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PROMOTING COMPETITIVE ENTREPRENEURSHIP: USING CLOUD COMPUTING FOR OPTIMAL BUSINESS INTELLIGENCE IN SMALL AND MEDIUM ENTERPRISES

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Abstract

Globally, adoption of Information Communication Technologies (ICT) especially emerging cloud innovations are increasingly becoming an integral aspect in enterprises' decision for sustained growth and competitiveness. Small and medium enterprises (SMEs) mainly adopt cloud services in order to facilitate their business operations and increase competitive edge. The key question is how to utilize available resources and opportunities for entrepreneurial success amidst constrained resources and competitive environment. Current advancement in ICT and in particular cloud-based Business Intelligence (BI) offer myriad of opportunities that have potential to accelerate SMEs growth, sustainability and competiveness. However, most SMEs especially in developing nations have not achieved anticipated level of cloud BI adoption and utilization. In particular, use of cloud BI services as an emerging technological paradigm in developing nations is characterized by challenges of slow adoption and sub-optimal use. This is mainly due to limited understanding of value of BI and uncertainties associated with new innovations. This review paper aims to enhance understanding on how to frame use of cloud BI within the five competitive forces model as a way to promote optimal use cloud computing for BI. The paper begins with a review of benefits of Cloud BI in SMEs. Further focus is on the hindrances and uncertainties that require mitigation in order to actualize the great opportunities of cloud BI for SMEs. The emerging insights will inform effective application of cloud computing for competitive business intelligence. This will potentially contribute towards realization of cloud BI in relation to promoting sustained growth and competitiveness in SMEs.

Keywords: *Cloud computing, Competitive business intelligence, Data analytics, Small and medium enterprises, Strategic advantage*

Introduction

Globally, ICT has become widespread and continues to revolutionize our lives in many ways. Business organizations and the entire society are now digitally connected in ways that affect how entrepreneurs perceive and operate within a business environment. In particular, business processes have undergone a paradigm shift that is manifested by how business transactions have become paperless, geographical and temporal barriers are now limited than ever before. More importantly, ICT advancements have led to new approaches that are now facilitating and promoting business processes (Tarutė & Gatautis, 2014). These processes include: cloud computing, online information resources, digital marketing and advertising, online market research, electronic payments, e-commerce, e-outsourcing online training big data analytics among others. As aforementioned, entrepreneurs need to leverage these emergent ICT to enhance efficiency and effectiveness in their business ventures (Consoli, 2012; Cuevas-Vargas, Estrada, & Larios-Gómez, 2016). In the interest of scoping the current chapter and aligned to the

gaps identified through this chapter, we focus on application of cloud computing in relation to promoting firms' competitiveness, with particular interest on SMEs.

Use of cloud computing in today's world represents a convergence of two major arenas in information technology. These arenas relate to: First, IT efficiency which entail a focus on green computing for efficiency in energy consumption and reduced electronic wastes (e-wastes). Secondly, business agility arena, whereby IT is applied as a competitive tool through various techniques such as rapid deployment, parallel batch processing, use of compute-intensive business analytics and mobile interactive applications that respond in real time to user requirements (Marston et al., 2011). There are three forms of cloud computing – software-as-a-service (SaaS), platform-as-a-service (PaaS) and infrastructure-as-a-service (IaaS) (Ramaswamy, 2015; Priyadarshinee, Jha, Raut, & Kharat, 2016). Firstly, SaaS offers complete applications on cloud computing environment, which applies pay per use model. This implies that the cloud users (in this case SMEs) do not need to house and maintain the application in its own data centre. The second form is PaaS which provides opportunities for clients to develop, test, host, deploy and maintain their applications in the same integrated environment, thus enabling a virtualized development environment as an outsourced service. Thirdly, IaaS enables clients to use cloud infrastructure according to their demands for particular time in which they pay on the basis of what they use. This allows the client to hire computing environment eliminating the need to create and maintain IT infrastructure internally. In the context of this chapter, use of cloud computing as a tool for business intelligence in SMEs mainly involves SaaS and IaaS.

