An Exploratory Study on the Adoption of Infrastructure as a Service (IaaS) for Small and Medium Enterprises (SMEs) in the Media and Advertising Industry in Singapore

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Abstract

The challenging and highly competitive business environment necessitates that businesses adopt information technology to leverage their position in the market. Cloud computing is one of the technological advancements with great promise to small and medium enterprises. This study sought to explore the adoption of Infrastructure as a Service (IaaS) among the Small and Medium Enterprises (SMEs) in Singapore's media and advertisement industry.

Data were collected from 15 practitioners from five SMEs to provide an insight into their opinions and views on the adoption of IaaS. Together with existing literature and through qualitative research analysis the validated information collected were used to guide the analysis and presentation of the thesis. The resulting evidence guided the design of the proposed conceptual model which could provide informed decision making on IaaS adoption.

The study resulted in key findings that are valuable to the stakeholders in the industry. Practitioners have expressed concerns over challenges associated with IaaS adoption including upfront costs, difficulties in maintenance, and complexity in the billing processes. The research data suggested that IaaS adoption reduced costs of operation and released quality time for SMEs to focus on core strategic business issues resulting in increased competitiveness.

The contribution of this study dwells on a unified approach using the secondary (desk research) and primary (field research) approaches. This research resulted in an original and pragmatic model focusing on factors affecting the IaaS adoption, hence providing the bulk of knowledge in IaaS adoption among the SMEs which will continue to attract the attention of scholars given the need to rely on Information Technology (IT) as a basis to improve business competitiveness. Further, the study highlighted areas for further research to expand the knowledge in accelerating IaaS adoption for enhancing productivity for SMEs to stay relevant and attain sustainable competitive advantage in the digital economy.

Keywords: Business Environment, Business Systems, Cloud Computing, Infrastructure as a Service (IaaS) adoption, Singapore SMEs, Small and Medium Enterprises (SMEs)

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"We don't meet people by accident. They're meant to cross our path for a reason."

~ Kathryn Perez

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Finally, the readers who will be spending time reading this thesis.

Declarations

I hereby declare that the work presented in this thesis has not been submitted for any other degree or professional qualification and that it is the result of my own independent work.

Pok Stanley

Full Name Goes Here (Candidate)

01 October 2020

Date

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1.0 Introduction

Business competition across the various economic sectors is on the increase with new entries, changes in customer preferences and dynamics in the market environment necessitate that most of the firms employ relevant strategies to survive (Ford & Håkansson, 2013; Prajogo, 2016; Sipa, 2017). Research reveals that a company position is largely determined by its innovation, technologies and commitment to remain competitive in the market (Busch et al., 2014; Chen, Paxson et al., 2010). Information and Communication Technology (ICT) is one of the main factors that businesses rely on to leverage their competitiveness in the market environment (Bhatt & Grover, 2005; Modimogale & Kroeze, 2011; Powell & Dent-Micallef, 1997). Businesses continue to adopt various Information Technology (IT) solutions to improve their business positioning and competitiveness within their industry. Previous studies highlighted that cloud computing could be one of the approaches that companies employ to reduce costs and remain competitive in the industry (Aljabre, 2012; Heiser & Nicolett, 2008; Jadeja & Modi, 2012; Krautheim, 2009; Truong, 2010).

Small and Medium Enterprises (SMEs) are considered to be the backbone of the economy. Hashi and Krasniqi (2011) pointed out that SMEs are important to both the developed and transitioning economies given their role in job creation and contribution to gross domestic products (GDP). Studies by Aris (2007) revealed that the total contribution of SMEs to economic growth varies, for instance, SMEs in China and Germany contribute to over 55% of the total GDP whereas for countries like Korea and Japan SMEs the contribution is slightly over 50% as outlined in Table 1 below:

Table 1. SMEs contribution to GDP for various economies (Source: Aris, 2007, p.1)

Country	**Korea**	**Japan**	**Germany**	**China**	**Malaysia**
GDP Contributions (%) By SMEs	50.0% of GDP	53.3% of GDP	57.0% of GDP	60.0% of GDP	47.3% of GDP

Pratama (2018) reported that SMEs account for more than 89% of the total business establishment in the ASEAN region. The SMEs contribution to the countries' GDP is estimated to be between 30% and 35% (Pratama, 2018). This is further added to the SMEs role towards the creation of employment opportunities and penetration to the non-urban areas of the various countries. In a more recent study that focuses on Singapore, it was suggested that SMEs contribute to 65% of the total employment in the economy (Lee, 2019). Further, SMEs contributed to 49% of the GDP in 2017 which is an equivalence of US$196.8 billion (Lee, 2019). The figures are comparable with the data provided by Aris in his earlier research in 2007.

Unlike large companies, SMEs are constantly facing resource constraints that threaten their competitiveness within the industry which ultimately affects their survival to continue to operate. Therefore, the reliance on the appropriate technology is one of the approaches that SMEs use to leverage their competitiveness and overcome the challenges in the commercial environment. According to Nkhoma et al. (2013), cloud computing enables small and medium business enterprises to access software and hardware which reduces the costs they ought to incur when relying on their own IT infrastructure. Adoption of cloud computing such as Infrastructure as a Service (IaaS) forms part of the current technologies that enables SMEs to limit costs and improve business operations among other functions (Aljabre, 2012).

Nevertheless, the adoption of IaaS among SMEs especially in Singapore remains a noticeable concern among both researchers and practitioners. For instance, Forbes reported an annual growth of 29.2% in cloud computing adoption which is forecasted to reach $262.4B by the year 2027 (Columbus, 2018). Meanwhile, IaaS contributes 15.2% which shows the popularity of the model in meeting the business needs (Columbus, 2018). While the expenditure is projected to increase, cloud computing remains to be an inexpensive commodity in the technological shifts that enable the business to remain competitive through cost reduction among other aspects (Hugos and Hulitzky, 2010; Misra and Mondal, 2011; Wang et al., 2011).

1.1 Background of the Study

The present study focuses on Infrastructure as a Service (IaaS) adoption among a selection of Small and Medium Enterprises (SMEs) in Singapore's Media and Advertising industry. SMEs are important pillars of the economic growth of the nation. The SMEs are spread across all the economic sector including manufacturing, commerce, and services sectors. The statistics show that in the year 2017, SMEs made up about 99% of enterprises totalling around 190,000 in Singapore and contributing to almost half of the national gross domestic product (GDP) by employing about 70% of the national workforce (Chia, 2017).

While the percentage of their coverage remains 99, the number of SMEs is currently estimated to be over 273,100 contributes 50% of the GDP (Singstat, 2020). Further, SMEs employs 72% of the working population in Singapore (Singstat, 2020). In Singapore, SMEs are defined as companies that comprise at least 30% shareholding from residents, generate annual revenues of less than $100 million and employ less than 200 workers (Skills Connect, 2014). A study of Singapore SMEs' business structures showed that more than 70% have a sales turnover of even less than $1 million and are, therefore, known as micro-SMEs (Scully, 2014). Given their small size, the SMEs cannot rely on brand reputation and other traditional marketing approaches. As a result, the SMEs must leverage their competitiveness based on state-of-the-art technology to survive and remain competitive in the industry.

The 2017 statistics reported by the Department of Statistics Singapore revealed that there are 2,200 SMEs in the Media and advertisement industry out of which 85% are home grown. Therefore, 1,870 are deduced to be the local SMEs in the Media and Advertisement industry. Further, the Department of Statistics, Singapore revealed that only 14% of the SMEs rely on cloud computing services which indicates that 262 SMEs in the Media and Advertisement industry rely on cloud computing despite its importance in leveraging the business competitiveness. The industry comprises four main segments that are Film and Video, Games, Publishing, and Broadcasting. According to an annual survey on the media industry in Singapore entails games, broadcasting, and publishing accounted for 11.6%, 6.7% and 34.2% respectively (IMDA, 2018). The Film and Video was the largest contributor in the industry accounting for 47.6% (IMDA, 2018).

According to Alshamaila et al. (2013), SMEs reliance on scalable technologies improves their ability to deliver competitive products and services that level the competitive landscape. The media industry also referred to as the media and advertisement industry survey 2018 reported total revenue of SG$6,926.2 million (IMDA, 2018). The industry segments including Film and Video, Broadcasting, Publishing, and Games contribute differently to the overall revenue. For instance, in the 2018 report, the games segment contributed 28.1% of the revenue share which was the largest while the film and video segment resulted in 19.9% of the share (IMDA, 2018).

A study on the digital transformation in Singapore revealed that SMEs that have digital strategies realized a revenue increase of 26% (Singapore News Center, 2018). Cloud services especially IaaS is one of the main approaches to digital transformation among SMEs that provides operational and strategic advantages (Yeboah-Boateng and Essandoh, 2014). Further analysis showed the ability of the IaaS to reduce costs, improve business performance, as well as enhancing competitiveness in the global market (Armbrust, et al., 2009; Fan, et al., 2015; Marston, et al., 2011; Leavitt, 2009). Conversely, the SMEs in Singapore demonstrate a low adoption of IaaS compared to the large firms. The research by Microsoft Singapore indicated that only 56% of the SMEs in Singapore embraced IaaS and other digital technology compared to 98% in the large organization despite its benefits in engaging customers and optimizing operations (Singapore News Center, 2018). A review of the literature conducted by Tehrani and Shirazi (2014) affirmed that resources constraints and external challenges constitute the underlying reasons for the limited adoption of cloud computing. In this case, the costs associated with the adoption of IaaS are not feasible given the limited financial and human resource capacities among the SMEs. On the other hand, being a new technological development, lack of policy support and fear of failure compromise its attractiveness among the small firms which are susceptible to disruptions. Even with the stated challenges, cloud computing especially IaaS remains to be an available option for the survivability of SMEs in Singapore. It is for this reason that this research seeks to explore the potential for the adoption of IaaS among SMEs in Singapore's Media and Advertising Industry.

1.2 Problem Statement

Cloud computing technology especially IaaS has noticeable benefits to businesses across various sectors (Aljabre 2012; Wang et al., 2011). In media and advertisement where the use of new technology is commonly used due to its benefits, reliance on IaaS is known to improve business performance for both large and small business. Rath et al. (2012) pointed out that SMEs use cloud adoption as a strategic value to improve their competitiveness. It implies that IaaS represents one of the IT approaches that SMEs can employ to improve their competitiveness and longevity in the industry. According to Stansfield and Grant (2003) use of IT-related technology is necessary for SMEs to compete equally both locally and internationally through increased efficiency and financial control. Meanwhile, the adoption of the IaaS is relatively low among the SMEs in the Media and Advertising industry compared to the larger firms. The study by Infocomm Media Development Authority of Singapore (IMDA) found the implementation rate of cloud services by the enterprises to be very poor. It has been asserted that only about 30% of the organizations in Singapore have made use of cloud services and consequently reported higher growth rates in overall productivity (Ong, 2017). Further, operational efficiency has the potential to create more time for businesses to concentrate on core activities and improve their overall performance (Khan, 2015). However, it has been noted that small and medium enterprises lag in the adoption of cloud services (Staltari, 2017).

It is thus implied that IaaS as one of the cloud computing technologies may have both short-term and long-term benefits for SMEs in the Media and Advertising industry. Despite the purported benefits of the scalable technologies to the success of the SMEs, adoption especially in the Media and Advertising industry where there is a greater need to interact with the customers on a global scale is still very low (Carcary et al., 2014). It is apparent that cloud services particularly the adoption of IaaS are a key component of success that results in increased benefits to SMEs The study conducted by Khan (2015) revealed the need for cloud computing as the basis of a more efficient approach to business process management compared to other traditional approaches.

In Singapore, the Government has established mechanisms to support SMEs to adopt cloud computing services (Shiao, 2018). This implied a favourable policy environment and support in terms of expertise and finance. Stansfield and Grant (2003) contended that large amounts of public

resources were used for internet-related technologies among SMEs. However, the SMEs continued to perform relatively poorly due to limited internal resource capacity as well as a lack of training on information technology (Khan, 2015). Inasmuch as the external support may not be adequate, the benefits associated with the adoption of cloud services especially IaaS should act as a drive to the SMEs adoption of cloud services in the Media and Advertising industry. Meanwhile, the SMEs in the Media and Advertising industry in Singapore continue to lag in terms of IaaS adoption compared to the large businesses despite its ability to improve the competitiveness among the small enterprise (Shiao, 2018). Therefore, this study seeks to explore the potential adoption of the IaaS among the SMEs in Singapore's Media and Advertising Industry to address the existing challenges.

1.3 Research Purpose

Despite the continued efforts by the Government in Singapore, in terms of resource provision and policies to improve cloud adoption, the uptake of these technologies remains slow. Hence there is a need to understand how some SMEs in Singapore's Media and Advertising industry make such decisions. This will inform the practitioners and policymakers on the best approaches to adopt in improving the reliance on technology to improve business performance. The trends in adoption of the IaaS are contrary to the Government support and benefits that are associated with cloud computing. It implies that the concept of IaaS as a cloud-based service adoption in the context of Singapore presents a complex scenario that can be best understood through exploratory approaches. Therefore, the present study will provide an insight that is valuable in adopting or rejecting the IaaS as part of the cloud services. As a result, the study seeks to provide vital information to practitioners in their attempt to understand if implementation and adoption of cloud services would be in the best interest of the SMEs in the media and advertisement industry. The study aims to provide insights that are valuable to guide the creation of awareness and government policies to enhance the adoption of cloud services especially IaaS in Singapore.

1.4 Research Aim

To explore the adoption of infrastructure as a Service (IaaS) as a possible business enablement tool for Small and Medium Enterprises (SMEs) within the Media and Advertising Industry in Singapore.

