IBIMA Publishing
Journal of Cloud Computing
https://ibimapublishing.com/articles/JCC/2021/110932/
Vol. 2021 (2021), Article ID 110932, 12 pages, ISSN: 2169-0359
DOI: 10.5171/2021.110932

Research Article

Skill Deficits Impact Cloud Business Returns

Brian Cusack and Adekemi Adedokun

AUT University, Auckland, New Zealand

Correspondence should be addressed to: Brian Cusack; brian.cusack@aut.ac.nz

Received date:16 September 2020; Accepted date:10 February 2021; Published date: 16 June 2021

Academic Editor: Peter Busch

Abstract

Cloud computing (Cloud) presents an opportunity to businesses for cost reduction in IT services, however, it also requires new skills to optimize the effective management and realization of the business benefits. The skills gap is described as a deficit because many previous management methods and strategies fail to adequately cover the new requirements and fully grasp the value opportunity. Businesses are offered the opportunity to purchase IT services (computing, storage, software, etc.) as required rather than retaining traditional IT assets and infrastructures. Management must disentangle from former IT services supply arrangements, and effectively engage with new contractual and trust requirements. This research proposes the next question: What are the impacts of Cloud computing on the required business IT skill sets? A sample of 20 industry consultants was analyzed through interviews and the data was thematically analyzed in NVIVO to answer the research question. It was found that some skill sets have become irrelevant to business performance and other new ones are in demand. Skills deficits were particularly apparent in the security area where privacy and data protection are a concern. The implications are for new Cloud management knowledge and techniques, education and training, and for implementing effective utilization.

Keywords: Cloud Opportunity, Skills, Management, Disruption.

Introduction

Cloud is an evolving technology that is disrupting established computing and business information services. It is replacing many supply models with an on-demand generic system that is causing radical changes to the way Business Information System (BIS) services are perceived and procured. The revolution is causing disruption that impacts every sector, from the breaking up of tradition business value chains and creating new business models, to creating new business

Cite this Article as: Brian Cusack and Adekemi Adedokun (2021)," Skill Deficits Impact Cloud Business Returns", Journal of Cloud Computing, Vol. 2021 (2021), Article ID 110932, DOI: 10.5171/2021. 110932

skill sets, and changing the stakeholders' ecosystem. Studies (Youseff, Butrico and Da Silva, 2008; Armbrust et al., 2010; Jadeja and Modi, 2012) have analyzed the benefits and limitations of Cloud. In addition, many studies focus on exploring the factors affecting the adoption or resistance to Cloud services in organizations (Khan and Malluhi, 2010). These studies identify that the biggest challenge or limitation facing Cloud adoption is related to security and privacy concerns. From the perspective of the business model, some studies have investigated the role of value networks in Cloud computing and for Cloud business models (Clohesy, 2016; Frank, 2012; Hedman and Xiao, 2016; Krikos, 2010; Marston, Li, Bandyopadhyay, Zhang and Ghalsasi, 2011). Another notable concern when adopting Cloud technology is the lack of expertise for maximising the potential benefits of the technology, and for optimizing the positive and negative risks associated. Cloud computing is transforming the way Information Technology (IT) services are accessed and provided for business purposes. However, the opportunity to create a Cloud business value has few guidelines or proven risk treatment strategies. Cloud is changing the traditional IT roles and the skills required for success. This research is specifically concerned with the management skill sets required for maximizing the potential benefits from the Cloud technology opportunity.