Today, SMEs are increasingly being recognized as drivers of socio-economic growth and development in both developed and developing nations. SMEs are substantially contributing towards increased income, job creation, poverty reduction, sustainable entrepreneurship and more inclusive national development (Yeboah-Boateng & Essandoh, 2014). According to recent literature, SMEs constitute the most significant percentage of the private sector worldwide (OECD, 2018; Yeboah-Boateng & Essandoh, 2014). This is to suggest that their growth and sustainability is critical to global economic growth and development. The key question is how to utilize available opportunities to achieve the potential of SMEs amidst constrained resources in the digital and globalized society. One of the key resources that come with myriad of opportunities to serve this purpose is use of ICT. Convergence of digital society and advanced ICT has potential to accelerate SMEs growth and sustainability. However, most SMEs especially in developing nations have not achieved anticipated level of ICT adoption and utilization of ICT. In particular, cloud computing, an emerging technological paradigm in developing nations is characterized by challenges of slow adoption and sub-optimal use (Yeboah-Boateng & Essandoh, 2014). This is mainly due to limited understanding of value of BI and uncertainties associated with new ICT innovations. Cloud computing offers SMEs a relative affordable strategy for accessing scalable technological solutions, in ways that facilitate strategic

opportunities and competitive advantage without high costs and risks, thus giving them a level playing ground with larger firms (Gkikas, 2014; Yeboah-Boateng & Essandoh, 2014).

Many nations across the globe are increasingly experiencing socio-economic challenges of low productivity growth, diminishing trade and investment, and high inequality of income, wealth and well-being. It is now apparent that SMEs are potentially a key driving force to the shared aspiration of increasing productivity, reducing inequality and safeguarding the benefits from increased globalisation and technological advancements (Koirala, 2019). In the Organization for Economic Co-operation and Development (OECD) area (about 37 nations mainly in Europe, USA and Australia), SMEs represent almost the totality of the business population, account for 60% of total employment and generate between 50% and 60% of value added, on average (Koirala, 2019). In recent decades, employment in SMEs has steadily increased globally and they contribute to more than one third of GDP in emerging and developing economies and account for 34% and 52% of formal employment respectively (Koirala, 2019). Over 2003-16, across 132 countries, the number of total full-time employees in SMEs has nearly doubled, from 79 million to 156 million (ILO, 2017).

Moreover, SMEs are integral to ensuring more inclusive growth. SMEs typically create job opportunities across populations and sectors, employing broad segments of the labour force that generate value-added and quality jobs. The job opportunities generated through SMEs also provide avenues for skills development, inclusion and poverty reduction, especially in emerging and low-income nations by serving locations, populations and markets that do not have incentives to attract large-scale enterprises (Koirala, 2019). In this way, SMEs create entrepreneurial and job opportunities for the disadvantaged and marginalized groups, especially the youth, women and people living with disabilities. Increasing entrepreneurship and job opportunities among these groups, as well as improving their occupation and wellbeing, broaden the opportunities to promote productivity and sustainable economic growth.

Research Objectives

The overall objective of this paper is to explore how Cloud BI can be effectively applied as a strategy to stimulate SMEs competitiveness and sustainable growth. The specific research questions are:

i. How can use of cloud BI be framed within the five competitive forces model to promote optimal use of cloud computing for BI?
ii. What are the key benefits of Cloud BI in SMEs within a competitive strategy framework?
iii. What are the key hindrances and uncertainties that require mitigation in order to actualize the great opportunities of cloud BI for SMEs?

Review Methodology

This paper focuses on review of related literature with an aim to elucidate, critique and synthesize the key findings guided by the aforementioned focus. A systematic review approach was adopted in analyzing related literature (Rossella, 2015). This review adopts a qualitative interpretive approach that focus on analysis of related literature to inform the inferences offered (Rossella, 2015).

The reviewed studies were selected based on their suitability to address paper focus. In searching for the relevant literature, the author targeted articles focusing on key themes. Published research articles focusing on cloud computing and enterprise success determinant were selected. Inclusion criteria was established by using key search terms and phrases which included cloud computing, business strategic goals, competitive business intelligence, business data analytics, enterprise threats, small and medium enterprises and strategic advantage. Using these terms, a systematic search was carried between November 2020-August 2021 within leading electronic databases mainly Education Research Complete, ProQuest, Science Direct and Google Scholar.

To facilitate focused scope, the inclusion criterion was bound within SME contexts in the last 12 years in which advancement and widespread use of cloud technologies in enterprises has grown rapidly. Peer-reviewed sources were considered as the key source of literature in order to ensure quality of the review. This is what informed the exclusion criteria. A total of 22 sources were identified as relevant although the extent of their relevance varied in relation to the themes they revealed. Among the selected sources, 16 of them were peer-reviewed Journal articles and they were given primary consideration. In addition, other 6 relevant sources such reports from authoritative bodies and peer-reviewed books, conference articles that met inclusion criteria were selectively considered. The search process continued until the search could not reveal any new relevant articles without introducing redundancy. Retrieved articles were clustered based on inclusion criteria to enable a systematic review.