1.5 Objectives of the Study

The study will be guided by the following objectives:

- Critically Review of Literature in the area of Information Technology as a business enabler or business enablement tool.
- Explore the key benefits of Infrastructure as a Service (IaaS) adoption for Small and Medium Enterprises (SMEs) in the Media and Advertising Industry in Singapore.
- Explore the key challenges of Infrastructure as a Service (IaaS) adoption for Small and Medium Enterprises (SMEs) in the Media and Advertising Industry in Singapore.
- Provide insights on whether Infrastructure as a Service (IaaS) adoption is a workable solution for Small and Medium Enterprises (SMEs) in the Media and Advertising Industry in Singapore

1.6 Research Significance

The Government has demonstrated an interest in the need to spearhead cloud services adoption in Singapore. This is apparent in the nationwide promotion of fibre broadband network usage and the industry digital plans (Kiat, 2017). The case of SMEs is of significant interest to the Government based on the low levels of adoption compared to the MNCs. The adoption of cloud services especially IaaS is still 31% among the SMEs in Singapore (Kiat, 2017). One of the major efforts that the Government has put in place to improve cloud services is The SME Go Digital program.

Inasmuch as there is limited data based on the various sectors in the economy, the low percentage also implies a likely limited adoption among the SMEs in the Media and Advertising industry. SMEs have limited resources despite the large number in Singapore's Media and Advertising industry. The budget constraints imply a lack of incentive to invest in Information Technology services such as cloud computing. As a result, most SMEs rely on traditional approaches or outdated technology in the performance of tasks. Given the importance of cloud services, it is a

key component of technological advancements that will likely enhance success among SMEs across the various sectors.

Despite the considerable amount of research focusing on the general areas of cloud services, there is limited emphasis on the specific elements of the cloud services especially IaaS. This is not surprising given that cloud adoption is a new technological approach to business that has not been exclusively explored. The present research will, therefore, use an exploratory approach to study the adoption of IaaS as an aspect of the cloud services among the SMEs in the Media and Advertising industry in Singapore. The benefits of IaaS to SMEs in a highly competitive market environment are considerably apparent in the revenue returns and opportunities for businesses among others. Meanwhile, the existing resource challenges that are both human and financial form part of the barriers to IaaS adoption. Research has demonstrated that the application of cloud services results in a reduction in costs and the creation of more time for businesses to focus on core activities among other benefits (Armbrust et al., 2009). SMEs compete in an environment that include but not limited to giant businesses which have greater resource capabilities. Therefore, the adoption of cloud services especially the IaaS balances the competitive landscape to enhance the performance of the SMEs. The present research reveals the uses of IaaS to the SMEs to improve the knowledge among the managers and business owners especially in Media and Advertisement industry.

The present research outcomes will enhance the understanding regarding IaaS adoption among the SMEs in Singapore's Media and Advertising industry. Further, the research has the potential to highlight the benefits, challenges, and factors that influence the adoption of the IaaS among SMEs in the Media and Advertising industry. Thus the research will significantly assist decision-makers in supporting the cloud services adoption. Similarly, the research will involve a review of the literature and the conducting of empirical research and study. As a result, the study will be valuable to the scholars by contributing to the existing knowledge regarding the IaaS adoption as well as adding to the bulk of knowledge in cloud services adoption in the context of SMEs.

1.7 Structure of Thesis

The Thesis is presented in six (6) main chapters which include Introduction, Literature Review, Methodology, Data Analysis and Findings, Discussion and Conclusion.

Chapter 1 provides an overview of the study background, statement of the problem, research purpose, and aim of the study. It further encompasses the objectives, research questions as well as significance of the study. The chapter ends with an outline of the research.

Chapter 2 will provide an in-depth review of the literature on cloud computing with a focus on the IaaS. The first chapter entails the introduction of the extant research and a brief background of the literature review focusing on IaaS and its uses among SMEs. Additionally, the general background of the literature review introduces SMEs in the context of Singapore's Media and Advertising Industry. Given that several studies are focusing on cloud computing services, the chapter seeks to review studies that examined cloud computing especially IaaS. Having established a general background to the literature review and the context, the study examines the theories that underpinned the study. The study further involves a comprehensive analysis of the Diffusion of Innovation Theory (DOI), the Technology Acceptance Model (TAM), and the Technology-Organization-Environment Framework (TOE). While the theories provided critical insight into the factors considered in technological adoption, TOE and TAM frameworks have been considered to underpin the whole thesis. Moreover, the study will examine the factors that influence the adoption of IaaS and establish their relationships with the existing models. Chapter 2 ends with a summary of the Literature review, the aims and objective of the study and identified gaps that the present study seeks to examine.

Chapter 3 will explain the methodology used to undertake the study. It includes the research philosophy, approaches to data collection, sampling, and analysis. Since the study involves a qualitative approach, the semi-structured interview will be used to collect the data. Notably, most of the earlier studies relied on quantitative approaches to investigate cloud computing issues. The qualitative research design was deemed valuable in exploring the concept to gain a deeper understanding of the IaaS adoption among the SMEs.

Chapter 4 presents the results and findings from the analysis of data obtained from the fieldwork. It comprises of a comprehensive analysis to draw valuable insights from the responses resulting from the study. The analysed data will be presented in themes.

Chapter 5 entails the discussion of the findings from the previous chapter and drawing upon both earlier and current up to date studies from the literature review to highlight the contribution of the study to both theory and practice. The chapter also addresses the chosen theoretical underpinning to inform the development of a conceptual model alongside the justification from the researcher's perspective.

Finally, Chapter 6 gives the conclusions and recommendations involving a detailed presentation of the study implications as well as theoretical and practical contributions. The conclusion will also encompass the value that the study has added to the SMEs in Singapore's Media and Advertisement industry. The chapter will also outline the limitation of the research and point out opportunities for future studies.

Figure 1 below outlines a summary of the different processes involved and the context of the individual sections within each chapter.

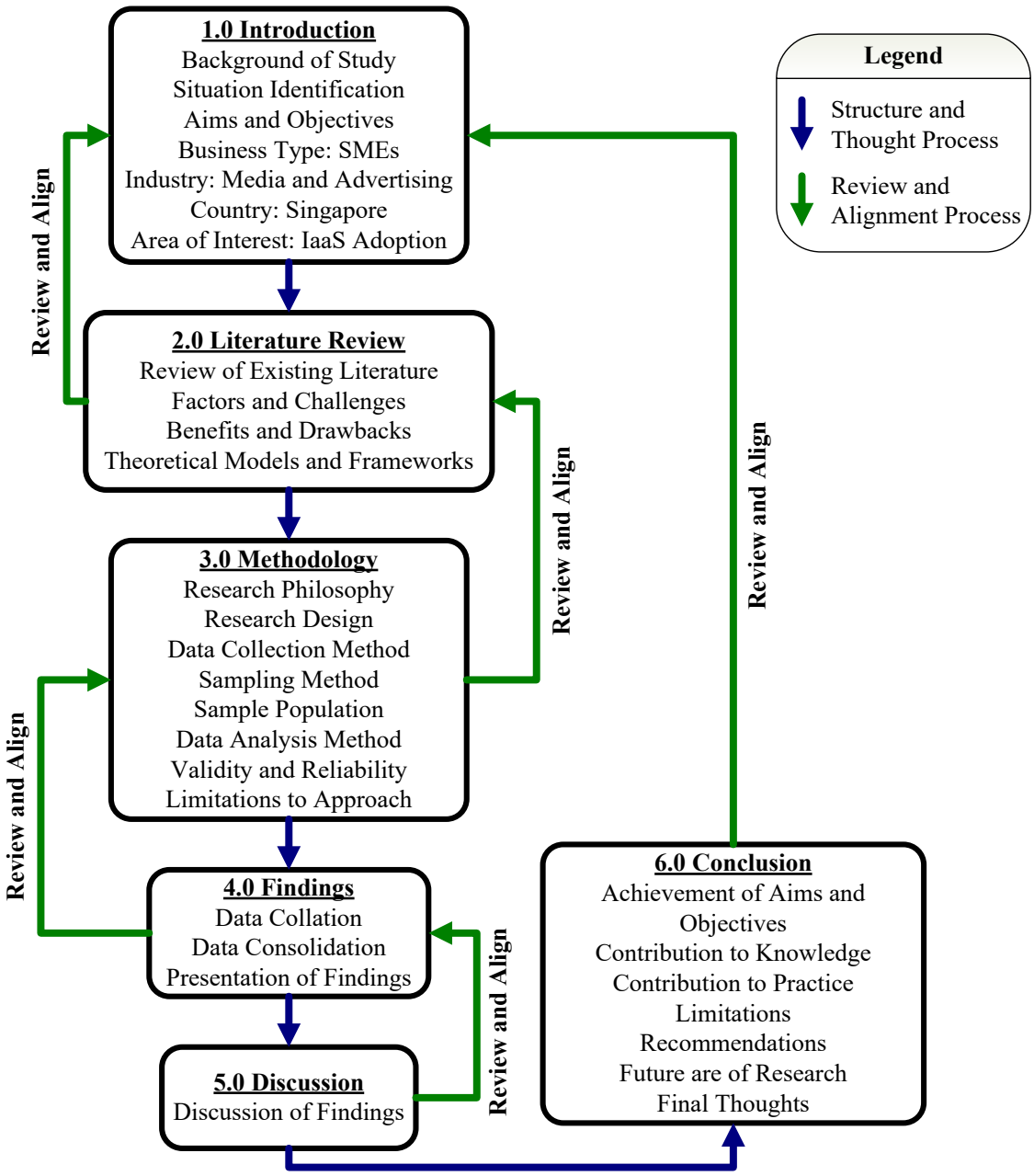

Figure 1. Thesis structure thought process (Source: Author)

2.0 Literature Review

IaaS is part of the wider cloud computing technology which is gaining considerable popularity in the business field. The cloud-based services form part of the approaches that SMEs rely on to leverage their competitiveness in the market. As cloud computing is an evolving field there are various approaches to defining its components. Various scholars employ different definitions for IaaS which is the focus of the present study.

As Chen et al. (2010) pointed out, IaaS is a service model which enables cloud users to control data flow. Similar definitions have been advanced by Jadeja and Modi (2012) who argued that IaaS is a layer of cloud computing architecture which allows the customers to only pay for the time they use the service. On the other hand, Chavan et al. (2013, p.549) define IaaS as:

> "…a provision model in which an organisation outsources the equipment used to support operations including storage, hardware, servers, and storage working components…"

The definition captures the components of cloud as outlined by Imran and Hlavacs (2012) including the application tools, storage as well as cluster and node. Therefore, the definition by Chavan et al. (2013) will be used for the present study since it is relatively comprehensive. Notably, the storage component highlighted in the definition enables the running of raw disk images as resources while the server components form part of the Application Programming Interface (API) that intermediate the communication with the cloud services. On the other hand, the cluster and the nodes enhance the distribution of resources to improve the overall throughput. While the IaaS system architecture is beyond the scope of this study, it is important to understand that the system comprises four main aspects that are the IaaS selector, Knowledgebase, Model Repository, and Adapter (Kritikos et al., 2016). In this case, the IaaS selector is responsible for information retrieval from the model repository as well as a knowledge base. Once the communication circle is complete, the IaaS selector relays the information back to the Adapter (Kritikos et al., 2016).

2.1 Understanding IaaS

The cloud computing services such as IaaS form part of McCarthy's (John McCarthy) concept developed in the 1960s to enhance resource sharing through the internet (Ma, 2012). Cloud computing services have since been developed to improve service delivery based on various needs. According to Gong et al. (2010), the development of cloud services focused on integrating four aspects of computing including virtualization, high performance, utility, and grid computing. The IaaS is therefore understood based on its capacity for storage and networks. Studies conducted by Chavan et al. (2013) demonstrated that IaaS is a form of hosting whereby customers have access to hardware to store their information and applications. Additionally, the providers are responsible for the administration of the services, security and applications. In this case, the roles of the vendor and the customer are relatively distinct.

The customer is charged with the responsibility to monitor both the built-in and licensed software to ensure they are functioning as required. The providers have relatively greater responsibilities including housing and maintaining the equipment. They are also charged with the task of ensuring that the application runs effectively to deliver the dynamic function as appropriate. To run the virtualized systems in the cloud, the vendors will create virtualized machines that they load with software. The virtual machine is then configured and housed in the hosting environment. As a result, the vendors offer the necessary support to ensure the virtual machine remains secure and effective in the delivery of the services to the customer (Chavan et al., 2013).

IaaS is an important cloud-based service that is used for various aspects across different industries. Studies by Dillon et al. (2010) highlighted five main benefits of cloud services usage including on-demand self-service which enable customers to access the services upon need within a specified time frame. The application also increases access to a broad network with a relative elasticity. In this case, the cloud service enables customers to use various applications with further opportunity to scale up or down according to the existing needs. Aljabre (2012) in explaining the advantages related to cloud-based services pointed out that IaaS enables users to cooperate on projects that are stored in the cloud which can be accessed globally with internet connectivity. In this case, the employees can work remotely while maintaining and improving performance when they are connected to the cloud through the internet. As a result of increased remote access to the resources,

the business limit challenges that may result from the differences in geographical location. In the words of Iosup et al. (2014), the IaaS is considered important due to its on-demand and sustained good performance. Therefore, business activities are likely to progress with limited interruptions resulting from physical distances.