It has been argued that the advances in Cloud computing is as much dependent on the organization structures and processes as it is on technology (Fellows, 2008). The adoption of Cloud services involves a redefinition of existing business service skill sets by creating new requirements and terminating the old ones. There are two aspects in a technology shift (Avram, 2014, p. 533). The first is concerned with acquiring new skill sets to deploy the technology in the context of solving a business problem, while the second is concerned with how the technology will change business structures. For example, system support skills diminish in the scope when Cloud applications come with their own support, and a support function changes to exclusive co-ordination and communication skill sets. Subsequently, the business restructures to discontinue internal IT hardware and software support services and concentrates on on-demand service supply to match the business processes. Consequently, the IT service supply becomes an information management task that optimized the value returns, and the business design a BIS architecture with optimized revenue streams. The radical redesign leaves a trust and a skills gap for business processes to adapt and to fill. One of the major challenges is finding those in the business who can and will change to meet the new challenges. A skills deficit inhibits beneficial returns on the new business opportunities. Yeboah-Boateng and Essendon (2014, p.14), in their studies, noted that the shortage of internal knowledge and expertise are rated as the biggest limitations to Cloud revenue gains, especially amongst Small and Medium Enterprises (SMEs). This paper briefly explores the theoretical background to Cloud service transition, defines a research methodology, and then reports the findings to answer the research question: What are the impacts of Cloud computing on the required business IT skill sets?

Theoretical Background

The concept of disruptive technology or innovation was first introduced by Clayton Christensen (Christiansen, 1997). According to Christiansen, disruptive technologies are innovations that interrupt the prevailing order of things in a particular industry. These innovations occur less frequently, and are likely to be cheap, smart, and easy to use. Also, they have the tendency to alter the market dynamics and nature of competition which may result in the failure of established businesses. Christiansen further identified two criteria to define a disruptive technology (Christensen, 2002). First, a disruptive technology should enable less skilled or less-wealthy customers' access to what only the skilled or intermediary customers could do. Secondly, it should meet the demands of low-level customers who only require limited functionality of

existing products in the market. This business model is expected to enable the disruptive innovator to realize attractive profits that are unattractive to the current innovators. Cloud shows the features of disruption, and it offers improvement in terms of performance, convenience, price, and flexibility to meet and exceed market demands (Krikos, 2010, p. 23). Businesses now have access to computing resources that previously appeared impossible cost-wise (Krikos, 2010, p. 24). Moreover, the low-cost utility pricing model of Cloud computing enables vendors to target those customers that were initially unable to access such resources and services. Christiansen's disruptive theory is based on the idea that existing companies aim to satisfy and respond to their current customers but fail to commit to new technologies and eventually end up losing to the newcomers whose businesses are built around the new and trending technologies. Cloud has been referred to as a disruptive technology as it exhibits all these characteristics (Sultan, 2012, p. 167).

The Cloud computing opportunity, from the vendor's perspective, also means disruption to revenue streams and value chains (Hedman and Xiao, 2016, p. 3990). The Cloud business model removes the need for separate maintenance and license fees, hence simplifying the complexities involved in software releases, patch management, and human maintenance service between the service provider and the business. However, this source of revenue normally accounts for two-thirds of a major software business income (Cusumano, 2010, p. 29). One-third of the service revenue is generated from customizing software and patch migration, and this is also eliminated (Cusumano, 2010, p. 29). Furthermore, the traditional software delivery model to end customers usually involved several layers of businesses; however, the mediating layers are eliminated as Cloud provides software solutions remotely and directly as a service (Boillat and Legner, 2013, p. 49; Hedman and Xiao, 2016, p. 3991). Cloud is also changing the stakeholders' ecosystem. The traditional IT service provision system consists of two stakeholders, which are the consumer and the provider, however, Cloud is changing these roles as well as introducing new enablers to service a provisioning ecosystem (Marston et al., 2011, p. 182). There are now three entities in the Cloud ecosystem: Cloud Service Users (CSU), Cloud Service Providers (CSP), and Cloud Service Partners (CSN). Disintermediation and new entities eliminate the need for a middle layer for business transactions. The Cloud business model is changing the structure of the software and IT service industries. Software and services are being delivered directly to the end users and disintermediating various software vendor partners such as Value-added-Resellers (VAR) who act as consultants, mediators, and retailers for distribution of the products (Hedman and Xiao, 2016). With Cloud service infusion, the need for this kind of partnership is eliminated and replaced by a triangulated flat structure. The Cloud disruptive model is displacing some businesses, while others are benefitting from the changes (IBM, 2010, p. 3).