In reviewing the selected articles, scanning was done, organizing the articles according to their date of publication while considering the relevance of emerging themes. Selected journal articles were further categorized as primary (empirical) studies and secondary sources, giving preference to peer reviewed sources in the last 12 years (from 2010-2021). To enhance the depth and breadth of the review, other relevant sources of literature were keenly selected and included based on relevance of the emerging themes.

To exhaustively address the key theme of this review, each of the 22 peer-reviewed Journal articles were read and reviewed in depth to draw relevant inferences from their findings. In writing the literature review, the findings and perspectives from the reviewed articles were critiqued while drawing inferences from the key findings, implications and conclusions of each source. In addition, the relevant themes and implications for practice emerging from the other

literature were keenly considered and integrated guided by the central themes derived from reviewed empirical studies.

Review Findings and Discussion

The Strategic Role of Cloud Computing in Promoting Competitiveness in SMEs

Cloud-based ICT are providing new avenues for enterprises to grow leading to more productivity and job creation (Al-Johani & Youssef, 2013; Alcantara & Kshetri, 2013; Gkikas, 2014; Yeboah-Boateng & Essandoh, 2014). For instance, emerging innovations including mobile-based cloud applications have created new opportunities which have promoted business environment especially in SMEs. ICTs also support innovation that has created new, more flexible forms of entrepreneurship and employment. However, ICT create opportunities, but also pose new challenges for workers and employers (Yeboah-Boateng & Essandoh, 2014). By enabling new forms of work, ICT also changes the structure of jobs, the way people develop their career, and the way they work. These changes require to be well management through appropriate change management strategies.

Use of ICT including cloud services in business organizations has led to the concept of strategic information systems and strategic business information systems goals (Ramaswamy, 2015; Priyadarshinee, Jha, Raut, & Kharat, 2016). Strategic information systems can be defined as computer-based systems at any level of the organization that change goals, operations, products, services or environmental relationships to help the organization gain a competitive advantage. Correspondingly, strategic business information systems goals refer to role of information systems in facilitating and promoting strategic business goals resulting to strategic opportunities and benefits (Laudon & Laudon, 2018). From a broader perspective there are six strategic business goals that are applicable to enterprises, namely: operational excellence, new product, services and business models, customer and suppliers' intimacy, improved decision making, competitive advantage and survival. In relation to these six core goals, Table 2 offers a Summary of strategic benefits in relation to competitive advantage.

As summarized in Table 1, cloud computing contributes to strategic benefits in many ways towards achievement of strategic business goal and competitiveness. In order to use the strategic information systems as competitive tool in enterprise, it is important to frame implementation of ICT and information systems within relevant competitive theories and models. The selected competitive model is articulated in the subsequent section.

Table 1: Summary of Cloud Computing Strategic Benefits and Related Competitive Advantages

Initiative	Benefit
Reduce costs	An enterprise can gain advantage if it can sell more units at a lower price while providing quality and maintaining or increasing its profit margin.
Raise barriers to market entrants	An enterprise can gain advantage if it deters potentials entrants into the market, leaving less competition and more market potentials.
Establish high switching cost	An enterprise can gain advantage if it creates high switching costs; making is economically infeasible for customers to buy from competitors.
Create new products or services	An enterprise can gain advantage if it offers a unique product or service.
Differentiate products or services	An enterprise can gain advantage if it can attract customers by convincing them its product differs from the competitors.
Enhance products or services	An enterprise can gain advantage if its product or service is better than for competitors
Establish alliances	Firms from different industries can help each other gain advantage by offering combined packages of goods or services at special prices.
Lock in suppliers or buyers	An enterprise can gain advantage if it can lock in either suppliers or buyers, making it economically impractical for suppliers or buyers to deal with competitors

Theoretical Perspectives: Porter's Five Forces Competitive Model

Porter's five forces model offers a suitable framework for industry analysis and business strategy development. It draws upon industrial organization (IO) economics to derive five forces that determine the competitive intensity and therefore firm's survival and sustainability in the market (Laudon & Laudon, 2018). Competitive advantage can be achieved by enhancing the firm's ability to deal with customers, suppliers, substitute products and services, and new entrants to its market, which in turn may change the balance of power between a firm and other competitors in the industry to the firm's advantage. The five competitive forces model is used to describe the interaction of external influences, especially threats and opportunities that affect an organization's strategy and ability to compete. A typical enterprise is exposed to a number of potential external threats as outlined below (that can be re-shaped into opportunities by making appropriate strategic decisions) (Porter, 2008):

- The threat of new entrants into its market
- The pressure from substitute products or services
- The positioning of direct industry competitors'/industry rivalry
- The bargaining power of suppliers
- The bargaining power of customers

Porter's competitive forces uncover the most important aspects of a competitive environment. They also provide a foundation for determining firm's strengths and weaknesses in a way that can guide decision makers towards effective strategic and operational decisions (Porter, 2008). The model represents congruent conceptual underpinnings that can facilitate effective requirement definitions for BI and evaluation of effectiveness of the existing business strategies. In these ways, SMEs will be in better position to anticipate and exploit opportunities more favorably.