2.1.1 Characteristics of IaaS

Cloud computing is distinct from other technological advancements given its essential and common characteristics. The National Institute of Standards and Technology (NIST) highlighted the five major essential characteristics of cloud computing which contain aspects of service levels as well as deployment models (Chandrasekaran, 2014; Mell and Grance, 2011). The essential aspects of IaaS are applied today as one of the categories of cloud computing. The characteristics are as outlined in Figure 2 below:

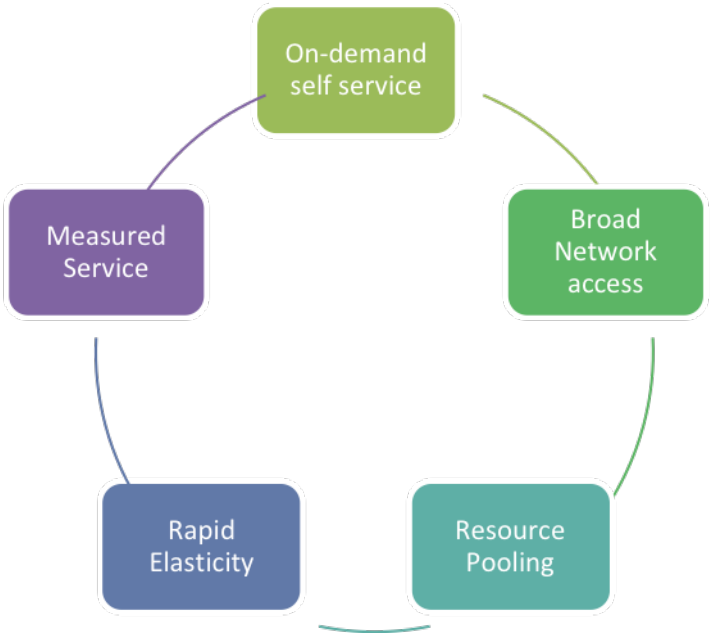

Figure 2. Characteristics of IaaS (Source: Chandrasekaran, 2014)

2.1.1.1 On-demand self-service

The on-demand self-service as a characteristic of the IaaS implies that the customers have access to the resources whenever there is a need without going through an IT department or human intervention to make the services available. According to Yang and Tate (2012), customers should access the services provided by the cloud service provider without necessarily interacting with the providers directly. It implies that the server time, as well as network storage among other functions of the cloud-based services, can be automatically accessed by the customer. Since the services rely on network functionality, whenever the clients have access to the network that is when connected to the internet, they have access to the services via the various devices. Unlike the traditional approaches to computing, the on-demand self-service feature increases the level of flexibility which is beneficial to both the cloud service provider and the client (Mell and Grance, 2011).

2.1.1.2 Broad Network Access

The services are accessed over a network using the established standard mechanisms. Notably, cloud services are shared with properly defined control among the stakeholders. The broad network access implies heterogeneous platforms. As Chandrasekaran (2014) pointed out, the client platforms include a laptop, mobile phones, and tablets among other aspects. Meanwhile, the clients should have access to the networks using the various platforms. Given the rapid elasticity characteristic, the availability of computing resources such as storage is considered to be immediate. For instance, there is no need for contractual agreements between the service provider and the customers, it is on a pay per use model. For instance, the use of the cloud service is considered to satisfy the immediate business need while limiting the necessity for an upfront payment that is common when using traditional forms of computing services.

2.1.1.3 Resource pooling

Resource pooling is a feature of IaaS which involves the allocation of the physical and virtual resources to meet the demands of the customers. IaaS provides three major resources that are bandwidth, storage, and memory. As the clients have abstract knowledge of the location of the service providers, they do not have control over the cloud services provided given the location independence attribute. The pooling of the computer resources is guided by the need to serve the

diverse need of customers more efficiently according to the virtualization model (Zhang et al., 2010).

2.1.1.4 Rapid elasticity

The scalability of the cloud services based on the needs of the clients is one of the main benefits that customers rely on to attain the business objectives at minimal costs. Chandrasekaran (2014) pointed out that the capability of the cloud-based services enables the providers to be highly flexible in meeting business demand whereby the services can be scaled in or out quickly. Additionally, the customers have the opportunity to purchase the services at any time and quantity of their choice. The changing business environment necessitates that organizations remain highly flexible to maintain their level of competitiveness. Armbrust et al. (2009) argued that the business shifts require that firms work based on estimates and expectations. These are subject to change given the unpredictable nature of customer behaviour. The ability to scale the resources up and down will depend on the immediate business needs. As a result, the cloud service should provide an opportunity to reduce the resource idle time especially when the expected capacity is not required.

2.1.1.5 Measured Service

Based on the type of service, cloud services are automatically controlled and optimized to meet the needs of the customers. This is achieved through the service level agreements which guarantee the clients enough capacity upon the needs and purchases (Leavitt, 2009). The measured service as an attribute enables the providers to demonstrate control and transparency in the provision of services based on the needs of the clients. In developing the essential characteristics that determine cloud computing, NIST pointed out that the failure by a cloud-based service to display any of the above services is an indication that it should not be considered as a cloud-based service.

As stated, the IaaS involves the provision of fundamental computing resources including storage and processing among others (Mell and Grance, 2011). In outlining the existing differences between IaaS and other cloud deployment models, the study pointed out the measure of control between the service provider and the customers. In the case of IaaS, the users or clients have more control over the operations of the computing service. For instance, they (consumers) control some

components of the network such as host firewall. They also control storage, the operating systems as well as the deployed applications on top of the provider's infrastructure (Obeidat and Turgay, 2013).

Meanwhile, various studies focusing on cloud computing services have pointed out different reasons as to why firms adopt cloud services especially IaaS and move from the traditional forms of computing. While the features outlined by NIST are universal to the cloud computing models that are Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS), the IaaS has a distinct attribute. According to Chandrasekaran (2014), IaaS is a unique deployment model that allows web-based access to resources, one-to-many delivery, and centralized management among other aspects. The Application Programming Interface (API) enhances the simple and transparent way of sharing resources. This has enabled IaaS to support the pay-per-use approach which limits the over-expenditure associated with traditional forms of computing services (Floerecke and Lehner, 2016; Herzfeldt et al., 2019; Zhang et al., 2010).

2.2 Cloud Deployment Models

The IaaS should also be understood in the context of the various cloud deployment models available to users. Research conducted by Dillon et al. (2010) demonstrated that there are four main cloud computing deployment models namely: public, private, hybrid, and community cloud computing infrastructure. If a business relies on a public deployment model, it gives authority to the third-party cloud providers who have control over the hardware and policies to guide the level of engagement. In such cases, IT operations are treated as operational expenses in a business.

The first type of cloud is Public, whereby the computing resources are used by many organizations at the same time on a shared basis and is hosted by a third-party service provider. The second type is Private cloud, it is maintained for exclusive use by a single organization keeping in mind the requirements of that single organization and is hosted by a third-party service provider. The third type is the community cloud which is used on a shared basis for a specific group of organizations. The last is the hybrid cloud type which is a comprehensive model whereby the single organization adopts the combination of both private and public cloud types (Boss et al., 2007; Chang et al., 2013; KPMG, 2012; Narayana et al., 2017; Sun, 2009).

Each type of cloud has its benefits (Bozman and Chen, 2010). For instance, the public shared cloud provides the maximum economies of scale and is charged at utility-based pricing. The private cloud provides maximum security but does not provide productivity benefits and/ or economies of scale. The community cloud provides better security since it is designed for a particular group, but reduces the economic benefit as compared to that of the public cloud. In contrast, the benefit of a hybrid cloud is the ability to access multiple deployment methods to meet the specific needs of the business (Boss et al., 2007; KPMG, 2012; Sun, 2009). The deployment model for cloud computing is illustrated with the help of Figure 3 as shown below:

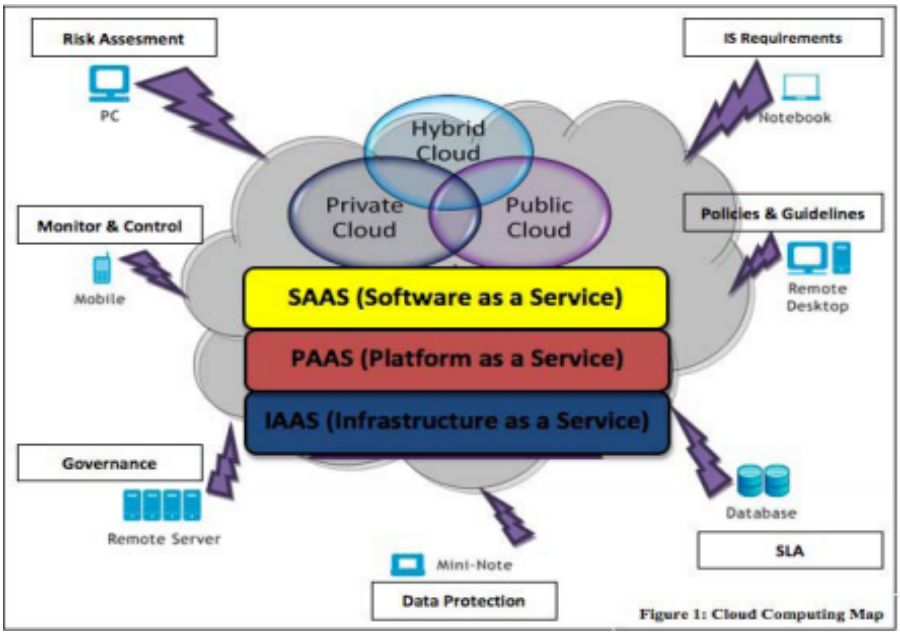

Figure 3. Deployment Model (Source: Platform Computing, 2009)

Since the cloud models encompass the various types of service models, IaaS can also be deployed using one of the highlighted approaches to improve the performance of the businesses. Meanwhile, the research conducted by Subashini and Kavitha (2011) revealed that IaaS has greatly changed the deployment approaches used by firms to integrate cloud computing services. This is due to its ability to shift business attention to the core business concepts without worrying about the underlying complexities.

2.3 Advantages of IaaS

Karkonasasi et al. (2016) argued that cost reduction represents one of the challenges that current companies seek to address. Information Technology (IT) infrastructure provides one of the most feasible approaches that can be useful in reducing operational costs. For instance, reliance on IaaS will drive the costs down by providing on-demand computational resources (computational power, disk storage spaces etc.) in the cloud. It implies that the businesses owners will not need to purchase any physical hardware (servers, network switches etc.) which would require large sums of upfront monetary investments. Moreover, the use of IaaS like other cloud-based services enhances the level of compatibility among the operating systems. Regardless of the operating system used, the cloud services provide an opportunity to share resources among the users across various operating systems (Bhardwaj et al., 2010).

The resulting elasticity makes the resource provisioning more flexible to meet the shifting demand trends of the business to meet the evolving needs of the global economy. Research reveals that cloud computing service adoption is guided by the users' needs as well as advantages resulting from the adoption (Karkonasasi et al., 2016). In using the IaaS as a cloud-based service, the main benefits include the need to expand or scale up, multiple usages, resource distribution, and resilience (Chavan et al., 2013). It implies that for a business relying on IaaS, when the system goes down due to technical problems, the organization's structure will remain intact. This is due to the vast resource sharing across the different servers.

When using IaaS, a failure in the datacentre or particular hardware has minimum impact on the overall business functionality given the multi-site fail over capabilities of IaaS which ensures continuous functionality of services (Rao, 2015). IaaS is also preferable due to the high levels of flexibility it gives to the users. Notably, the competitive business environment resulted in constant demand for change based on emerging opportunities and challenges. Research by Marston et al. (2011) demonstrated that the changing competitive landscape necessitates that all businesses employ effective strategies to offer increased value to the customers as well as rely on excellent computer services to improve their internet use. Therefore, using IaaS enables the business to accomplish this goal by scaling up or down its services according to the prevailing demand.

2.4 Disadvantages of IaaS

Although IaaS has several benefits, research has revealed some of the disadvantages including security, vendor outages, and training employees in readiness for new infrastructure. According to Chavan et al. (2013), the concern for the security of the IaaS involves various areas. For instance, the data shared over the platforms are susceptible to leakage since many people and organisations are sharing the resources. In such cases, the providers are responsible to know those who access the data at a given time and establish their locations. Notably, the business contains critical information that requires discriminated access based on the established law. Since the businesses lack the in-house capabilities to manage the cloud services, the cloud service providers are tasked with the responsibility and are accountable. As a result, information security is greatly at risk of exploitation by third parties. It implies that the concerns for information security remain to be one of the challenging aspects of the IaaS to users, especially in business-related fields (Dillon et al., 2010; Dodani, 2009; Hay et al., 2011; Lampe et al., 2013; Vaquero et al., 2011).

Vendor outages form another piece of the challenges that face cloud-based service users. The outages may be associated with the bankruptcy of the cloud service provider or maybe as a result of technical problems resulting in service disruptions and outages (Dillon et al., 2010). Research further showed various disadvantages including a threat to consistent service availability based on its constant connection to the internet (Aljabre, 2012). It implies that users must connect to a faster internet to remotely access and download content from web-based applications. This limits the reliability of the services especially when the users rely on smaller bandwidth. Moreover, it is relatively difficult to integrate cloud services into the firm's existing internal IT services, since there are concerns that may compromise the integration of the cloud services especially IaaS, it is apparent that it has more value to the business.

2.5 Reasons for Adopting IaaS among the SMEs

Cloud computing offers various benefits to the SMEs given its potential to improve business growth prospects (Assante et al., 2016). The market environment is becoming more competitive and the cost of entry across the various industry is on the rise. The reliance on the cloud computing services especially the IaaS deployment model has demonstrated to be greater opportunities for the small business to limit resources use by avoiding huge amounts of finances necessary to train

staff and built an in-house cloud capacity. Despite the economic viability that is apparent in cloud adoption for the SMEs, the adoption trend in Singapore's Media and Advertisement industry is yet to be impressive. This section seeks to outline some of the reasons that inform the SMEs decision in adopting the IaaS.

Studies by Bhardwaj et al. (2010) revealed that the three main components of IaaS include storage, network access and network routing services. These aspects can be understood from the perspective of the providers as well as the customers. The providers' main role is the provision of virtual infrastructure as well as the deployment of web applications among others. On the other hand, the customers are mainly concerned with their software application that is hosted by the providers within the environment (Bhardwaj et al., 2010). The present review of the literature focuses on the reasons for the adoption of IaaS among SMEs from the perspective of the customers. Sobragi et al. (2014) pointed out various factors including scalability, reliability, and cost-saving have a noticeable impact on the decision to adopt cloud-based services.

The literature review on cloud adoption among the SMEs conducted by Nguyen (2009) revealed that various reasons determine the adoption decision among the small firms. In broad categorization, Nguyen (2009) asserted that external factors such as competition and innovation play an integral role in influencing the decision-making process. Internal factors such as business maturity and availability of the desired staff also determine the adoption among the SMEs. The study further argued that the external factors that result in change seek to ensure the survival and stability of the business while the internal factors reflect the maturity or the life cycle of a business.