Cloud introduces new threats to established business models and disrupts traditional value chains. Therefore, it is critical that skill groups are available to thoroughly analyze the Cloud opportunity and to meet a business need before adoption (Frank, 2012). The success or failure of a business is dependent on understanding the new ecosystem of competing risks and opportunities before purchase commitments are made. These are the new skills required for effective business delivery. In the past, IT services were about the technical capability to do the business work and the cost-benefits of the solutions provided. With Cloud, the emphasis has shifted towards thinking out the best combination of IT service choices for the highest business returns. The opportunity to explore and test business ideas has been made possible by removing the constraints of in-house IT capability and the cost-efficient purchase of on-demand services. This business opportunity has removed the cost of purchasing hardware and software, its depreciation and retirement costs, and the

cost of retaining expensive high-end IT skill groups. IT procurement advisors are now required to optimize the purchase of on-demand services to match the business requirement and compute the economic value from the service supplier choices. These are business optimization skills for business project design, service procurement, and market thinking. Figure 1 summarizes the literature analysis of the transformation in IT skills before and after Cloud.

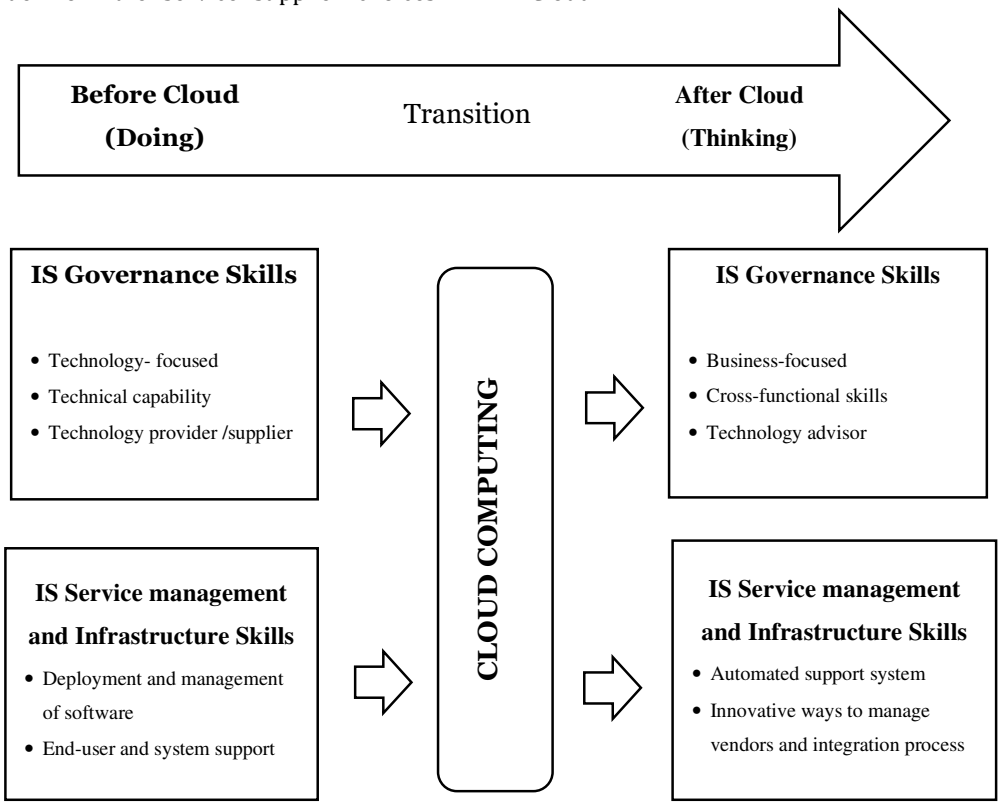

Fig. 1: Skills & knowledge transitioning

The roles are changing from doing the actual technical jobs to thinking of innovative ways to maximize the available technology for optimal business benefits. The concept has shifted from an "IT support business" to "IT empowered business". The traditional skill requirements have shifted away from doing processes that are supported by IT, toward enabling business thinking by providing seamless IT opportunities for the business plans. Cloud provides the freedom to choose quantities, qualities, and the scope of services as required; however, the skill and capability to do this effectively is a gap in the current practice.