Awareness of the five competitive forces can support a firm understand the structure of its industry and strategize a position that is more profitable and less vulnerable to the potential threat in terms of becoming non-competition or unprofitable (Porter, 2008). This implies that the SMEs need to analyze their goals and requirements for BI using the five competitive forces as an underpinning framework. As well, for strategic continuity they need to use the same framework to evaluate the actual value of BI. For instance, this would help them gain a complete picture of what is influencing the enterprise profitability. Using BI output strategically, they can then be able to identify game-changing trends early, so they can swiftly address potential risks and exploit opportunities ahead of competitors. This means that SMEs can identify the drivers or constraints on profitability which informs decisions on how to reshape the forces in their favour. Reshaping competitive forces in firm's favour can be achieved through various ways as discussed in the following sub-section.

Countering Competitive Forces: Key Competitive Strategies to Deal With Competitive Forces

In order to achieve sustainable competitiveness, competition must be defined beyond current industry rivals and direct competitors to include the other four competitive forces: potential entrants, substitute products, suppliers and customers (Porter, 2008). The extended dynamics that results from all five forces defines an industry's structure and shapes the nature of competition. The five competitive forces also inform the drivers of profitability and the appropriate decision for setting competitive strategy. Applying cloud BI within competitive model therefore enhances understanding of the competitive forces, and their underlying shapers, which in turn offers more reliable insights on the source of current profitability while providing a framework for anticipating and influencing competition and profitability) in future. Based on Porter's conceptualization, the five forces model is depicted in Figure 1.

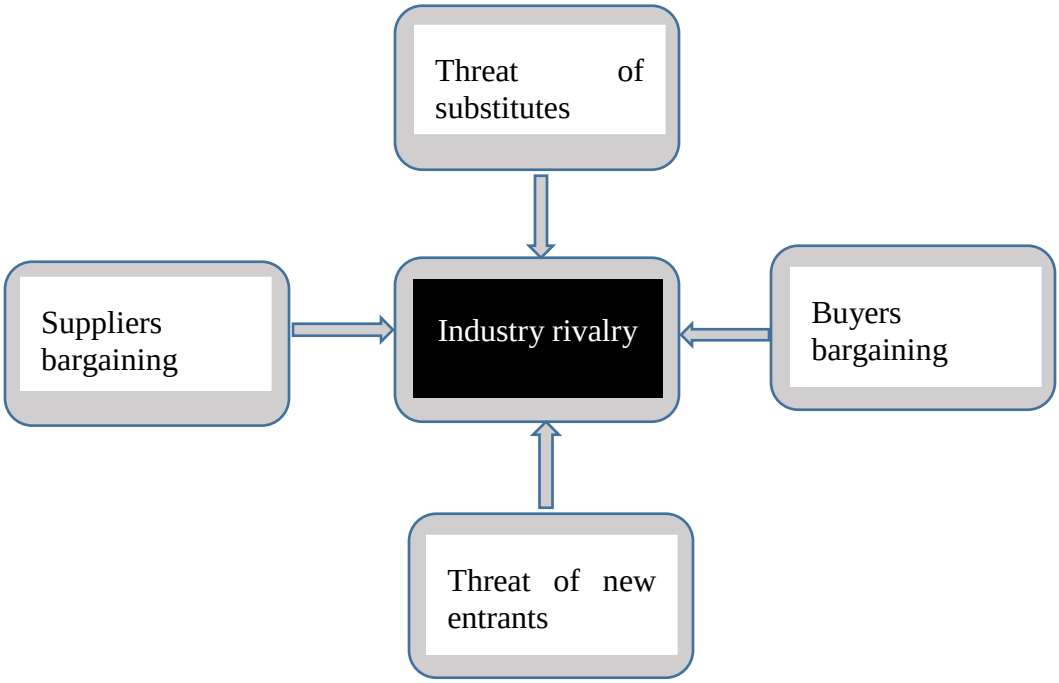

Figure 1: Five Forces Competitive Model (Adapted from Porter, 2008)

According to Porter (2000; 2008), there are 4 key strategies that can be applied to counter competitive forces favourably. The four competitive strategies are summarized in Table 2 in relation to how cloud computing can facilitate strategic advantage.