SMEs like other business develop and grow through the various stages in a market environment that is characterized by stiff competition and changing customer needs. To attain efficiency and remain relevant in the market by meeting the demands of the customer bases, they must adopt technological changes following the business needs. In this case, IaaS provides an economically viable alternative to the attainment of the efficiency that is needed for survival in the ever-changing and competitive marketplace.

Similar studies conducted by Wilson et al. (2015) on cloud adoption among the SMEs in Tamil Nadu showed that various reasons are attributed to the decision to migrate to new cloud services from traditional forms of computing. The four major reasons highlighted in the research included scalability, adaptability, agility, and cost. Meanwhile, 91.7% of the respondents who participated in the survey acknowledged that cost concerns were the greatest determinant of cloud computing adoption (Wilson et al., 2015). Most of the SMEs further demonstrated that their willingness to adopt new technology is greatly compromised by fears regarding new costs and the capability to remain competitive. The study affirmed the previous findings which demonstrated that SMEs operations were based on limited resources (Dwivedi et al., 2009). It implied that favourable internal aspects accompanied by fair prices for IaaS services in the market will trigger an improvement in the adoption of cloud-based services among SMEs.

Inasmuch as Nguyen (2009) did not focus on the Media and Advertisement industry, the study provides an insight into the realities that face the small businesses given the resource constraints in an increasingly competitive environment. The research conducted by Pathan et al. (2017) among the SMEs in the service industry further confirmed the finding that IaaS is one of the deployment model of cloud computing that has the potential to reduce costs among the start-ups in the economy. Since the Media and Advertising industry forms part of the most used services, the consideration of the cost of adoption and operations are important factors that inform the decision-making process.

Research further revealed that the business that already adopted the IaaS model reported cost reduction and scalability as part of the short-term effects (Khan and Al-Yasiri, 2016). The SMEs being late adopters of technology required more time to consider the costs against the benefits based on the experiences of their peers in the market. Consequently, the apparent evidence of positive cost outcomes among the SMEs that have adopted the IaaS showed that it met one of the pressing demands in the market. Another reason that has largely been cited in the literature is the changes in the external environment that determine the behaviour of firms.

Seethamraju (2015) conducted a study on operating in an environment that is characterized by constant changes in terms of the external environment, as well as the customer, demands found that when old processes become obsolete or less effective based on the trends, the adoption of new technology is a necessary step in remaining competitive in the industry. Studies demonstrated that SMEs enjoy the advantage of faster decision-making as well as higher levels of flexibility which are vital in the adoption of cloud-based services. Meanwhile, the ease of decision making is not a reason for acceptance or rejection of the cloud service. As Nguyen (2009) pointed out most of the SMEs experienced managerial problems that have a noticeable impact in determining the ultimate outcomes of their decision to adopt IaaS.

The social needs which are mainly due to the dynamics in the customer demand also act as a pull factor toward the adoption of IaaS and other cloud-based services. Awiagah et al., (2016) pointed out that the SMEs mainly focus on niches hence are highly responsive to the customer changing demands. The attempts to satisfy customer demands while limiting the costs remain to be one of the reasons that SMEs need to consider in their quest to adopting IaaS as a business enabler. In the discussion involving the TOE model, organizational context factors especially managerial support was identified as one of the key determinants in the adoption of cloud-based services (Stieninger et al., 2014).

2.6 Reasons for not Adopting IaaS among the SMEs

Stansfield and Grant (2003) in examining the adoption of e-commerce and internet use among 484 SMEs in Scotland revealed that lack of knowledge and associated risks act as the main barriers. In their analysis, 46% of the businesses investigated lacked the in-house IT skills that were necessary for adopting e-commerce. With the limited knowledge of IT as well as a small capital base, the SMEs lack the impetus to adopt new technology that is necessary for performance improvement and increased competitiveness. These findings are important to the present study since IaaS adoption and use require internet connectivity. Additionally, the SMEs in media and advertisement industry like their peers in other sector has a limited capital base to employ experienced staff in developing the necessary IT skills hence compromising their internal expertise.

In another study involving a mixed-mode method conducted by Joseph et al. (2015), the lack of immediate direct benefits as well as uncertainties associated with the adoption of new technology act as the main reasons why SMEs fail to adopt IaaS. The researchers' analysis of the data demonstrated that new technology is characterised by higher levels of normalisations as well as increased chances of uncompetitive outcomes to the business. In this case, most of the SMEs remain largely uncertain regarding the sustainability of the IaaS in the turbulence. The outlined dilemma facing the SMEs as outlined in the study acts as a barrier that is vital in understanding the reasons for not adopting IaaS.

Khan and Al-Yasiri (2016) identified eight security vulnerabilities that are likely to affect SMEs. Specifically, the research demonstrated that IaaS faces the security challenges resulting from the insecure Application Programming Interface (API) as well as other vulnerabilities resulting from the shared technology. For instance, the hypervisors are designed to take control of the overall IaaS. Since they can be configured to meet the diverse needs of the business, they can be a source of compromise. When a security breach occurs, the whole system is exposed since the virtual machines are interconnected and can also be configured based on the client needs. Dillon et al. (2010) further pointed out that when a data breach occurs in the shared cloud space, the behaviour is attributed to all the cloud citizens since it will be difficult to distinguish the villain users from the genuine cloud citizens. As a result, the SMEs fail to adopt the IaaS due to the anticipated security risks.

2.7 Factors Influencing IaaS adoption among the SMEs

Several studies have focused on cloud computing among SMEs to provide an insight into the business behaviour about the adoption of new technology (Alismaili et al., 2016; Ali et al., 2015; Tehrani and Shirazi, 2014; Espadanal and Oliveira, 2012; Low et al., 2011). Meanwhile, there is a limited focus on the IaaS deployment model as one of the cloud computing services among SMEs (Joseph et al., 2015; Seo, 2013). Therefore, the general factors that determine the adoption of cloud-based services will be used to explain the adoption of IaaS among SMEs given that it is one of the basic cloud computing deployment models.

Alshamaila et al. (2013) explored the cloud computing adoption among the SMEs in North England to conclude that several internal and external factors that create relative advantage play a significant role in influencing the decision to adopt cloud services. The innovativeness of the SME plays an important role in determining the cloud computing decision. This implies that IaaS adoption will be adequately understood by studying the SMEs in their context. The findings are supported by the research conducted by Low et al. (2011) which affirmed that relative advantage resulting from cloud-based services act as an incentive to improve cloud service adoption among SMEs.

Conversely, the studies revealed conflicting outcomes regarding the role of competitive pressure in influencing cloud computing adoption among SMEs. According to Low et al. (2011), the pressure from trading partners in the high-tech industry significantly contributes to the increased adoption of cloud-based services. Contrary to this finding, Alshamaila et al. (2013) pointed out that competition in the market is not a determinant of cloud computing adoption. Similar findings are also apparent in the studies conducted by Kannabiran and Dharmalingam (2012) who argued that a competitive environment greatly impacts cloud computing adoption among the SMEs in the ancillary industry. Further, their study demonstrated that security concerns and inadequacy of supporting infrastructure had limited impacts on the SMEs' decision to adopt cloud computing. The conflicting study outcomes demonstrate the need to understand factors that influence cloud computing adoption based on a specific sector. The IaaS adoption among the SMEs in the media and advertising industry can be best understood based on the context thus the need for an empirical study.

Studies conducted by Nguyen (2009) pointed out that the internal environment plays the greatest role in determining the adoption of technology in an organization. The internal aspects include culture, top management, employees, and the absorptive capacity (Nguyen, 2009). The culture within an organization is a key determinant of how the business stakeholders will respond to change. For instance, if the top management develops a more positive attitude towards the IaaS, they will employ necessary efforts to ensure that the desired cloud-based service is used within the business. On the other hand, the likelihood of success in the adoption of IaaS depends on the employee's involvement levels. Employees form part of the critical internal resources among the

SMEs and their perception regarding the positive contribution of a new change is vital in attaining the expected success (Neirotti et al., 2013; Rao and Mandal, 2013). Given that employees are constantly interacting with the IT in the business set up, their contribution in determining the desirable change cannot be assumed.

Extant research further demonstrated the need for absorptive capacity as one of the main factors that determine the SMEs adoption of cloud computing services. The adoption of IT among SMEs depends mainly on four factors that are the ability and capability of the firm, external expertise, networking, and internal aspects (Brynjolfsson et al., 2010). While the factors are aligned to the situation facing the SMEs in their quest for IaaS and other cloud deployment models, Nguyen (2009) only focused on extant literature to draw conclusions and make inferences.

Conversely, Seo (2013) in developing the explorative model for cloud adoption with the focus on the IaaS adoption in Korea argued that security and scalability are the concerns for companies to accept a cloud-based service. The scalability involves prospects of expansion when there is an increase in the customer base. While there are significant differences in terms of the goals of SMEs, the need for growth or maintenance of customer bases are apparent among most of the businesses. The issue of security is of significant interest to the SMEs in the quest to adopt new technologies such as cloud computing (Seo, 2013).

According to the studies conducted by Delfosse et al. (2013), argued that the security of the IaaS should be viewed from both the client and the provider sides. Notably, the adoption and use of cloud services involve the sharing of roles. For instance, the IaaS adoption necessitates that the providers remain in charge of the underlying cloud infrastructure and network components. Meanwhile, the consumers assume control over other aspects such as operating systems, storage as well as other applications. It implies that the providers have a responsibility to ensure adequate protection of the infrastructure. This involves the protection of the client data despite the sharing of storage and other resources.

On the other hand, the customer agrees with the provider having a clear understanding of the existing measures to uphold the security of information. Therefore, the two parties have a role to

play in ensuring security in using the newly adopted cloud service. Research conducted by Dawoud et al. (2010) demonstrated that IaaS has developed over a considerable period. As a result, it has several components including service level agreement and utility computing among others that are employed together. However, when one of the components of IaaS is compromised, the whole system will be rendered dysfunctional. The SMEs have limited resources to invest in comprehensive security protection against their information systems. Moreover, the resource capability limits the SMEs ability to employ experts in managing their information infrastructure. In this case, the perception regarding the security concerns remains to be one of the significant factors in determining the IaaS adoption.

Perceived scalability represents one of the factors that lacked a significant effect on the behavioural intention to use (Seo, 2013). While the research concluded that companies are not concerned with growth prospects in making the adoption decision, the study by Dwivedi et al. (2009) provides a different insight into the differences in findings regarding scalability. In this case, the SMEs are characterized by varying orientations and contextualized decision-making process. It implies that not all businesses aim at growth as their primary goal. Dwivedi et al. (2009) further argued that some small business owners prefer to avoid growth given the need for stability or lifestyle. Since most SMEs focus on niches within a market environment, they display a limited desire for growth.

Joseph et al. (2015) contended that SMEs cloud computing adoption mainly relies on four main factors that are technology availability, market competition, utility, and increased use of the internet. Arguing from the extant literature, studies revealed that regardless of the available internet, SMEs still shy away from the adoption due to the perceived need to invest in internet usage. The utility factor, however, explains the existing constraints which act as barriers for SMEs to move to new technology. The IaaS associated with increased productivity given its time-saving capability which allows the SMEs to focus on the core business activities.

Additionally, the existing competition and hidden costs also form part of the characteristics that limit the SMEs from adopting the IaaS. As Joseph et al. (2015) pointed out that creep costs involving training to employees, internet connectivity, and administration of cloud service are considerations that influence the decision to adopt IaaS. Similarly, competition in the market also

plays a vital role in determining the preference for innovation in the market (Teubal and Twiss, 1979; Tung, 2012; Weerawardena, 2003). For IaaS, the benefits achieved by early adopters incentivize other industry players to embrace the technology. Meanwhile, the downfalls that are associated with security concerns and increased costs result in resistance among the decision-makers. Competitiveness and innovation also form part of the factors that determine the adoption of IaaS among SMEs.

According to the review of the literature conducted by Palacios-Marqués et al. (2015), competition has a noticeable effect on the adoption of technology among SMEs. Competitive pressure in the external environment act as an incentive to adopt the new technology. More players are attracted to try the new approach especially when the use of new technology by their peers are showing impressive outcomes with the technology adoption. In the case of IaaS, studies have indicated that the adoption results in an increase in business growth by 26% (Kiat, 2017). Abdollahzadegan et al. (2013) asserted that competition is a prerequisite to increased performance and business growth. The SMEs lack the resource muscles to acquire sophisticated technology as the common practice among the large firms in the industry. Meanwhile, they have to survive in a highly competitive environment and deliver quality goods and services to remain relevant.

The cloud adoption resources came into the market as an alternative means of leveraging competitiveness among the SMEs which lack adequate resources to establish in-house capacity. Oliveira et al. (2014) given the environmental context revealed the need for economic incentives in the market to overcome the existing barriers. However, the findings demonstrated that competitive pressure as an environmental aspect has no impact on cloud-computing adoption. While studies acknowledged the importance of competition in the market, they pointed out that it lacks any significant impact on the decision-making regarding IaaS adoption among SMEs. The Review of literature by Nguyen (2009) also revealed that SMEs adopt new technology to respond to external and internal pressure. Competition in the market is one of the known external pressure that provokes the need for a response from the players in the market especially among the firms in the information sector.

On the contrary, extreme competition also discourages firms from adopting of cloud-based services. In most cases, the SMEs are subjected to frustration given the limited resource base as well as a lack of internal skills to handle the advanced technology (Stieninger et al., 2014). As stated, the IaaS unique attribute from other cloud deployment models includes the increased control by the clients on storage, application as well as other aspects of the network. The lack of proper training on how to manage the aspects under the client guidance can result in security threat or limited benefits to the SMEs. Inasmuch as the study did not focus on the industry of interest (the Media and Advertising industry) the resource limitation is apparent among the SMEs across the various sectors in the economy.