Research Methodology

Qualitative research is an interpretive-based method which seeks to understand the way others conceptualize events and concepts (Kaplan and Duchon, 1988, p. 572; Creswell and Miller, 2000, p. 125). Qualitative research tends to focus on how or what questions, which enables the researcher to explore in depth a specific context and observe the situation. When textual data are quantified, the aim of understanding a context from the participant's view is lost (Kaplan and Maxwell, 1994). Hence, this makes the qualitative approach suitable for exploring opinions and perceptions about Cloud impacts. A two-phase approach was

adopted in this study. First, a pilot survey of industry experts was conducted through Survey Monkey to confirm the relevancy of the questions, and then semi-structured interviews were conducted with 20 selected participants. An important consideration in qualitative research is determining the sample size. The qualitative sample size is calculated by contextual considerations and the number of participants that will be needed to attain saturation (Glaser et al., 1968, p. 61; Turner-Bowker et al., 2018, p. 842). Saturation emerges when no more data are being found or repetition is occurring. Hence, a purposeful sampling size method will be used to suit the requirements of the study.

For this study, data was collected through a purposive, semi-structured, industry-based interview method after the questions and topics of interest were confirmed relevant in the pilot study. The participants were industry experts, selected based on their expert knowledge and experience working in traditional IT service environments as well as working in the Cloud environment. Selecting participants for qualitative research cannot be random, as it is chosen based on the interest of the researcher (Stake, 2005). The questions for the interview were prepared ahead of time by using the pilot study feedback. The respondents were probed to elaborate on their responses further, when, and where needed. The interview time varied between 30 minutes to one hour, depending on the respondent's disposition. The sample was limited to participants with an expert knowledge background who have experience in IT services roles for at least five years, having at least two years of experience working in a Cloud environment (see Table 1). An expert interview is concerned about the participant's knowledge and experiences because of their actions, roles, responsibilities, or obligations within a specific organization or institution (Littig and Vienna, 2013). An expert interview provides insights on background information, such as expert knowledge and descriptions of processes (Harrell and Bradley, 2009, p. 24). Also, expert interviews are a more efficient and concentrated way of gathering quality data than using observation and surveys (Bogner et al., 2009, p. 3). An expert, in this sense, is a person with insights in aggregated or specific knowledge (Van Audenhove, 2007, p. 5). Furthermore, one of the strengths of Interview methods is that it gives voice to common people, allowing them to present their life situations in their own words freely and provide personal interaction between the researcher and the subjects (Kvale, 2006, p. 481).

Table 1: Interview Participants

Interview participants	Job title	Years of experience	Years in current position	Cloud service or environment deployed	Years using Cloud services
P01	Audit Manager, Technology	10+ years	0-3 years	AWS and Azure (PaaS, IaaS, SaaS)	0-3 years
P02	IT Audit Manager	3-6 years	0-3 years	IaaS, SaaS	5+ years
P03	Internal Auditor	7-10 years	0-3 years	SaaS	5+ years
P04	Audit Manager	0-3 years	0-3 years	Microsoft Azure	0-3 years
P05	Network Engineer	10+ years	0-3	AWS	0-3 years

			years		
P06	Intermediate Developer	0-3 years	0-3 years	AWS	0-3 years
P07	AWS Specialist	3-6 years	0-3 years	Public Cloud	0-3 years
P08	Cloud Engineer	10+ years	0-3 years	Private Cloud	0-3 years
P09	Information Security Analyst	0-3 years	0-3 years	AWS / Azure	0-3 years
P10	Audit Manager	3-6 years	0-3 years	Sharepoint	3-5 years
P11	IT manager	10+ years	7-10 years	IaaS, PaaS, SaaS	3-5 years
P12	Senior Systems Administrator	7-10 years	0-3 years	Iaas SaaS	0-3 years
P13	Cloud Security Advisor	3-6 years	3-6 years	Hybrid	3-5 years
P14	Solution Specialist - Security Architecture	0-3 years	0-3 years	Both Microsoft Azure and Amazon Wed Services	0-3 years
P15	Chief Technology Officer	10+ years	0-3 years	AWS Serverless	0-3 years
P16	IT Consultant	3-6 years	0-3 years	Azure / AWS	0-3 years
P17	Site Reliability Engineer	0-3 years	0-3 years	Openstack, Vcenter, Hyper-V	3-5 years
P18	Senior security risk analyst	7-10 years	0-3 years	software as a service	5+ years
P19	IT platform manager	7-10 years	0-3 years	Azure / AWS	0-3 years
P20	Lecturer	10+ years	0-3 years	Azure and AWS	0-3 years