Table 2: Summary of Competitive Strategies and BI Usefulness

Strategy	**Example of how the strategy relate to cloud BI services**
Product differentiation	Firms equipped with appropriate BI can utilize various opportunities including ICT to create products and services that are custom- tailored to fit the customers' needs in a unique way.
Focused differentiation	Sophisticated cloud BI tools are able to establish patterns from large pools of data and infer rules from them that can be used to guide tailor-made production, branding and marketing decisions.
Links to customers and Suppliers	Effective BI can enable enterprises to gather intelligence on customers' behavior, needs and expectations. It can enable an enterprise to identify new trends which informs tailored interactions with supplier towards meeting enterprise's needs.
Low cost producer	Strategically oriented BI can help enterprises to significantly lower internal costs by utilizing BI information to become first movers as they discover opportunities and threats ahead of competitors.

At this point, it is important to note that for an enterprise to able to implement the aforementioned competitive strategies and gain competitive advantage with information systems, they need devise appropriate and adequate techniques to inform and shape these strategies. However, such techniques are not obvious and this means that potential benefits in applying ICT and information systems could diminish. Innovative use of cloud computing has potential to offer effective and cost-effective techniques to address this challenge. Albeit increased cloud technologies, business organization and in particular, the SMEs sector is yet to substantially embrace this opportunity. Research with a focus on application of cloud computing in SMEs is still at nascent stage, much of it focusing on factors influencing diffusion, benefits and limitation. There is very little critical analysis on desirable approaches towards realization of benefits and management of limitations. This informs the focus of this chapter which is on application of cloud computing for competitive (business) intelligence as a technique for informing and optimally shaping competitive strategies. This will potentially contribute towards realization of competitive benefits in relation to competitive advantage outlined in Table 2, thus promoting sustained growth and competitiveness in SMEs.

Business and Competitiveness Intelligence

Broadly, business intelligence (BI) entails collecting and analyzing information about products, business processes, markets, competitors and environmental changes. BI refers to effective ways of collecting, storing and analyzing multifaceted set of enterprise data from internal and external sources for purposes of converting the data into more meaningful information through intelligent applications, designed to support decision making processes and informing firm's strategic goals (Al-Aqrabi et al., 2015). The fundamental viewpoint is that the current patterns can provide insights from which future behavior can be anticipated. Competitive intelligence refers to application of BI as technique for better understanding of behavioral patterns in a competitive market with the aim to identify strategic opportunities and inform strategies that convert opportunities into strategic advantage (Laudon & Laudon, 2018). Cloud-based BI in the context of this chapter is applied as a broader term which encompasses use of cloud applications, infrastructure, and related best practices that support enterprises to access and analyze diverse data from internal and external sources. Cloud service providers are increasingly offering advanced services that have capability to collect and analyze both structured and unstructured data from existing business information systems and other sources. The core aim is to obtain information that can guide and optimize decision-making processes for improved business strategic positioning and strategic advantage, hence the concept of competitive intelligence as a cloud service.

The concept of applying cloud computing as an ICT tool for business intelligence relate to use of cloud-based intelligence tools as a means to enhance data-driven decision making approaches. In the recent times, business organizations have demonstrated interest to use data-driven approaches in decision making. However, they mainly rely on desktop risk and market analysis techniques to gather business intelligence in relation to competitive opportunities and risk analysis. Limitations associated with these traditional practice mean reliance on models which assume a normal Gaussian distribution of events which can result to underestimated risks and misinformed business strategies (Chang, 2014). Use of cloud computing as a tool for business intelligence offers flexible and optimal capacity that can potentially enable and sustaining competitive advantage in a competitive market that commonly characterize SMEs.

It is important to illustrate the concept of competitive intelligence at this point being a core concept in this chapter. The following is a simplified example of how competitive advantage may be derived from business intelligence using cloud services. Through (cloud-based) business intelligence, a firm can discover (unlimited) important market trends before its competitors, it can then apply complex analytical capabilities of Business Intelligence as a Service (BIaaS) to optimally infer the correct interpretation of information ahead of its competitors, and make a decision in relation to whether and how to adapt product differentiation, focused differentiation, and enhance relations with customers and suppliers. As well, this information can

enable the firm to become low cost producer. Low cost production, for instance, can be achieved through enabling the firm to lower their internal costs and market risks, thus allowing them to deliver products and services at a lower price (and potentially with higher quality) before the competitors focus on business opportunity. Lower internal could result from exploiting the advantage of adequate (or non-competitive) supply of inputs, and non-competitive distribution channels as other industry players are yet to identify the new opportunity. This results lower cost of production and more efficiency in supply chain management. Thus, gaining strategic competitiveness through first-mover advantage (Laudon & Laudon, 2018). The competitive advantage gained by being first to offer a competitive intelligence is such an important aspect of gaining competitive edge in the market.