Innovation also forms part of the factors that determine cloud computing adoption. The cloud-based services provided by third parties are based on current technology (Awiagah et al., 2016). The availability of vendors to serve the market needs to act as a driver for cloud service adoption. Conversely, when the vendor is limited due to policy restrictions or slow growth, the demand will go higher, and prices will increase. Most SMEs are price-sensitive and will likely avoid such technology. Nguyen (2009) argued that the technology push and market-pull factors act as the main determinants for cloud adoption among SMEs. In this case, the social needs of the customers exert pressure on the businesses to adopt more efficient approaches to service delivery. Additionally, technology push factors such as the new standards of operation affect the decision to adopt cloud-based services.

Oliveira et al. (2014) pointed out that the firms in the manufacturing sectors posited that cloud computing adoption is mainly influenced by three factors that are innovation characteristics, technology context, and organizational context. The organization relies on the advantages of a specific technology based on its impacts on productivity, business opportunity, and quality improvements. When a new technology results in positive outcomes whereby it improves the quality of products and services to customers and opens a new opportunity for the business, it receives acceptance in the industry. On the contrary, a new technology that limits the competitiveness of firms in terms of productivity and cost-saving are rejected. The research further revealed the potential of cloud computing to leverage business competitiveness based on cost-saving and creation of more time to engage in core business activities. The findings are consistent

with the research conducted by Pathan et al. (2017) who argued that businesses adopt cloud-based services to address concerns over productivity and need to survive in the market. The higher the comparative advantage that cloud computing brings to a business the more likely it will be accepted and adopted by players in the industry. As will be outlined in the next section, IaaS has noticeable benefits that result in a decrease in costs to leverage the firm's competitiveness.
Additionally, technology and organization context also form part of the factors that affect the decision to adopt cloud services. The technology context mainly refers to the level of technology maturity within an organization. Greater information capacity improves the attitude of the stakeholders regarding innovation. The cloud adoption like other disruptive technology is associated with challenges thus the existing technology infrastructure must offer adequate support for successful integration (Lawrence et al., 2010). Without proper infrastructure to support the cloud services including human resources, the resulting challenges will compromise the likely benefits from the adoption of IaaS.

The technology context applies to the case of SMEs only to the extent that there is adequate support from the government given the lack of in-house IT capacity. Finally, the organizational support is necessary for the adoption of cloud services since the adoption involves resource commitment which is vital for the successful integration of new technology in the firm. Yeboah-Boateng and Essandoh (2014) in view of the factors that influence cloud adoption among the SMEs in developing economies acknowledged the role of top management support as one of the major determinants of cloud adoption. The level of compatibility with the firm's IT structures as well as the availability of cloud vendors also contributed to the likelihood of cloud adoption among the SMEs.

2.8 Benefits of IaaS adoption among the SMEs

Studies by Alzahrani (2016) revealed that all cloud providers rely on a pay-per-use model for pricing. As a result, the business is relieved of the up-front costs or the need to make an initial purchase of computing resources as in the case of traditional computing services. Research has further indicated that the high flexibility associated with the price model is due to the ability of the cloud providers to rapidly work with the demands of the clients (Gong et al., 2010). The SMEs cannot enjoy the privilege of in-house resources given their small budget. The cost reduction is

further exacerbated by the ability of the business to only pay for the services that meet their needs and demands. As a result, there is a considerable cost saving especially on the idle resources that are relatively fixed.

Khajeh-Hosseini et al. (2010) posited that the cost-saving attribute of IaaS makes it one of the main benefits to the business. For instance, as a result of the IaaS adoption, the SMEs will benefit through the reduction in the cost of maintenance, limited capital investment, and cost-effectiveness. Similar studies conducted by Xue and Xin (2016) also pointed out that concerns for costs explain 45.5% of the decision to adopt cloud computing services. Similarly, Rath et al. (2012) found that cost-saving contributed as the largest percentage of factors that determine cloud adoption among the SMEs followed by concerns for profitability. For instance, the desire to avoid capital expenses accounted for 19% while controlling the marginal profit explained 18% of the decision to adopt cloud services. The findings are further supported in the research conducted by Norton Rose (2011) which demonstrated that IaaS is beneficial to the firms given its ability to enhance the management of investment risks alongside other costs-related aspects such as pay-as-you-use.

The studies by Khajeh-Hosseini et al. (2010) on the migration to IaaS revealed critical insights into the costs concerns that result from the adoption of IaaS. Besides the reduction in the upfront cost of purchasing hardware, the study demonstrated that IaaS improves the cash-flow management given the reduced utility costs. Notably, utility costs associated with running the hardware are relatively high especially for SMEs that have limited resources. In the cases of IaaS adoption, the third parties are well-positioned to negotiate their utility prices and get better wholesale prices. On the other hand, the IaaS also improves the management of income for both customers and staff.

Unlike the traditional computing approaches, the IaaS provides relief since vendors can bill the customers and be relieved of support costs as well as other monthly payment (Khajeh-Hosseini et al., 2010). It implies that the adoption of IaaS enhances the effectiveness of income management. The present study focuses on the SMEs, some of which face significant challenges given the multiplicity of roles among the staff. As stated, some SMEs are mainly run by the business owner

who also doubles up as the CEO (Misra and Mondal, 2011). As a result, the management of incomes remains to be a significant challenge that requires the adoption of IaaS.

Meanwhile, the impact analysis revealed that IaaS adoption increases the dependence on third-party service providers and creates uncertainty within the organization. SMEs serve niche markets and are subject to increased competition from both peers and large firms. In this case, the leakage of information that may occur due to weaknesses in the third party will greatly impact the business. However, the reduction of cost is one of the noticeable benefits that SMEs gain through the adoption of IaaS. From the literature, it is apparent that there are various dimensions of costs that are related to the adoption of IaaS and other cloud deployment models (Bhardwaj et al., 2010).

The scalability of services is one of the features that are beneficial for businesses that adopt and use IaaS. According to Yang and Tate (2012), the business environment is characterized by constant changes in the demands of the clients or policy frameworks. The IaaS is suitable for adjustments to suit the changes that occur among the customers. Khajeh-Hosseini et al. (2010) also supported that the scalability that is attained through IaaS is a significant determinant of customer satisfaction. As stated, the SMEs mainly operate niche customers thus there is a need for the provision of superior services to improve customer satisfaction and loyalty. Similarly, the SMEs are in the process of business growth either in terms of capital availability or improved quality of goods and services. In this case, the adoption of IaaS provides a platform whereby the shifting trends in terms of business demands can be met. Scalability also enables service users to avoid the chances of vendor-lock whereby reliance on a single provider makes it difficult for the business.

The benefits of IaaS adoption to the SMEs also includes the satisfaction, opportunity for growth, and collaboration that result in the exchange of valuable skills (Carcary et al., 2014; Gupta et al., 2013; Neves et al., 2011; Rath et al., 2012). The concerns for stakeholders' satisfaction are due to the creation of more time to focus on the core activities as part of the roles are shifted to the third-party service providers. In this case, the support engineers are relieved of various tasks such as network support which are routine and add limited value to the business progress. As a result, the technical team gets adequate time to focus on customer demands as well as other value-adding responsibilities in the business.

The new roles and cooperation between the third-party service providers as well as the internal technical team contribute to an increased exchange of knowledge and skills which is vital for career growth (Bhat, 2013; Joseph et al., 2015). Similarly, the sales and marketing personnel benefit from the creation of new services that make them more competitive in the market. Finally, the IaaS cloud services are scalable hence can support growth as the sales team can target and explore new market opportunities (Alzahrani, 2016; Khajeh-Hosseini et al., 2010). Therefore, the IaaS has a greater potential to improve the performance among the SMEs despite the limited adoption. The studies have however demonstrated that regardless of the sector of operation, the adoption of IaaS creates result in significant benefits to both the customers and the business.

2.9 Challenges and Barriers for Adoption of IaaS

Since there are benefits of IaaS adoption, the market is characterized by significant challenges and barriers that compromise the ability of the SMEs to adopt cloud services. Xue and Xin (2016) asserted that businesses are more interested in adopting cloud services to leverage their competitiveness in the market. However, they face the risk of security which results in data-stealing which acts as a barrier to adopt the cloud-based services. Rath et al. (2012) in support of the findings contended that security and confidentiality is the top barrier among the SMEs to adopt IaaS. While this is aligned with the research conducted by Xue and Xin (2016) where security concerns occupy the highest percentage, both studies which attempt to quantify the security concerns regarding cloud adoption revealed positive outcomes. Yang and Tate (2012) in explaining security and confidentiality as a major concern for cloud computing adoption highlighted various issues. The researchers argued that the increased use of cloud services exert pressure on its capacity. As a result, there are chances of systems crashing which can lead to loss of valuable data.

Additionally, as the number of users increases, cloud-based services become attractive opportunities for cyber-attackers to steal data for malicious gains. As stated, the resource capability of SMEs limits their ability to hire skilled professionals to protect against likely attacks (Takabi et al., 2010; Yeboah-Boateng and Essandoh, 2014). The SMEs are also highly vulnerable to attacks especially when sensitive information is leaked to competitors. The level of security risks is further exacerbated by the various incidents of attacks on cloud service providers such as Google Inc.

(Xue and Xin, 2016). When data is stolen from the external links and client private information is exposed due to a compromise on the third party, the SMEs stand a chance to experience irreparable damages. As Armbrust et al. (2009) revealed, the SMEs focus on niche customer bases which implies that their survivability is pegged on the loyalty of the few customers who they (SMEs) strive to satisfy their needs through quality service provision. In the Media and Advertising industry, a security breach that exposes customer data will automatically lead to the loss of valuable customers and ultimate damage to the business reputation.

Resource constraints and access to cloud services have also been highlighted by extant studies as some of the noticeable challenges facing SMEs in their attempt to adopt cloud-based services (Bazini et al., 2011; Lian et al., 2014; Trigueros-Preciado et al., 2013; Zaied, 2012). The resource constraints, in this case, refer to both human and capital resources within the firms. SMEs are identified based on a limited number of employees and financial resources (Dillon et al., 2010). In essence, they face challenges due to limited investment in employee training and development. Therefore, even amidst the willingness to adopt IaaS and gain from the resulting improved business competitiveness, the employees' attitude greatly compromises the success of such ventures. IaaS, unlike other cloud deployment models, requires that the client remains in control of the applications, part of the network, and storage (Abdollahzadegan et al., 2013). The responsibilities are critical for the business to reap the desired benefits from the adoption of IaaS. Without internal skills, the employees will not effectively meet the desired objectives of cloud computing adoption.

Khajeh-Hosseini et al. (2010) pointed out that the SMEs lack the supporting resources to adopt IaaS. Therefore, the adoption results in upsizing of the internal team (both technical and business teams) to ensure the staff familiarize with the new cloud services. It implies that the firms will be obliged to invest additional resources by hiring experts to train and nurture the internal staff. However, this is in contrast to SMEs' main focus on cost-cutting strategies given their limited resource base (Yang and Tate, 2012). The concern regarding the additional investment coupled with uncertainties among the business regarding the returns on investment act as barriers to adoption of IaaS.

On the contrary, Carcary et al. (2014) asserted that financial constraints only act as a barrier to cloud computing adoption due to the lack of awareness among SMEs regarding the strategic benefits. While acknowledging the concerns for resources, the researcher pointed out that the resulting financial burden will be neutralized by the cost reduction benefits. Rath et al. (2012) also pointed out that the adoption of cloud computing services requires some level of staff training to provide an adequate understanding of the basic functionalities. Despite the divergent view in the academic field on financial factor, it acts as a barrier to adoption since SMEs are mostly cost-sensitive organizations. There is a need to provide financial resources to support the training of staff for effective uptake of IaaS technology.

Access to cloud services also compromises the ability of SMEs to adopt IaaS. Studies conducted by Rath et al. (2012) noted that access to services is determined by internet penetration and the availability of vendors in the market. It implies that a mature cloud-based market characterized by multiple players act as a driver to IaaS adoption. Similar studies by Khajeh-Hosseini et al. (2010) revealed that when the service providers are fewer in the market, the customers are subjected to vendor-lock whereby they cannot easily switch to new providers with favourable deals.

The existence of several cloud service providers ensures maturity and stability in the market which acts as an incentive to the adoption. The lack of trust between the cloud providers and the business also affect the relationship (Oliveira et al., 2014). Since cloud services majorly rely on internet availability to function, lack of access to the internet act as a barrier to adoption. The availability of the internet to facilitate connection to the resources is a considerable factor in IaaS adoption (Abdollahzadegan et al., 2013, Gupta et al., 2013; Rath et al., 2012)

2.10 Small and Medium-Sized Enterprises

Previous studies on SMEs have attributed success in a competitive environment to be driven by factors such as increase customer relationships and improved marketing (Appiah-Adu and Singh, 1998; Sheth et al., 2000). Meanwhile, survival in the Singapore market has been a difficult task for small companies given the external conditions such as stiff competition as well as high operational costs. SMEs are highly vulnerable to difficult market and economic conditions due to their limited resource capabilities. Studies conducted by Lee et al. (2013) highlighted that SMEs

play an important role in economic growth across various industries. Research further revealed that SMEs account for 99% of the total domestic enterprises in Singapore (Lee et al., 2013). It implies that they (SMEs) constitute a strong economic driver in a country's prosperity.

The SMEs are largely defined based on their characteristics such as size, income, and the composition of shareholders among other aspects. According to Aris (2007), SMEs are divided into three main categories are Micro, small, and medium. This categorization is based on the number of employees as well as annual income Other attributes including the number of products, the region of operation, resource capabilities, informal management, and narrow niche form part of the aspects that define SMEs (Hillary, 2017; Prashantham and Birkinshaw, 2008). In this case, most of the SMEs are managed by the business owners given the limited resource capabilities to hire highly experienced professionals. Research further revealed that SMEs are characterized by a lack of sophisticated IT application, centralized power as well as high business flexibility. The defining aspects of SMEs demonstrate their capabilities regarding technology adoption as well as other aspects.

In the context of the present study, a general definition for SMEs refers to businesses that have an annual turnover of less than $100 million and not more than 200 employees (Khoo and Chan, 2016). United Overseas Banking (UOB) further revealed that the SMEs employ about 65% of the total workforce and constitute 99% of all Singapore enterprises (Khoo and Chan, 2016). Additionally, the 180,000 SMEs in Singapore contribute 48% of the country's GDP indicating the integral role they play in the economic progress.