Findings

The Pilot study provided feedback on the questions and the relevancy of the assumptions the researcher planned to explore. There was 100% agreement that Cloud is causing significant changes in business IT skill requirements, confirming the researcher's hunch that this is a relevant area for research. However, other questions, teasing the strength of the Cloud, resulted in divided opinions. However, there was an agreement that the skills requirement has changed and not all traditional skills are redundant. There was also a significant group of respondents who indicated that they were not sure about the new skills requirements on account of the evolving and changing work environment. The indication is that new and old skills are required for success when taking up the Cloud opportunities. Hence, the researcher was assured that the relationship between Cloud changes and new skills was a matter

of concern. It is part of industry consciousness and problem-solving. There are divided opinions on several issues regarding the features of the required skills for Cloud (see Table 2).

Table 2: Pilot Study Responses

Question	Yes	No	Not Sure
Are new skills required to cope in the Cloud environment?	89%	11%	0%
Does the type of Cloud determine the business skills required?	78%	12%	0%
Is Cloud causing significant change in IT skill requirements?	100%	0%	0%
Are some skills now irrelevant in Cloud?	33%	45%	22%
Are traditional skills still efficient in Cloud?	67%	22%	11%

The 20 interviews were noded and coded, and thematically analyzed using the NVIVO software. The codes were systematically reviewed, modified, and categorized into broader themes for extended meanings. The review resulted in merging, renaming, and clustering nodes into related categories. The emerging ideas were reconstructed into broader hierarchical themes known as tree nodes. For example, skills were grouped together as essential skills required to work with Cloud computing technology. A total of six descriptive themes emerged, of which, four are related to skills. The first theme that emerged is related to the important skills required to cope in the Cloud environment. This theme is in line with the research question, which seeks to elucidate the important skills required by business professionals to optimize Cloud business opportunities. The skills are categorized into technical and non-technical skills (see Figure 2). The tree nodes confirm the earlier literature review that showed Cloud privacy and security concerns as inhibitors to its adoption. The analysis shows a dominant and detailed expression of security features but a lesser concern for basic IT business skills. This suggests that the perceived IT skills are security related and that other IT skill requirements are simple communication matters. The non-technical nodes are also populated with listed business skills for Cloud value generation. Principally, Analytics, Creative thinking, and Vendor management are the required skills. Vendor management is critical to optimizing business returns, having the three controls of co-ordination, contracts, and economic value (Figure 2).