Overview of Cloud-Based BI Functionality

Today, data-driven approach to BI are enabled by enhanced data collection and management capabilities that are supported by large data warehouses with 10–100s of terabytes of Web-based relational database management systems (RDBMS) that have advanced interactive capabilities (Al-Aqrabi et al., 2015). Cloud-based BI applications comprise a number of data warehouses created by obtaining decision-support data from organizational databases which store relevant internal and external data. The key capability of the cloud-based BI relate to data warehouses that are updated frequently (or real-time) through appropriate queries executed on the business processing and transactional information systems. BI is therefore relevant to SMEs in monitoring the performance of business processes through analysis of multidimensional data taken from distributed sources and accurate visualization (Al-Aqrabi et al., 2015). Visualization is a key component of BI that provides a better and faster way to identify patterns, trends and correlation in data sets that would otherwise remain undetected with conventional data formats.

BIaaS in the cloud has capacity for dual-service meant for risk computation and pricing for financial analysis (Chang, 2014). The first type of BIaaS service offers capabilities to compute of risks and asset prices. The second type of BIaaS service facilitates business analytics for multi-dimensional market analysis. Such cloud services therefore support risk and financial analysis and optimizes accuracy, timeliness and efficiency in business analytics. The concept of business analytics relates to data analytics which is part of prediction-making phase within the BI process. Moreover, cloud BI is also linked to Online analytical processing (OLAP) framework that provide the user-end interface of BI (Al-Aqrabi et al., 2015). This interface has enhanced visualization capability to generate multi-dimensional graphical reports to the end users. These reports constitute value of cloud BI in providing timely, accurate, organized and integrated information that is useful in guiding and optimizing decision-making processes for improved business strategic positioning and strategic advantage. The BI and OLAP framework therefore offers an important resource to enterprises by facilitating identification and management of

business process inefficiencies and informing about unexploited opportunities at operational and strategic levels.

Based on traditional BI applications that are desktop-based, the high costs associated with acquiring and maintaining BI and OLAP framework has made them unreachable especially to SMEs (Al-Aqrabi et al., 2015). However, recent ICT innovations in cloud computing are now offering more advanced capabilities at a relatively low cost to enterprises. Cloud BI also come with more efficiencies, effectiveness and better affordability mainly because of the following characteristics: unlimited /scalable resources, resource flexibility (resources on demand), cheaper usage costs, high uptime and availability, enhanced security, limited user involvement in upgrading and maintaining extensive servers and databases (Bento & Bento, 2011). Based on these characteristics, cloud computing has great potential to enhance enterprises experience with BI especially through offering SMEs a playing level ground with large firms in relation to affordability and elasticity of infrastructural and software resources and medium-scale businesses, which could not afford the framework in self-hosted IT infrastructures. While this potential is enormous, SMEs are yet to fully benefit due to sub-optimal utilization of cloud service especially among emerging economies where websites and email applications are the most commonly used cloud services.

A BI system is made of seven technical layers: IT and related infrastructure, data acquisition, data integration, data storage, data organizing, data analytics and data presentation (Al-Aqrabi et al., 2015). BI and OLAP framework comprises a highly complex multi-layer structure. The 7 key components of BI and OLAP framework are outlined in Table 3.

Table 3: Key Components of Cloud BI Framework (Adapted from Al-Aqrabi et al. (2015))

Component	Description
User interface layer	Comprising a large library of dashboards for graphical reporting.
Layer for data analytics	Comprising what–if scenarios, reports, stored queries and data models.
layer for storing the OLAP cubes	Created by multi-dimensional data extraction from the data layer (the data ware-houses)
Data integration layer	For identification, cleaning, organizing and grouping of data extracted from the data warehouses before the cubes are formed.
Data layer	Comprising of the data warehouses
Layer for acquiring data	For acquiring data from the business processing, decision support and transactional databases used by various functions of the organisation.
IT infrastructure layer	The layer comprising the IT infrastructure components and related resources (data processing, storage and networking).