Meanwhile, SMEs experience considerable challenges due to the high cost of operations as well as stiff competition in the market. Attempts to integrate technology by the SMEs in Singapore are apparent given the positive outcomes attributed to investment in technology. However, resource constraints and lack of capabilities limit their ability to benefit from the existing technological advancements. The Digital Transformation survey revealed that 57% of SMEs in Singapore are aware of digital transformation and 56% have strategies in place to adopt this change. Digital transformation in Singapore is expected to have a stronger impact on the SMEs' bottom-line with those actively implementing the strategy projecting a 26% revenue increase and 22% cost savings (Singapore News Center, 2018).

The Singapore government has demonstrated tangible efforts in empowering the SMEs towards digital transformation and innovation. A joint survey conducted by United Overseas Bank (UOB), Ernst and Young (EY) and Dun & Bradstreet demonstrated that the lack of future-oriented approaches is one of the main challenges that continue to compromise the ability of SMEs to engage in digital transformation (Survey, 2018). This is further exacerbated by the perceptions regarding the high cost of integrating technology and maintenance costs. Research by Lee et al. (2013) revealed that most of the SMEs lack the incentive to invest in technology, a trend that has resulted in overemphasis in day-day operational expenses. The volatile nature of the economic trends and keen competition necessitates that SMEs rely on technology especially digital transformation to leverage their competitiveness. Research conducted by Microsoft showed that SMEs in Singapore have three main priorities that are customer engagement, operations optimization as well as products and service transformations (Singapore News Center, 2018).

Inasmuch as the stakeholders in SMEs understand the potential of the digital transformation to contribute to business success, the rate of adoption of cloud services remains relatively low. As Yoo and Kim (2018) pointed out, cloud services especially IaaS form part of the digital transformation that businesses integrate to leverage their competitiveness in the market. This is similar to the findings by Hassan et al. (2017) which demonstrated that IaaS is a basic level of cloud-based service that improves business operations and customer engagement. The concerns for the adoption of cloud services as an aspect of cloud computing are apparent among the stakeholders. Based on the Microsoft Survey in Singapore, only 56% of SMEs have adopted cloud-based services as part of their business operations (Singapore News Center, 2018). Comparatively, the adoption trends are low compared to the large firms where 98% rely on cloud services to improve business activities.

2.11 Singapore SMEs in the Media and Advertising Industry

The Media and Advertising industry comprises four main segments that are Film and Video, Games, Publishing, and Broadcasting. According to an annual survey on the media industry in Singapore entails games, broadcasting, and publishing accounted for 11.6%, 6.7% and 34.2% respectively (IMDA, 2018). The Film and Video was the largest contributor in the industry accounting for 47.6% (IMDA, 2018). After the government liberalisation of the Media and

Advertising industry in the year 2000, new entrants emerged fuelling competition as a result, SMEs which contribute a major part of the business to the industry continues to experience increased reliance on information technology through software optimisation to attain unique positioning to leverage their competitiveness.

However, the outlined statistics show that despite the benefits of information technology, SMEs in the media and advertising industry lagged in the adoption of cloud services. The top challenges highlighted by IMDA (2018) include lack of manpower to deliver digital content, limited financial resources, and inadequate information on opportunities which accounted for 51.4%, 48.3%, and 44.4% respectively. The trends in the industry ecosystem from majorly print to digital content have enabled the players to provide solutions to these challenges. For instance, technology advancement has contributed to improvements in workflow, increased time to market, and enhanced competitive advantage among other benefits. The interest to study the adoption of IaaS was informed by the observed digital trends and adoption of innovation resulting from government liberalisation of the sector and ensuring competition.

Although the SMEs lagged in the adoption of cloud computing, they continue to play a significant role in the economy and also form the largest number of businesses in the sector. The outlined trends in digital transformation and cloud services adoption in Singapore show that SMEs in the Media and Advertising industry continues to experience low adoption of cloud-based services. Since the reliance on technology is vital for the success of the SMEs in the media and advertising sector, the present study sought to explore the adoption of the IaaS as part of the digital transformation initiative that has the potential to improve performance among SMEs in the sector.

Notably, SMEs operate in a technologically competitive environment in which the adoption or failure to adopt new technology determines the business competitiveness in the market environment. Business activities including the adoption of cloud computing are part of the approaches that SMEs use to gain a competitive advantage. Hove and Masocha (2014) pointed out that technological changes influence the structure of the industry either favourably or unfavourably. Therefore, the decision-making process to adopt any technology should be based on

relevant information to ensure that adoption of the change or new technology contributes positively to the business performance.

The competition among the SMEs in Singapore can be understood through Porter's five forces which focus on rivalry among firms, the threat of new entrants, the threat of new substitutes, the bargaining power of suppliers, and the bargaining power of buyers (Hove and Masocha, 2014). The extent of competition largely relies on the determinants such as technology, the required amount of capital to start the business, as well as dynamics in customer demands that influence the business activities within the sector. The suitability of Porter's five forces in explaining competition among SMEs is also underpinned by the unique approaches used by SMEs to conduct businesses such as reliance on local suppliers, rapid changes in customer demands, and intense competition from the international market (Hove and Masocha, 2014). For instance, the globalisation trends necessitate SMEs to reconfigure their strategies and shift their focus from local customer orientation to international markets. Therefore, Porter's five forces could provide valuable insight into the competition that SMEs are facing in today ever changing economic landscape. A large number of SMEs within the same sectors implies a possible threat to product substitution since consumers have access to wider alternative to choose from.

Given the low capital required to enter the SMEs and continuous development of technology, threats due to new substitutes and new entrants are high. Meanwhile, although there is significant stiff competition within the cloud computing industry, the rivalry is low owing to a lack of strong market leadership among the SMEs. On the contrary, the bargaining power of buyers and suppliers are high due to the limited switching costs and the fewer number of vendors in the cloud computing industry (Hove and Masocha, 2014; Kraja and Osmani, 2015). Porter's five forces provide a valuable understanding of the five factors including rivalry, bargaining power of consumers, bargaining power of suppliers, the threat of new entrants, and the threat of substitute services which determine competition among the SMEs (Firmansyah and Amer, 2014).

2.12 Theories and Models

The literature review conducted by Green (2014) demonstrated the need to use theories and models in underpinning research in social sciences. The main argument for the use of the theories in research is to enable this study to attain order and completeness in addressing the research concerns. This section will focus on three main frameworks that underpinned the study.

2.12.1 Technology-Organizational-Environment Framework (TOE)

The development of the Technology-Organizational-Environment (TOE) framework was formulated based on the need to guide the process of technology adoption among the firms. According to Hassan et al. (2017), the technological, organizational, and environmental aspects influence the adoption of innovation. For an organization to adopt IaaS as a layer of the cloud computing architecture, the TOE framework is vital in understanding the factors that act as barriers or drivers to the adoption of cloud computing. The three factors can be summarized in Figure 4 shown below:

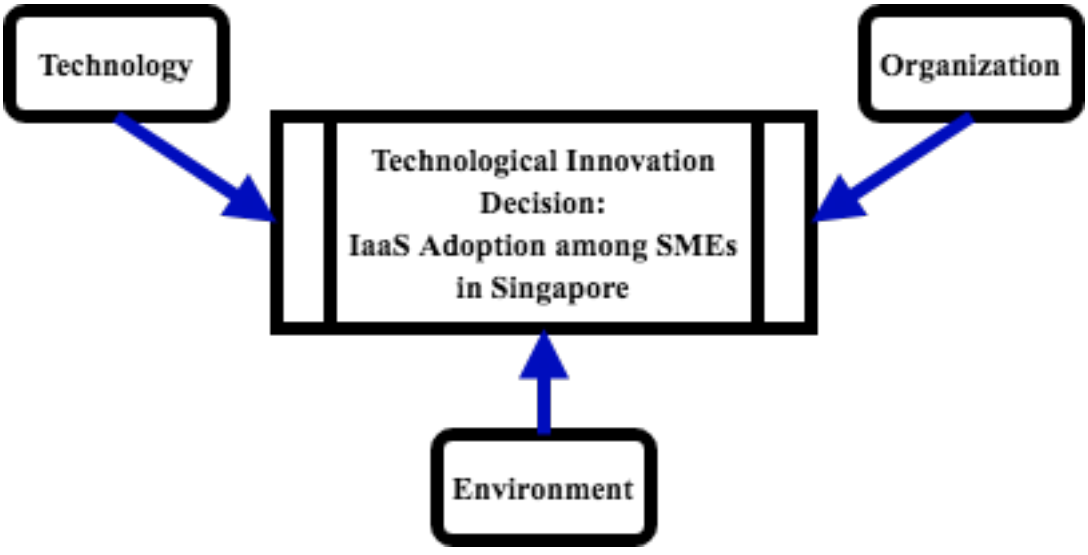

Figure 4. Factors for technology adoption based on TOE (Source: Hassan et al., 2017)

Research indicates that the TOE framework has been used in various context to explain the adoption of technology across business realms and that each of the identified factors influences the management decision to adopt new technology (Gangwar et al., 2015; Oliveira & Martins, 2010).

2.12.1.1 Technological Context

As pointed out by Hsu et al. (2014) an organization derives motivation to adopt a new technology based on the anticipated benefits. In the case of the IaaS, the businesses must weigh out the differences in terms of positive and negative outcomes that resulted due to the adoption of cloud services. The perceived benefits which form a significant aspect of the technological context factor include the direct and indirect impacts that are associated with the IaaS. In the case of the SMEs, the drive to adopt IaaS requires a clear outline of the potential benefits before they opt to integrate the cloud services. The apparent low adoption may be a reflection of the SMEs waiting out to see the need for IaaS and how it is relevant to the existing context.

As stated, the benefits associated with the adoption of IaaS including cost reductions, saving more time which could be redirected to spend on core business activities, and improved management of the IT resources form part of the considerations that will motivate the SMEs (Goyal & Dadizadeh, 2009; Kundra, 2011; McKinnie, 2016). As Oliveira and Martins (2010) pointed out, the perceived benefits should be accompanied by reduced obstacles to adoption to enhance the motivation among the organization. Poor perception regarding the expected outcomes explains the rejection of new technology especially cloud services among the firms.

Technical capabilities and readiness among the business entity also form part of the factors that drive technological adoption in an organization. According to the studies conducted by Oliveira and Martins (2010), the employees within an organization play an important role in determining the adoption of new technology. Since most of the SMEs rely on outsourced cloud services, the resulting attitude is vital in the overall relevance and success of new technology within the firms. Notably, the resource capability among most of the SMEs does not support the in-house integration of the IaaS or other sophisticated technology. It implies that the relevance of deployment models will significantly vary depending on the existing expertise to support the integration of the cloud services (Amanatullah et al., 2013; Gorelik, 2013; McKinnie, 2016).

While the earlier concerns regarding the availability of the internet or exposure to computers are already overcome, the IaaS require relatively increased knowledge among the employees to effectively function for the good of the business. As a result, firms with increased knowledge of

cloud-based services are likely to be highly motivated in adopting IaaS. Conversely, firms with limited expertise may lack the motivation towards adopting IaaS due to perceived difficulties. The SMEs main challenge as pointed out is the resource constraint that is both human and financial. Given the informal work arrangements that result in the performance of various tasks by an individual, the SMEs are likely facing inadequate in-house capabilities.

While this may not be necessary for cloud adoption especially IaaS, the employees may develop a negative attitude toward the new technology especially when there is limited technological integration. As a result, the firm will experience resistance in its attempt to adopt new technology. The research by Yoo and Kim (2018) demonstrated that customers' adoption mainly relies on compatibility which explains how the desired technology resonates with the existing IT infrastructure and the existing knowledge. It implies that when the employees in an SME lack the necessary skills, they will consider IaaS to be incompatible with the business capabilities. Therefore, technical capability as an element of a technological context has a greater impact in determining the adoption of IaaS among the SMEs.

The security concerns also form part of the technological contexts that may hinder or motivate the organization to adopt the Cloud services. SMEs operations are vulnerable to business interruptions since they lack the capital resources that can be invested in establishing stronger information security. Lu and Ramamurthy (2011) contend that except for a few instances, the cloud datacentres are almost always away from the premises. In this case, the sensitive organizational information is stored in shared infrastructure where the vendors are in control of the data. It implies that the business will lose control of its most valuable information to access the associated benefits. Given the increased information security threat due to hacking and other forms of data breaches, the firms dread that the cloud services can be vulnerable to cyber-attack (Ayyagari, 2012; Chou, 2013)

Inasmuch as the denial of cloud-based services does not reduce the security risks, cloud adoption is associated with the anxiety regarding the occurrences of risks when the business is not in absolute control over their data (Goyal and Dadizadeh, 2009). The SMEs which is the focus of the present study are highly vulnerable and data breaches will cause irreparable damages to the businesses. Moreover, the third parties entrusted with the hosting of the cloud services may go

bankrupt. As a result of the outages, the business will be disrupted and forced to incur significant amounts of financial resources. The weak resource base for the SMEs will not readily support such investment thus leading to the likely closure of the business. Therefore, the fears associated with the loss of control and the security control form part of the barriers that SMEs face in their attempt to adopt IaaS (Kreslins, et al., 2018; Messmer, 2009; Oliveira and Martins, 2010).

2.12.1.2 Organizational Context

Firms' success is highly dependent on the external and internal conditions that shape the environment in which business operates. The contextual factors including size, scope, resources, and management support are vital in determining its ability to adopt new technology (Zhu et al., 2006). Since the present study focuses on SMEs, the main organizational factors will involve support from the management as well as resources.

Notably, SMEs' operations are significantly different from those of large firms given their relatively small size as well as resource constraints. The decision to adopt new technology among the SMEs involves a significant risk that must be supported by the organization's contextual factors. Research conducted by Hassan et al. (2017) revealed that individual firm characteristics are determining factors in the overall attitude toward innovation. It implies that the technological context may be favourable whereby the existing skills and resources can adequately support new technology, but the lack of readiness may be a barrier to adoption of technology. Sobragi et al. (2014) further contend that organizational factors are largely defined by the prevailing culture as well as the structural aspects. In this case, the organization that is oriented toward innovation will likely adopt new technology with ease. The SMEs context especially the small and micro categories face unique challenges based on the nature of their business approaches. As stated, the main focus on highly centralized and informal SMEs are customer engagement and daily operational efficiency (Aljabre, 2012). It implies that the management support for new technology especially IaaS may be limited.

