the financial service in bid to increase adoption levels. Gradually, this model is geared to limit organizations ability to secure both Infrastructure and software acquisition on-premise consequently pushing users to the cloud Alan (2019) enabling Cloud Service Providers (CSPs) to deprecate the on-premise path from their service offerings.

Finally, as banks seek to address IT skills obsolescence, higher investments costs lurk within the realm of functional and Hardware Obsolescence (Sandborn, 2007). Presently, DevOps allows for faster development and deployment of applications into production to meet business needs (Trihinas, Tryfonos, Dikaiakos and Pallis, 2018) and scaling or upgrade of IT infrastructure on premise is no longer feasible. Software-as-a-Service relieves the banks of this concern and associated costs for a lifetime, allowing for a focus on user experience and satisfaction where the competition has since been redefined to exist by the Fintech companies.

Recommendations

Based on the findings the data collected, expound on the existing knowledge of Information Technology's value with an extended Resource Based View on how it can strategically be exploited to translate to competitive advantage in the digital era. The research findings will potentially equip business leadership in the banking sector, with a fresh approach to Information Technology (IT) within the changing digital landscape of banking and Financial Technology (Fintech), adding to an appreciation of its capacity to create Sustainable Competitive Advantage (SCA) its duality. There is room for research on how the data ownership amidst the move to Software-as-a-Service, and the risk it presents to the competitive position of a firm if they have diminished or no control of Information Technology (IT) as valuable resource that is hosted in even geographical locations that could have different Data Protection laws than the Data owners.

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Appendix A EMEA Fintechs and Traditional Banks Merger Investment (Deloitte, 2020)

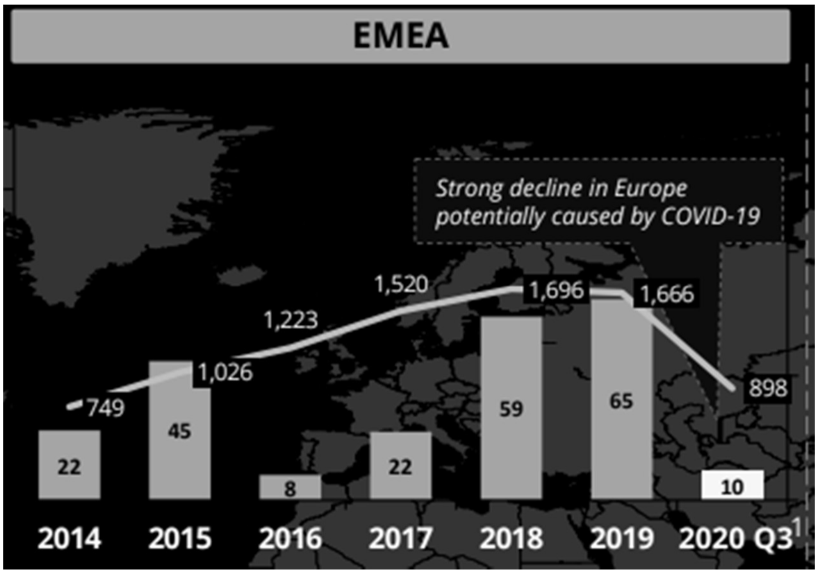

Figure .10. EMEA Fintechs and Traditional Banks Merger Investment (Deloitte, 2020)

Appendix B APAC Fintechs and Traditional Banks Merger Investment (Deloitte, 2020)

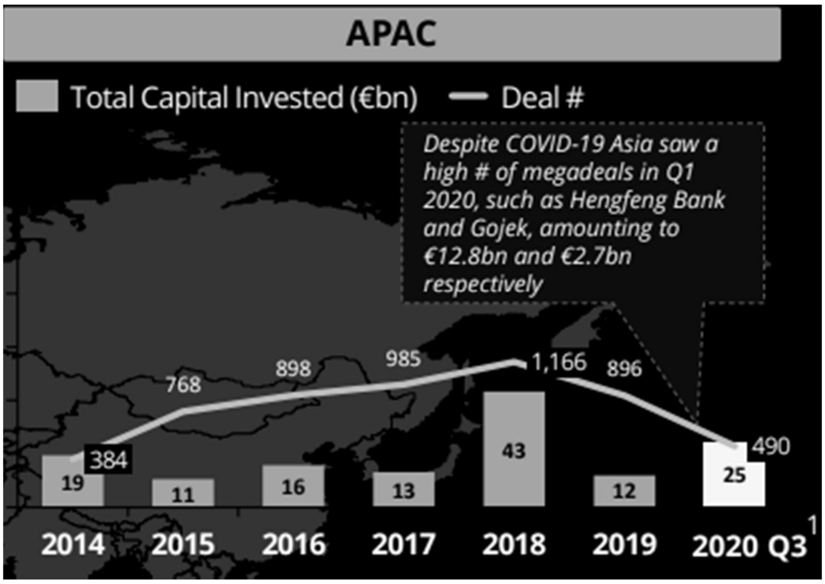

Figure .11. APAC Fintechs and Traditional Banks Merger Investment (Deloitte, 2020)

Table 4. *Information and communication technologies used by industry and size of enterprises (Statistics, 2020)*