Benefits of Cloud-Based BI

Cloud BI has high computing power and capacity that can support analysis of multifaceted risk environment and complex data analytics within a business setup. This potential has coincided with the challenge of big data which poses the need to have tools that can help entrepreneurs navigate through massive structured and unstructured data. It would be unreachable and cost ineffective to manage such data using traditional desktop BI application and tools especially in the context of SMEs due to their limited scale of operations. Utilization of cloud BI solves this problem and offers various benefits for enterprises (Al-Aqrabi, et al., 2015). The five key benefits of cloud computing for BI in SMEs are described below based on Al-Aqrabi, et al. (2015) conceptualization:

The first benefit relates to ***Cost efficiency***. In the Cloud through use of SaaS and IaaS, SMEs do not need to invest in large, up-front purchases of software packages or carry out time-consuming updates on local servers to put the BI infrastructure up and running. Cloud enables them to use these resources as scalable services, paying only for what they need (pay-as-you-use) at any particular time. This implies that SMEs can access advanced BI services at appropriate scale devoid of costly infrastructure acquisition and maintenance.

Flexibility and scalability is the second key benefit. Cloud BI services offer greater flexibility that is quickly adaptable to give decision makers in the enterprise access to new data sources, as well as opportunities experiment with varying analytical models. With the Cloud BI solutions, SMEs will be able to maintain enhanced fiscal control over IT investments and have the flexibility to scale usage easily to align it with their needs. Moreover, in the Cloud, resources can be automatically and rapidly scale up or down. This means that customers can easily upgrade their software usage instantly without the need to deploy additional hardware and software. Another important aspect of flexibility is that cloud-based BI has capability to update output in real-time which enable end users get the right answers to the right questions each time they need information pertaining to particular business processes. On-demand updates also eliminate the need to constantly re-generate analyses.

Thirdly, SME are also able to benefit from more ***reliable servi*****ces** through use of cloud BI. This is because cloud–based services are hosted on multiple redundant sites, which provide reliability and secure locations for data storage and access to computing resources that are distributed across diverse users. This capability is critical to disaster recovery and business continuity.

Fourthly, cloud BI offers enhanced ***data sharing and concurrency capabilities.*** Cloud applications allow data access to be shared remotely and concurrently. It also enables easy cross-location data sharing capabilities as they are deployed via the Internet and outside the enterprise's firewall. This sharing capability enables enterprises to access relevant external data more systematically and in a timely manner. As part of enabling shareability and concurrent use, cloud BI not only facilitate creation and distribution of automated reports that are distributed across the organization, it goes further to allow end users to define those reports. This means users have features that enable users to define and set up the reports they need to access as their needs changes.

Fifth, cloud BI services do not necessitate ownership of hardware and software and thus ***require no capital expenditure***. Low total cost of ownership (TCO) is a key benefit of the Cloud BI. With the Cloud, enterprises just need to pay for a service they actually use and therefore resource ownership is not a requisite. With this provision, cloud BI enable SMEs to have better control of the capital expenditure (CAPEX) and the operations expenditure (OPEX) associated with non-

core services. Relative affordability in accessing scalable cloud BI services offer SMEs a level playing ground with larger firms, thus enhancing their competitiveness (Gkikas, 2014; Yeboah-Boateng & Essandoh, 2014).

Despite these benefits, it is also important to point out that BIaaS is also prone to various threats and limitations. These hindrances need to be acknowledged and mitigated as enterprises endeavor to adopt the promising cloud BI technologies. These threats are discussed in the following section.

Threats and Limitations of Using Cloud BI

There are number of threats that are common while using cloud computing services in general that are also applicable to cloud BI service. As Pyae (2018) noted, data breaches is one of the key threats in cloud computing, between the providers and the clients and/or among owners of external data. This is mainly compounded by lack of policy alignment and common legislative frameworks across nation. Cloud computing being borderless is likely to involve multiple stakeholders and different nations, thus SMEs face the challenge of disharmony in policy and legal frameworks. In addition, there is a considerable lack of trust between the service providers and enterprises as end users. In pursuit of outsourced cloud services, the SME owners may feel vulnerable to lack of privacy and exposure of their internal data to external environments. The aspect of privacy contrasts with the desirable characteristics of flexibility and sharing capabilities in cloud-based of services (Stergiou et al., 2018); thus the need to establish appropriate compromising balances among stakeholders.

Moreover, there is also potential threat of compromised credentials and broken authentication leading to unauthorized access to privileged information. The threats of hacker attacks, accounting hijacking leading to interruptions and denial of service are not uncommon in cloud-based services (Stergiou et al., 2018; Subramanian & Jeyaraj, 2018). Sometimes, the hackers may be even insiders with malicious intentions but it becomes more difficult to identify the source of attack when services of BI are hosted virtually. Permanent data losses are also a potential occurrence if the service provider has no adequate capacity for backup and server redundancy services. However, virtual security technologies have substantially advanced which means the extent of such security threats largely depend on the provisions of particular cloud service providers.