While the resource requirements are limited, the willingness and anticipations for future increase in operational efficiency among other benefits may not be readily available. Hassan et al. (2017) affirmed that the top management support is vital for cloud adoption in an organization. Sobragi

et al. (2014) also demonstrated that cloud adoption in an organization largely depends on existing readiness. For instance, the firms that already rely on sophisticated technology can easily accept innovation. While the readiness may vary among the SMEs, generally most of the small businesses do not rely on the complex technologies due to the highlighted resource constraints. It implies that even if the IaaS offers the highly sought for sophistication among the SMEs with the potential to improve performance, the lack of readiness as an organization's contextual factor will compromise the willingness. Given the organization's contextual factors, Venkatesh and Bala (2008) further argued that most of the firms fail to adopt innovation due to cultural constraints. The prevalent culture results in a lack of support from the top management, the employees and the customers among other stakeholders.

The SMEs mainly serve niche customers who are attuned to specific values to cement positive and long-term business relationships. Therefore, if the existing practices are not supportive of innovation, the resistance for change will act as a significant barrier to the adoption of new technology. IaaS and other cloud service are innovation especially among the SMEs who could not initially afford the resources to develop in-house IT infrastructure. As Zhu et al. (2006) put it, without adequate preparations from the management, the employees and stakeholders will resist any attempt to adopt the IaaS regardless of its benefits to the business.

2.12.1.3 Environmental Context

Firms operate in an environment in which they have limited or no control over especially the external factors that affect business activities. McKinnie (2016) in examining the organizational climate pointed out that the organization's wide information system has both direct and indirect implications to the adoption of cloud services. Chan et al. (2012) accentuated that the main environmental factors include competition, market forces, and regulatory forces. In the context of SMEs in the Media and advertising industry, the above analysis already indicated the existence of stiff competition in the market. This implies that the businesses are looking for alternative ways to leverage competitiveness while reducing the costs to remain relevant in the market.

The regulatory forces that are policies, laws as well as government support are also apparent in the environment. For instance, the government has improved the IT infrastructure in the country intending to improve the adoption of IT among SMEs. The government support reflects a positive regulatory environment that encourages the adoption of innovation (Singapore News Center, 2018). Similarly, cloud service providers are readily available for SMEs. Meanwhile, the environment is further characterized by concerns over the trust between providers and customers as well as the existing pressure among peers (McKinnie, 2016).

These factors may act as barriers to IaaS adoption even when the other external environmental factors are favourable. Research conducted by Rai et al. (2009) pointed out that the customer (in this case SMEs) will enter into a contract with the vendor (an organization that provide cloud services). The contract is expected to be guided by given terms and conditions especially in the interest of the client. Meanwhile, the nature of cloud services shows the possibilities of leaking sensitive data. This may occur voluntary or involuntary as an external factor. The SMEs face stiff competition such that negative exposure or data leakage will greatly affect their overall performance and success.

The external pressure also piles as the technological changes continue to define the competitive landscape. According to Hassan et al. (2017), SMEs are more likely to adopt a wait-and-see approach whereby they tend to adopt new technology after they see the benefits from peers. The pressure in the SMEs sector in Singapore is positive given the government and policy forces that continue to shape its desirability. IaaS represents one of the cloud computing services that is largely preferred among SMEs given its basic attributes and benefits to the businesses (Mikkonen and Khan, 2016). The increasing external pressure given the trends in IaaS adoption has a positive influence among the SMEs in the Advertisement and Media industry.

The three aspects of the TOE model that are technology, organization, and environment are distinct but complementary in determining the adoption of cloud services (Chan et al., 2012). It implies that the technological aspects such as competency, readiness, and capabilities must resonate with the culture and overall management support to improve the incentive to adopt IaaS in an environment that is characterized by favourable laws and policies. The TOE model's suitability in

explaining the IaaS adoption among the SMEs in the advertisement and media industry is based on external and internal aspects. In this case, the TOE model helps in explaining both the value that IaaS has on the business as well as the possible disadvantages.

As Nkhoma et al. (2013) pointed out, the TOE model provides a big picture of the possible factors that will influence the adoption of IaaS. Therefore, the adoption of IaaS among the SMEs in Singapore's media and advertisement industry can be understood based on the technological, organizational, and environmental models. The analysis indicates that the TOE model provides a context-specific explanation on factors that influence the decision to adopt information technology. However, research shows that the TOE model does not offer a specific approach to explaining the features of information technology (Evwiekpaefe et al., 2018). In as much as this is one of the criticisms for the theory, the present study on IaaS adoption rely on the external factors to understand how decision-making process occur in regards to IaaS among the SMEs in the media and advertisement industry.

2.12.2 Diffusion of Innovation Theory (DOI)

Roger's diffusion of innovation theory (DOI) has been widely used to explain the attitude of consumers towards various products and services (Cheng et al., 2004). The key attributes of the diffusion of Innovation theory including complexity, trialability, compatibility, observability, and relative advantage as suggested by Everett Rogers are valuable in explaining the innovation adoption (Rogers, 2010). Extant studies generally agree that DOI provides a suitable lens through which the adoption of technology can be adequately viewed (Golding et al., 2008; Nuseibeh, 2011).

Further DOI is considered to offer a clear insight based on the organizational present situation and later dissemination through the existing social systems (Stieninger et al., 2014). It implies that an understanding of the adoption of current technology such as IaaS will involve various processes to be fully accepted among the users. In explaining IaaS adoption, Alkhalil et al. (2017) pointed out the various elements of the DOI theory can be classified into three main stages. Firstly, the understanding is whereby an organization seeks to understand its current state and if this state is where it is expected to be or how far it is away from where it should. Secondly, it is the realization

component that involves an attempt by an organization to understand the various elements and conditions that are affecting them from achieving their desired state and strategize the next course of action to achieve the desired state. Finally, the execution which is a situation in which the organization selects the next best course of action based on the strategic direction from the realization stage to achieve the desired state that the organization should be while moving forward. Alismaili et al. (2016) in examining cloud computing in Australia revealed that DOI is one of the theories that is mainly used to guide the research on cloud computing.

2.12.2.1 Trialability

In most cases, new technology is often associated with real and perceived risks, especially among customers. According to the research conducted by Alkhalil et al. (2017), the existing uncertainty among the users of a new technology necessitates that organizations test the innovation to gauge its relevance. Since most of the cloud computing services especially IaaS are provided by the third party, companies have the opportunity to test the services for a period to decide on the adoption of the cloud-based services. Meanwhile, the resource constraints especially the hardware limits the trialability since it involves the use of extra hardware to keep the applications running without compromising the normal business operations.

Therefore, waiting to see the benefits from peers remains a feasible option for the business that seeks to take calculated risks. In the case of SMEs, trialability as a determinant of IaaS adoption is not feasible given the nature of the operations as well as limited resources. While it can be easier to test, the existing competition in the market environment will not provide the necessary room for vendors to engage in experimentations without benefits. Since testing the cloud services results in adoption, the ease to test the new cloud service is an important determinant of the adoption in a market saturated with stiff competition.

Rogers (2010) defines trialability as the perception among the members in a community regarding the ability of the innovation to be tested on a limited scale, in this case, the ease of testing IaaS among the SMEs in Singapore's media and advertising industry. Among the early adopters, trialability is necessary for influencing their decisions. On the contrary, late adopters can rely on anecdotal evidence regarding the associated benefits among their peers in the market. Golding et

al. (2008) in examining the application of DOI in cloud computing adoption acknowledged the role of trialability in reducing the level of uncertainty among the users. As stated, SMEs operate in a volatile environment in which the existing levels of uncertainty regarding new ventures act as barriers to accept changes (Babakus et al., 2006; Love et al., 2001; Swierczek and Ha, 2003). It implies that they are highly likely to rely on traditional approaches despite the apparent benefits of technology.

2.12.2.2 Compatibility

The adoption of technology is triggered by the needs, experiences, and trends within the external environment. Extant studies reveal that business is also guided by the customer needs in deciding on whether to adopt new technology. Based on Rogers (2010) description, compatibility refers to the degree of consistency between the needs of the potential adopters as well as the innovation. Stieninger et al. (2014) affirmed that when there is congruency between the innovation characteristics and the perceived needs of the potential adopters, it enhances the rate of adoption. Notably, the users must consider the cloud service in light of the data structure as well as the intended improvements. For instance, while business seeks an opportunity for growth, SMEs mainly address the needs of their various market niches. They seek to increase relationships and improve loyalty to secure a strong market base. The IaaS should, therefore, resonate with the needs of the customers in terms of quality of services and improved efficiency to gain considerable acceptance.

Alkhalil et al. (2017) contended that concerns over the need for additional expertise that is not readily available are part of the incompatibilities that prevent firms from adopting beneficial innovation. Similarly, the employees' familiarity with the new technology improves the compatibility and supports the adoption processes. The overall perception regarding the innovation should be compatible with the existing features within the organization to limit negative attitudes among the employees. In the case of SMEs, Golding et al. (2008) revealed that beliefs, experiences, and location are the key compatibility issues affecting cloud adoption. In this case, the potential adopters consider how the customer experience will be affected by innovation. They also rely on existing beliefs regarding the nature of their business and possible outcomes.

2.12.2.3 Relative advantage

Innovation is a progressive phenomenon that is subject to constant change. The business environment also responds to the technology based on the value or benefits that users realize by adopting the new changes. The concept of a relative advantage as advanced by Rogers focused on incentives and acceptance (Rogers, 2010). It implies that potential adopters will seek information to make a comparison between the existing practice as well as the innovation. Golding et al. (2008) analysed the concept of relative advantage and how it relates to cloud computing adoption to conclude that customers weigh the superiority of the new approaches against the existing processes based on costs, effectiveness, and immediacy of returns due to the investment.

While the comparison may be based on one or more factors, relative advantage plays an integral role in the final decision to either adopt or not to adopt the new technology. Stieninger et al. (2014) further argued that the potential adopters will readily accept cloud-based services if the benefits supersede the traditional approaches. While most of the SMEs rely on the experiences of their peers to make decisions, the relative advantages associated with IaaS including load relieving and cost-saving among others can be realized through testing. However, the limited resource base amongst the SMEs compromises their ability to invest in trialability.

Ghobakhloo et al. (2011) pointed out that cloud-based services result in other benefits such as improved quality of operations, increased speed of task delivery, and improved productivity compared to previous innovation. Without the relative advantage, the business is likely to reject innovation and continue with its existing structure regardless of the expected benefits. Extant research has demonstrated that relative advantage has a positive relationship with the decision to adopt cloud-based services (Espadanal and Oliveira, 2012; Low et al., 2011; Wu et al., 2013). As an element of DOI, the decision to adopt IaaS is based on the perceived benefits that it gives to SMEs.

2.12.2.4 Complexity

Innovations are associated with some difficulties in terms of usage as well as basic operations. According to Rogers (2010), there is a need for potential adopters to understand the basic operations of the innovation before they can accept it. In the case of IaaS, the vendors offer

hardware support while the customers are charged with basic maintenance of the applications. In adopting IaaS, the SMEs will consider the in-house capabilities in deciding to adopt the new system and the underlying new processes that are associated with it.

The perceptions regarding the technical attributes of cloud services may vary among SMEs. In most cases, the complexity-simplicity continuum is a key consideration when adopting cloud services. Complex innovation is associated with a negative rate of adoption among the organization (Habjan and Pucihar, 2017; Seo, 2013). The concerns regarding complexity are mainly based on the perception of the employees in the organizations. Research reveals that most of the cloud-based services are relatively simple given the nature of their administration, level of automation, and usability (Goel et al., 2012; Rajan, 2013; Soliman et al., 2013; Stieninger et al., 2014).

Conversely, the complexity of adoption can turn into a barrier when the users experience difficulties in understanding or using the new technology. In most cases, the IaaS is associated with ease of use since most of the technical aspects are addressed by the vendors or service providers. However, IaaS adoption requires that the customers be responsible for the technical aspects of the applications which are running on top of the infrastructure while the cloud provider remains in charge of most of the technical aspects at the infrastructure layer.

2.12.2.5 Organizational Attributes

Organizational attributes are one of the aspects of the DOI that greatly impact the adoption of innovation, especially in cloud computing. According to Ali et al. (2015), there is a need for greater attention to organizational attributes given the various factors that determine the technological adoption capabilities. Golding et al. (2008) in analysing the attributes of SMEs acknowledged the significant differences in terms of the culture, capacity, and mode of the business. Added to the small size and the resource constraints, SMEs decision to adopt any form of new technology is subject to specific characteristics.

As Arpaci (2019) contended, the SMEs are highly diverse thus general approaches to improve adoption of technology is subject to barriers and challenges resulting from the specific attributes

of the business. For instance, the micro-SME that is the businesses that employ between 1 and 50 employees may lack the desired capacity to access the use of cloud-based services. Meanwhile, regardless of the industry of operation, the attributes of the SMEs play an integral role in enhancing their willingness to adopt a particular cloud computing service. The concern for increased competition in the media and advertising industry alongside the reliance on technology necessitates the adoption of technology.

Other factors such as observability form part of the DOI model, the above-stated factors have a greater influence in explaining the IaaS adoption among the SMEs in the advertisement industry. Meanwhile, the application of DOI in guiding the process of cloud computing adoption has been criticized for two main reasons. Firstly, Shah Alam (2009) in studying internet adoption among SMEs in Malaysia revealed that DOI overemphasizes the concept of innovation. As a result, the theory fails to address other contextual aspects that influence the decision-making process among SMEs. Research further reveals that most of the studies employing the DOI theory are factor-based (Abu-Khadra and Ziadat, 2012; Alkhater et al., 2014). In such cases, the theory fails to incorporate the process-oriented nature of technological adoption in analysing the contextual aspects. Even with the stated weaknesses, DOI remains to be one of the theories used in underpinning studies on cloud computing adoption.