Geography	Canada (map)				
North American Industry Classification System (NAICS)	Private sector	Wholesale trade	Retail trade	Finance and insurance	Professional, scientific and technical services
Size of enterprise	Total, all enterprises	Total, all enterprises	Total, all enterprises	Total, all enterprises	Total, all enterprises
Information and communication technologies (ICT) used	2019	2019	2019	2019	2019
	Percent				
Company-wide computer network	50.7^{A}	68.0^{A}	53.5^{A}	70.7^{B}	70.3^{A}
Industry-specific software	39.9^{A}	42.6^{A}	42.4^{A}	66.3^{B}	63.4^{A}
Software not specific to this business's industry	45.6^{A}	50.6^{A}	45.1^{A}	51.8^{B}	57.5^{A}
Customer relationship management (CRM) software	16.4^{A}	28.7^{A}	17.0^{A}	43.2^{B}	26.0^{A}
Electronic data interchange (EDI) on the Internet	11.1^{A}	17.7^{A}	12.4^{A}	29.3^{B}	12.3^{A}
Enterprise resource planning (ERP) software	5.9^{A}	17.7^{A}	5.7^{A}	7.3^{A}	9.5^{A}
Radio frequency identification (RFID) tags	1.8^{A}	4.1^{A}	2.3^{A}	1.3^{A}	2.5^{A}
Cloud computing	38.9^{A}	42.7^{A}	28.4^{A}	60.3^{B}	68.8^{A}
Internet-connected smart devices, or Internet of things (IoT)	22.6^{A}	24.6^{A}	23.3^{A}	14.5^{A}	26.2^{A}
Software and hardware using artificial intelligence (AI)	2.3^{A}	0.7^{A}	1.5^{A}	5.5^{A}	9.6^{A}
Advanced robotics	0.8^{A}	0.8^{A}	0.6^{A}	0.9^{A}	0.8^{A}
Big data analytics	1.8^{A}	1.9^{A}	1.3^{A}	5.9^{A}	6.4^{A}
3D printing	1.7^{A}	1.2^{A}	0.8^{A}	0.4^{A}	4.3^{A}
Blockchain technologies	0.3^{A}	0.0^{A}	0.9^{A}	0.8^{A}	1.1^{A}
Open source software	17.2^{A}	18.6^{A}	14.8^{A}	23.6^{B}	35.2^{A}
Business does not use information and communication technologies (ICT)	19.8^{A}	10.6^{A}	18.6^{A}	9.0^{A}	6.7^{A}

Table 5. *Regional Cloud Data Center Workloads and compute instances in millions (GCI, 2020)*

	2016	2017	2018	2019	2020	2021	CAGR 2016–2021
Asia Pacific	61.1	84.7	111.7	138.6	167.6	200.5	27%
Central and Eastern Europe	6.0	7.7	9.4	11.0	12.7	14.6	20%
Latin America	7.2	9.0	10.8	12.3	14.4	17.0	19%
Middle East and Africa	5.1	6.5	8.0	9.4	10.8	12.4	20%
North America	81.0	104.6	129.1	149.5	169.9	192.1	19%
Western Europe	39.0	49.9	61.8	72.5	83.8	97.1	20%

Table 6. *Regional Traditional Data Center Workloads and compute instances in millions (GCI, 2020)*

	2016	2017	2018	2019	2020	2021	CAGR 2016–2021
Asia Pacific	42.1	41.4	40.8	39.1	36.2	32.9	27%
Central and Eastern Europe	10.4	10.7	10.9	10.6	9.5	8.4	20%
Latin America	1.1	1.0	0.9	0.9	0.8	0.8	19%
Middle East and Africa	1.1	0.9	0.8	0.7	0.7	0.7	20%
North America	0.9	0.8	0.8	0.7	0.7	0.6	19%
Western Europe	19.9	19.5	19.0	18.0	16.6	14.9	20%

Table 7. Global Data Center Workloads and compute instances in millions (GCI, 2020)

	2016	2017	2018	2019	2020	2021	CAGR 2016-2021
Traditional data center workloads and compute instances	42.1	41.4	40.8	39.1	36.2	32.9	-5%
Cloud data center workloads and compute instances	199.4	262.4	331.0	393.3	459.2	533.7	22%
Total data center workloads and compute instances	241.5	303.8	371.8	432.4	495.4	566.7	19%
Cloud workloads and compute instances as a percentage of total data center workloads and compute instances	83%	86%	89%	91%	93%	94%	-
Traditional workloads and compute instances as a percentage of total data center workloads and compute instances	17%	14%	11%	9%	7%	6%	-

Table. 8

Derived Dataset Used in Quantitative Analysis For the Research

Region	Period	Traditional DC Compute WL (Mn.)	Cloud DC Compute WL(Mn.)	Fintechs and Traditional Banks M&A (€)
Central and Eastern Europe	2016	10.4	6	42.0
	2017	10.7	7.7	39.0
	2018	10.9	9.4	47.0
	2019	10.6	11	80.0
	2020	9.5	12.7	50.0
Latin America	2016	1.1	7.2	8.0
	2017	1	9	22.0
	2018	0.9	10.8	59.0
	2019	0.9	12.3	65.0
	2020	0.8	14.4	10.0
Middle East and Africa	2016	1.1	5.1	8.0
	2017	0.9	6.5	22.0
	2018	0.8	8	59.0
	2019	0.7	9.4	65.0
	2020	0.7	10.8	10.0
Notes	Notes: *M&A -Merger & Acquisition*			