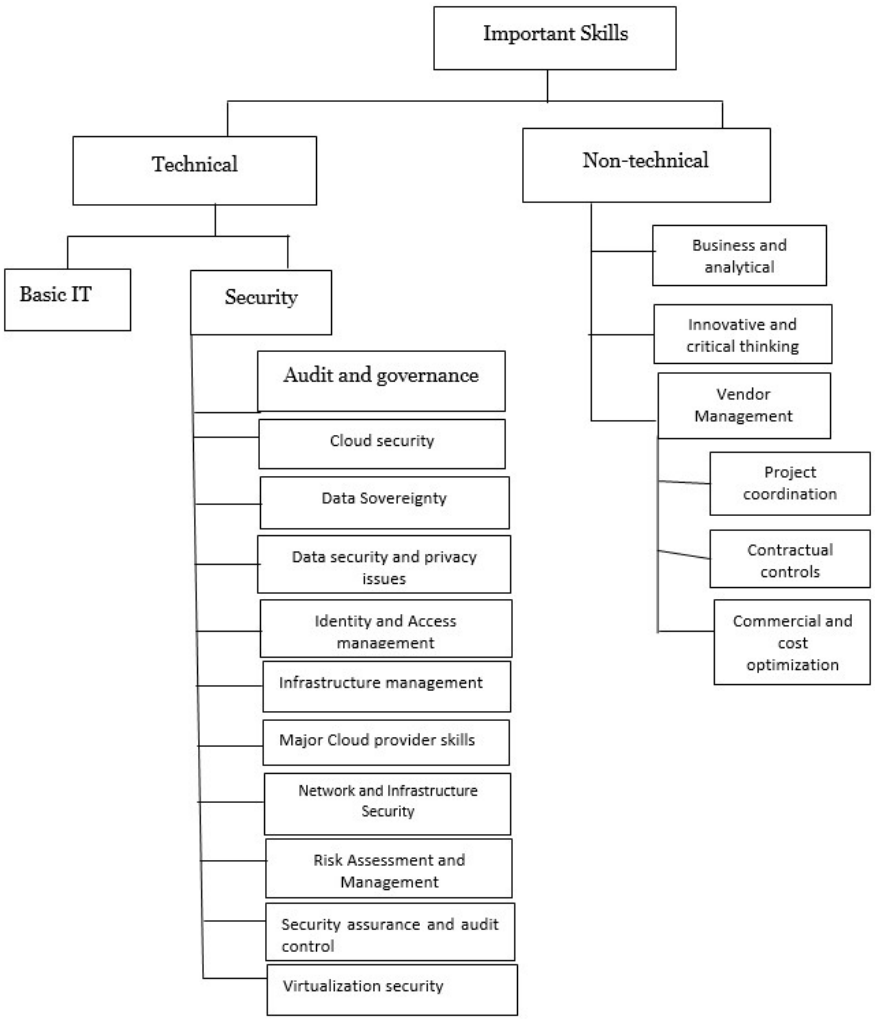

Fig 2. Codes for the Skills Theme

The first subtheme in the technical skills category is basic IT skills. Participants believe that basic IT skills are still important and fundamental in working in a Cloud environment. Overall, there was an emphasis on programming skills for application building and communication in this category. The participants noted that as there is a rise in automation and outsourcing, there is going to be a rise in the need for programmers in the future. Other skills included in this category are service and traffic management. For example, participant P12 and P14 noted that: "well, I still think the core skills of IT are still needed in terms of you know, in terms of scripting, patching, and all those kinds of things." However, the second subtheme of security had many more entries. Security is an all-encompassing word used by the participants throughout data collection. There is a large focus on risk assessment and management skills in the security category. An overarching skill requirement mentioned by most of the respondents is related to risk assessment and leadership in the Cloud environment.

Cloud technology increases the attack surface and makes risk management a

difficult task to achieve. The following excerpts illustrate some of the participants' views on the need for risk management skills. “Cloud significantly increased the need for formal risk management training”, “You still have to have a full-stack understanding in order to assess risks exposed, maybe not at quite the depth on physical security aspects but this still comes into play for the consumers of the Cloud service and the devices that they use. The data is still held somewhere in something that has a level of risk that you need to understand.” “This is one area where most changes will take place. A much larger amount of data will be travelling out of our network boundaries, mobile apps are on the increase, and people are working from a remote location. Securing our data will become increasingly more difficult.” “The most important skills you’ll have are related to access management. It is very important in this area”. Cloud services, especially data storage, are breaking the traditional geopolitical barriers of data privacy; hence, skills related to understanding legal requirements and compliance of data to enforce global data privacy are necessary. Other skills identified in the security category are information security governance and audit controls, virtualization security, and network and infrastructure. Network and infrastructure security skills are stated to be essential to protect and manage the organization’s Cloud infrastructure.

Non-technical business skills were also critical for using Cloud opportunities. Skills that emerged in this category are business analytical, innovative and critical thinking, and vendor management skills. “Cloud technology is requiring new thinking patterns and is currently lacking people with critical thinking that can cover those domains.” There is a shift in IT professionals focusing on business and analytical skills. Innovative and creative thinking is necessary for professionals to view and address security in the light of Cloud technology. Participant P01 noted that:

> “As a general rule though for ALL staff, developing a new thinking pattern is absolutely critical. Incorporating all the key areas of thinking is important to deliver a secure product. Too often, it is a "just make it work" mentality that leads to issues in security, gaps in risk controls, and over-provisioned environments. As an example, trying to educate teams to ensure they understand that THEY own the risk for their systems and not the risk teams have been a huge challenge. It requires a shift in thinking to really take accountability for what they build”.