Furthermore, there are other organizational-related limitations that SMEs might experience during implementation of BI cloud services depending on their distinctive circumstances and environment. The magnitude and effects of these limitations are mainly determined by internal factors. As Pyae (2018) suggest, these limitations will determine the actual benefits and value that an individual SME can gain from cloud BI. Firstly, undefined requirements which imply the

enterprises may fail to achieve expected results, if from the outset they do not have clear definition of their BI needs in relation to business process and strategic goals. Without clear requirement definition, there is possibility for loss of focus and prospects to measure the actual value of BI diminish. Secondly, SMEs may fail to realize optimal benefits from BI if the decision makers and end users do not have adequate competence to enable them identify relevant data and interpret BI output. This aspect is critical especially in the context of today's world that is characterized by big data from both structured and unstructured sources. While BI cloud technologies have capacity to handle large amounts of complex data, it is not obvious that SMEs will draw proper optimization from the BI output if they don't invest in internal capacity building (Larson & Chang, 2016). Effective capacity building for successful utilization of new ICT innovations goes beyond technical skills to incorporate appropriate change management (Al-Johani & Youssef, 2013; Alcantara & Kshetri, 2013; Gkikas, 2014; Yeboah-Boateng & Essandoh, 2014). Change management is an important internal success factor in adoption of BI cloud services. Thirdly, there are also limitations in measuring and verifying the quality of data especially for data from external sources. This aspect is compounded by various factors in today's digital world including rapid change in market structures due to globalization and the current trends in big data in relation to its massiveness and unstructured nature especially due to proliferation of social networking. Fourthly, the quality and value of BI that an individual SME experience will definitely depend on design and service levels available from the cloud service provider they choose. This means that the enterprise's decision makers need to undertake due diligence to ensure value for money and alignment of outsourced services to the organizational needs.

Conclusions and Recommendations

To this end, it is apparent that cloud BI has incredible potential to facilitate high performance and user-friendly environment for SMEs towards generating adequate competitive intelligence that can inform decision making for sustainable growth and competitive strategies. Cloud BI platforms mainly provides SaaS and IaaS layers that have high computing power and capacity to support analysis of multifaceted risk environment and complex data analytics for strategic and operational business processes. This potential of BIaaS has also coincided with the current trends in the digital society such as proliferation of Internet connectivity, globalization and big data. These trends pose the need to have versatile BI tools that can help entrepreneurs navigate through massive structured and unstructured data and optimally adaptable and visualized output. It would be unreachable and cost ineffective to manage such complex data dynamics using traditional desktop BI application and tools especially in the context of SMEs due to their limited scale of operations. Utilization of cloud BI therefore solves this problem and offers other important benefits to enterprises.

The key benefits and barriers of Cloud BI in SMEs are identified through this chapter suggest that cloud BI represents a great opportunity that cannot be ignored if SMEs are to attain sustainable competitive edge and profitability. These benefits include cost efficiency, flexibility and scalability, shareability and concurrency, reliability and no requirement for capital expenditure. Through these benefits, SMEs are able to access strategic opportunities and attain competitive advantage without high costs and risks, thus giving them a level playing ground with larger firms. However, it is also important for SMEs to be cognizant of the hindrances and uncertainties that can limit realization of the expected benefits. As such, there is need to address key issues of concern such as data breaches, privacy issues, denial of services and change management among other important internal factors.

Moreover, the relevance of framing BI application on Porter's five competitive forces cannot be overemphasized. As a key recommendation, application of cloud BI within this competitive model enhances understanding of the industry structure which is essential to effective strategic positioning. Use of the model can guide decision makers and entrepreneurs in analyzing the underlying drivers of each competitive force to inform on recent and likely future changes in each force, both positive and negative. This approach can enable SMEs to overcome competitive forces and reshape them to their competitive advantage. Integrating the five forces framework analysis while implementing cloud BI provides enterprises with creative strategies that go beyond analytical outputs to enable them to optimally identify distinctive opportunities early and position themselves strategically for sustainable competitiveness.

Finally, the insights emerging from this review are relevant to the policy makers and stakeholders in showing the relevance of extending capacity building initiatives for SMEs to awareness creation and skills development on use of cloud BI. This review also offers basis for further empirical studies on appropriate strategies to empower SMEs in optimal use of cloud BI for enhanced competiveness and sustainable growth. Further research and development are also necessary to formulate technical solutions to mitigate threats that may undermine targeted outcomes.

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