Vendor management skills were also mentioned where there is an emphasis on commercial and cost management, contract negotiations, controls, and project coordination/management (PO7).

> “A lot of organizations now are creating teams around managing their costs in the Cloud, because most of the Cloud services charge you per hour for using the services, and some even charge you per minute. There is a high probability that some services are in use but not used, and you just deploy them, nobody is using them, and they are incurring costs for you. So, learning to manage those commercial aspects of Cloud is another good skill”

Discussion

The data analysis showed that there is a clear perception that the required IT skills for a successful business practice have changed because of the Cloud impact. There was, however, less certainty regarding the required new skills since previous ones have become irrelevant. The strong advocacy was for a basic set of IT

business skills and a demand for security skills for the Cloud. There was a sense of uncertainty in the responses that reflected the unfolding nature of Cloud impact and the belief that many skills could be transformed or adapted to be effective in the new Cloud context. Figure 2 identified sets of technical and non-technical skills required for optimizing Cloud business opportunities. These findings confirm previous literature reports of Cloud impacts on skill requirements. The respondents also noted the deficits in different skills areas created by the Cloud impact. These skills deficits were particularly apparent in the security area where privacy and data protection are a concern. It also reflected the challenges and changing nature of Cloud security that requires new knowledge and techniques. There was a strong belief that current skills can be used; however, there was uncertainty regarding their effect. The apparent lack of knowledge of the actual skill requirement suggests that some of the beliefs are wishful and may cover the need for a far greater acquisition of skills knowledge for effective Cloud security. The current risk exposure levels in the Cloud are driving demand for new skills and the requirement for more effective risk treatments.

Cloud has impacted both business and IT staff skills requirements. Cloud has introduced IT utility for all staff, and IT can no longer be segregated into a supply department. Business professionals are expected to be competent with a sufficient technical understanding to work with Cloud technology and use it as an integrated element in the business function. This means that IT staff must improve their non-technical skills and business managers must improve their IT technical skills. Both transition impacts are required for the employment and the successful utilization of Cloud services. The IT staff needs to acquire appreciative business skills of critical thinking, production and management, people management, emotional intelligence, judgment, knowledge negotiation, and cognitive flexibility. The business staff must add systems knowledge, device management, security consciousness, techno-logics, application management, and work systems knowledge to the daily skill set. All staff requires soft or intangible skills such as communication and interpersonal skills, project management, contractual control, and operations management. Cloud requires a new strategy to redesign the assimilation of IT and business requirements, to successfully maximize the Cloud business opportunity and to achieve competitive advantages. The impact of disruptive technologies can lead to the success or failure of a business, and filling skills deficits is crucial for achieving successful business outcomes.

The skill requirements for BIS participants in the Cloud environment are often portrayed as a reduction of the IT skill and an increase in business management skills. This research shows that respondents see the impact of Cloud as having a two-way effect. There is a reduction in IT skill requirements in terms of volume and scope, but equally, there is a demand for business managers to increase their IT skills and understanding of technical thinking. The former sharp segregation between IT and business skill sets is diminished by the Cloud impact, and cross domain skills and competences are required. Cloud is displacing many of the traditional skill supply assumptions, but also providing a new and evolving opportunity for innovation. Cloud provides cost-efficient opportunities for businesses by offering a variety of dynamic, scalable, and shared services. To maximize the business benefits, skill groups are required to represent strength in both domains, but more importantly partner with IT and business requirements concurrently. Demand for business-related skills, organizational skills, service-related skills, communication skills, and security skills are required by all staff. This means that previous areas of specialization must be shared and fairly distributed as generic skill sets. Security skills and service-related skills are ranked as the core of a business skill set required in the Cloud.

Conclusion

Cloud is a pervasive technology that has the capability to supply all BIS services. In this paper, a survey and interviews with experts were used to identify industry perceptions of Cloud impacts and the impact on the required new business skill sets. The data showed uncertainty as to the precise skill sets required for a successful business practice; however, there was an agreement that Cloud has changed the requirements. The ambiguous state reflects the current state of flux where there are degrees of Cloud use from little to 100%, and knowledge gaps for optimizing gains in current business adoptions. The skills deficits were particularly apparent in the security area where privacy and data protection are of concern. It also reflected the challenges and the changing nature of Cloud security that requires new knowledge and techniques. The skills impact is often portrayed as an IT loss and a business gain. This research shows that there are impacts from Cloud in both technical and non-technical skill sets that affect the whole business. Further research is required into the strategies for maximizing Cloud benefits and minimizing the drag factors that erode trust and slow the returns.

References

- Avram, M. (2014) 'Advantages and challenges of adopting Cloud computing from an enterprise perspective.' *Procedia Technology*, 12, 529-534.
- Bento, A. and Bento, R. (2011) 'Cloud computing: A new phase in information technology management,' *Journal of Information Technology Management*, 22(1), 39-46.
- Boillat, T. and Legner, C. (2013) 'From on-premise software to Cloud services: the impact of Cloud computing on enterprise software vendors' business models,' *Journal of theoretical and applied electronic commerce research*, 8(3), 39-58.
- Chiregi, M. and Navimipour, N. J. (2017) 'A comprehensive study of the trust evaluation mechanisms in the Cloud computing,' *Journal of Service Science Research,* 9(1), 1-30.
- Cusumano, M. (2010) 'Cloud computing and SaaS as new computing platforms,' *Communications of the ACM*, 53(4), 27-29.
- Friedman, A. L. (1994) 'The Information Technology Field: Using Fields and paradigms for analyzing technological change,' *Human Relations*, 47(4), 367-392.
- Hedman, J. and Xiao, X. (2016) "Transition to the Cloud: A Vendor Perspective," Proceedings of the49thSystem Sciences Conference (HICSS), Hawaii, USA.
- Jadeja, Y. and Modi, K. (2012) "Cloud computing-concepts, architecture and challenges," Proceedings of the Computing, Electronics and Electrical Technologies (ICCEET) International Conference, Milan, Italy.
- Khajeh-Hosseini, A., Greenwood, D., Smith, J. W., and Sommerville, I. (2012) 'The Cloud adoption toolkit: supporting Cloud adoption decisions in the enterprise,' *Software: Practice and Experience,* 42(4), 447-465.
- Khan, K. M. and Malluhi, Q. (2010) 'Establishing trust in Cloud computing,' *IT professional*, 12(5), 20-27.
- Krikos, A. C. (2010) Disruptive technology business models in Cloud computing, Massachusetts Institute of Technology Press, USA.
- Marquis, H. (2018) 'The Impact of Cloud Computing on Staffing,' *Computer and information Science*, 2(4), 565-578.
- Marston, S., Li, Z., Bandyopadhyay, S., Zhang, J. and Ghalsasi, A. (2011) 'Cloud computing—The business perspective,' *Decision Support Systems,* 51(1), 176-189.
- Orlikowski, W. J. and Baroudi, J. J. (1991) 'Studying information technology in organizations: Research approaches and assumptions,' *Information Systems Research*, 2(1), 1-28.

- Seay, C., Washington, M., and Watson, R. J. (2016) 'Impact of the Cloud on IT Professionals and the IT Industry,' *Encyclopaedia of Cloud Computing*, 653-663.
- Sultan, N. and Sylvia, B. (2012) 'Organisational culture and Cloud computing: coping with a disruptive innovation,' *Technology Analysis & Strategic Management*, 24(2), 167-179.
- Yeboah-Boateng, E. O. and Essendon, K. A. (2014) 'Factors influencing the adoption of Cloud computing by small and medium enterprises in developing economies,' *International Journal of Emerging Science and Engineering*, 2(4), 13-20.
- Youseff, L., Butrico, M. and Da Silva, D. (2008) "Toward a unified ontology of Cloud computing," Proceedings of the Grid Computing Environments Workshop, GCE'08.