2.12.3 Technology Acceptance Model (TAM)

Wiedemann and Strebel (2011) in examining the corporate IaaS usage argued that the Technology Acceptance Model (TAM) is suitable in explaining the intention to use IaaS. In this case, the model is appropriate due to the utilitarian nature of the IaaS as well as the behaviour of business in determining the acceptance of information technology. TAM involves five main elements that explain its application in determining the adoption of IaaS. Meanwhile, studies by Seo (2013) summarized the elements into two main categories that are perceived security as well as perceived scalability to explain the IaaS adoption.

Given the two categories, perceived usefulness is considered based on the ability of the particular cloud model to meet the expectation of the customers. For instance, the SMEs will consider how IaaS is suitable in the storage of sensitive information and how it meets the business needs. It

implies that the behavioural intention of the business owners will be influenced by their perception of security when using IaaS. The second aspect which is perceived scalability refers to the ability of the innovation to respond to the growing needs of the business over time (Seo, 2013).

SMEs are in constant growth as they attempt to acquire new customers. Therefore, the existing perception regarding the ability of IaaS to expand and accommodate increased load plays a significant role in the willingness among the SMEs to adopt it. On the contrary, the literature review conducted by Gangwar et al. (2015) revealed that perception regarding the ease of use and the usefulness of technology to the business are the basic determinants of its adoption. The two concepts also act as determinants of the attitudes among the primary decision-makers in business. Each of the constructs is further tied to other factors that also act as its determinant.

Venkatesh and Bala (2008) pointed out that perceived usefulness which implies the belief that using IT requires less or limited efforts by the adopter is further affected by subjective norms, output quality, job relevance, and image among other aspects. Yet, the perceived ease of use as a basic tenet of the theory is determined by two other moderators that are experience and voluntariness (Venkatesh and Bala, 2008). In this case, the perceived ease of use mainly encompasses social factors that influence the decision-making process among the firms while the perceived usefulness focuses on system design as key aspects in influencing the technology adoption decision.

As stated, SMEs are defined by the limited number of employees among other defining attributes whereby some business owners also double up as the chief executive officer. Therefore, both social factors, as well as system design perceptions, have a direct and indirect impact on how the business stakeholder make and implement decisions. As Dwivedi et al. (2009) pointed out, the intention and strength of belief among the decision-makers in business are important determinants of IaaS adoption. Joseph et al. (2015) further pointed out that the SMEs operate in a highly volatile environment in which the decision to adopt IaaS cannot wait until the technology is matured. It implies that the perception regarding its usefulness as well as ease of use should be aligned with the business needs to improve competitiveness. The delays that result in the late adoption of technology among the SMEs are detrimental to the business performance especially when the

adoption of technology among the business peers makes the business less competitive. TAM has been used to explain the various factors that motivate firms to adopt cloud computing technology (Wiedemann and Strebel, 2011).

The adoption of IaaS as a model to compute resource utilization is explained by the TAM model by helping in the prediction of behaviour and attitudes among the stakeholders. On the contrary, Dwivedi et al. (2009) posited that the reliance on TAM to explain the studies on cloud computing adoption neglects the complexities in the firm's immediate environment. In this case, the SMEs operate in an environment characterized by different stakeholders such as employees, business owners, and family among others. Since these factors are important predictors of IaaS and other new technology adoption among the SMEs, they are not addressed in explaining the basic elements of the TAM model.

Similarly, Evwiekpaefe et al. (2018) pointed out that TAM has been applied across various spectra of studies including simple standalone software adoption given its generalizability. Yet, the model does not focus on the social aspects of IT adoption which are important to SMEs in developing their businesses in a highly competitive environment. Further, the model is considered to only focus on external factors that affect the business which emphasize the volitional adoption (Amadin et al., 2018). Conversely, SMEs decisions to adopt information systems especially IaaS are compromised by a lack of finances or in-house technical capabilities to facilitate the use of technology for the benefit of the business.

Another noticeable weakness of the TAM model involves the discreteness of the theoretical constructs (Joseph et al., 2015; Seo, 2013). The theory assumes that perceived usefulness, attitudes, and perceived ease of use among the other five elements that determine the adoption of technology independently explain the acceptance among users. This view largely ignores the interrelatedness of these factors and the external variables in influencing the ultimate decision among the SMEs to adopt a particular cloud-based service. Regardless of the TAM model's weaknesses, it remains to be one of the tools that are suitable for understanding the adoption of cloud computing services.

Gangwar et al. (2015) contended that TAM is one of the traditional frameworks that are valuable in understanding cloud computing adoption and IT related services among firms. Therefore, the TAM model informed the present study on the adoption of IaaS among the selected SMEs in Singapore's Media and Advertisement industry.

2.13 Summary of Theories and Models

Table 2 below provides a summary on the discussion of the three theories and models which provided valuable insight into the analysis of the various factors that act as a barrier or a driver to the adoption of internet-related technologies especially the IaaS.

Table 2. Summary of Theory and Models

Theory	Characteristics	Highlighted in
Technology-Organization-Environment (TOE)	Context of technological adoption (organisational, environmental, and technological)	• Alismaili et al., 2016 • Alkhalil et al., 2017 • Chan et al., 2012 • Gangwar et al., 2015 • Hassan et al., 2017 • Mckinnie, 2016 • Nkhoma et al., 2013
Diffusion of Innovation (DOI)	Determinants of new technology adoption based on complexity, relative advantage, and compatibility	• Alismaili et al., 2016 • Alkhalil et al., 2017 • Cheng et al., 2004 • Golding et al., 2008 • Rogers, 2010 • Stieninger et al., 2014 • Zhu et al., 2006
Technology Acceptance Model (TAM)	Factors that influence decision to adopt a new technology including perceived ease of use, perceived usefulness, and attitudes	• Dwivedi et al., 2009 • Seo, 2013 • Venkatesh and Bala, 2008 • Wiedemann and Striebel, 2011 • Stieninger et al., 2014

The TOE framework emphasizes the need to consider technological, organisational, and environmental contexts in decisions to adopt or avoid new technologies. While the technological and technical aspects guide the business on the anticipated benefits and possible risks, the

organisational factors are largely focused on the resources as well as characteristics of the firm that makes it capable of adopting particular technologies. The environmental context is majorly concerned with the interactions within the organisational-wide information system and their influences on business competitiveness. As pointed out by Alkhali et al. (2017) TOE framework provides a holistic insight into the concept of technology adoption which makes it a viable model for the present study.

TAM framework also involves five elements that shape the perception of the usefulness of technology to business. Inasmuch as the various scholars revealed different approaches to the categorisation of the factors, perceived usefulness, ease of use, and intention to use remain to be significant in determining IaaS adoption. This study relies on TAM given its ability to explain the intention and actual usage of the IaaS.

Finally, the DOI model is mainly used to explain the processes resulting in the adoption of new information technology. The wide categorisations including the characteristics of the organisation, individuals, and innovation play an important role in determining the patterns of adoption. As pointed out, the DOI model has considerable limitations including a lack of focus on resource availability and support to adopt new technology. Additionally, the DOI models fail to take into account the unique business circumstances that face different SMEs. According to research, DOI is a factor-based theory with limited insight into the process-based nature of technology (Abu-Khadra and Ziadat, 2012; Light and Papazafeiropoulou, 2004; Lyytinen and Damsgaard, 2001; Papazafeiropoulou, 2002). It implies that DOI theory fails to provide an adequate explanation on IaaS adoption given its process-oriented nature. Similarly, Sha-Alam (2009) pointed out that DOI overemphasizes on innovation. As a result, the theory fails to address other contextual aspects such as the business environment and technical capabilities which are important in the adoption of technology such as IaaS. It is based on these reasons that this thesis relied on TOE and TAM as applicable theories to guide the study processes.

While the three theories have been widely used to underpin studies on cloud computing adoption, the above discussion is important in providing a holistic view of the models that guide the technological adoption. However, various studies reviewed have focused on either TAM or TOE

as a single theory. TOE theory has been used due to its focus on both drivers and barriers to adoption of technology based on the business environment. As pointed out, technology adoption is a firm is guided by the consideration of benefits and challenges which are the basic tenets of TOE theory (Oliveira and Martins, 2010; Hassan et al., 2017). On the other hand, TAM theory focuses on two major factors including perceived security as well as perceived scalability which are essential aspects in the decision-making process to adopt the technology (Wiedemann and Strebel, 2011; Seo, 2013).

Conversely, the extant studies have demonstrated that factors contributing to the low adoption of cloud technology such as financial constraints as well as inadequate in-house technical team are largely addressed through the aspects of both TOE and TAM models (Alismaili et al., 2016; Alkhalil et al., 2017; Bhat, 2013; Wiedemann and Strebel, 2011). Integration of TAM and TOE theories has been demonstrated in the research conducted by Gangwar et al. (2015) in a quantitative study which investigated cloud adoption among business organisations. Based on the process-oriented nature of TAM and TOE an integrated view provides a valuable lens through which IaaS adoption among the SMEs can be explained.

According to Tripopsakul (2018), the integration of the TAM and TOE models is an approach to overcome the weaknesses and gaps in each theory. The application of a single model leaves a methodological vacuum which compromises the ability of the researchers to address research challenges. For instance, the application of TAM only in researching IaaS adoption will result in excluding the social factors when predicting its adoption among the SMEs. Therefore, an integration of two frameworks is likely to play an important role in overcoming the weaknesses and criticisms.

This study relies on the integration of two of the theories that are TOE and TAM models to underpin the study to explore the adoption of IaaS among SMEs in the media and advertising industry. The rationale for selection of TAM and TOE is based on their complementary role in addressing both the resource concerns and the environmental context of the business. The integration of TOE and TAM models capture the resource capabilities as well as the unique environment in which the SMEs operate. Inasmuch as SMEs rely on innovation to improve

performance, their small capital base compromises their ability to attract and retain adequate personnel with relevant IT expertise (Bhat, 2013). DOI model overlooks the significance of resources and the necessary support that is required in the SMEs to benefit from technological adoption especially IaaS. Figure 5 presents a pictographic representation of the area which forms the rationale for selection of the TOE and TAM as the underpinning theories in guiding this study.

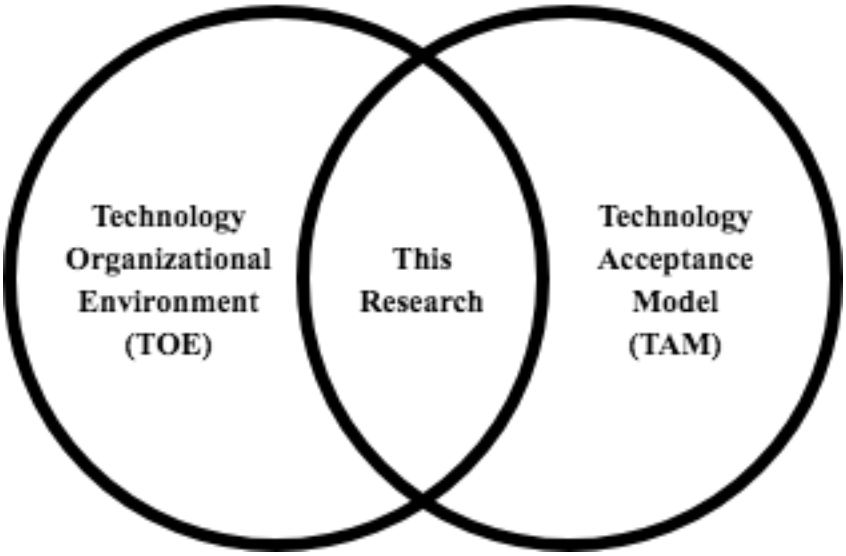

Figure 5. Integrating the TOE and TAM framework to underpin this study (Source: Author)

2.14 Key Concepts

Given the literature reviewed in the above sections, Table 3 below provides a summary of the key concepts:

Table 3. Summary of Key Concepts from the Literature Review

Key Concept	Aspects	Highlighted in
Revenue and/or Cost associated with adopting IaaS	Costs associated with human resources, Outsourcing costs, Network costs, revenue increase, reduction in infrastructure expenditure, connectivity and access to the internet, impact on customer service	• Bhat, 2013 • Carcary et al., 2014 • Khan and Al-Yasiri, 2016 • Rath et al., 2012 • Xue and Xin, 2016
Benefits/ Challenges in adopting IaaS	Competitive advantage, support from vendors, Operational efficiency, value addition, management support, Usability, Budget constraints	• Lian et al., 2014 • Trigueros-Preciado et al., 2013; • Zaied, 2012
Technical capabilities in using IaaS	In-house expertise, Training of employees, usability/usefulness, performance interferences, payment models	• Bhat, 2013 • Rath et al., 2012 • Soon et al., 2012

Table 3 highlights the key concepts drawn from the literature including integrating theories from both TAM and TOE to underpin this study as outlined in Figure 5. In the above section. The selected concepts are the basis of decision variables that influence IaaS adoption among the SMEs. The resources concerns raised from the reviewed literature are captured in terms of the costs and revenue associated with IaaS adoption. Additionally, the SMEs in their quest for IaaS adoption must weigh the benefits against the challenges associated with it. The benefits outlined in the literature such as competitive advantages as well as operational efficiency upon IaaS adoption are viewed to challenges such as budget constraints and usability of the new technology to guide the

decision-making process. The technical capability forms part of the resource considerations highlighted in the reviewed literature. It has been selected separately since it acts as a link between the other two main concepts. The usability and operational efficiency outlined under challenges and benefits occur when there are technical capabilities within the business. These are achieved through investment in employee training which informs the concepts of costs and revenue. Therefore, the decision-making process involves consideration of the various aspects under the main concepts.

Based on the identification and categorisation of the key concepts, the conceptual framework shown in Figure 6 below depicts the main aspects that the present study will focus on given the need to use both TAM and TOE frameworks in addressing the research questions.

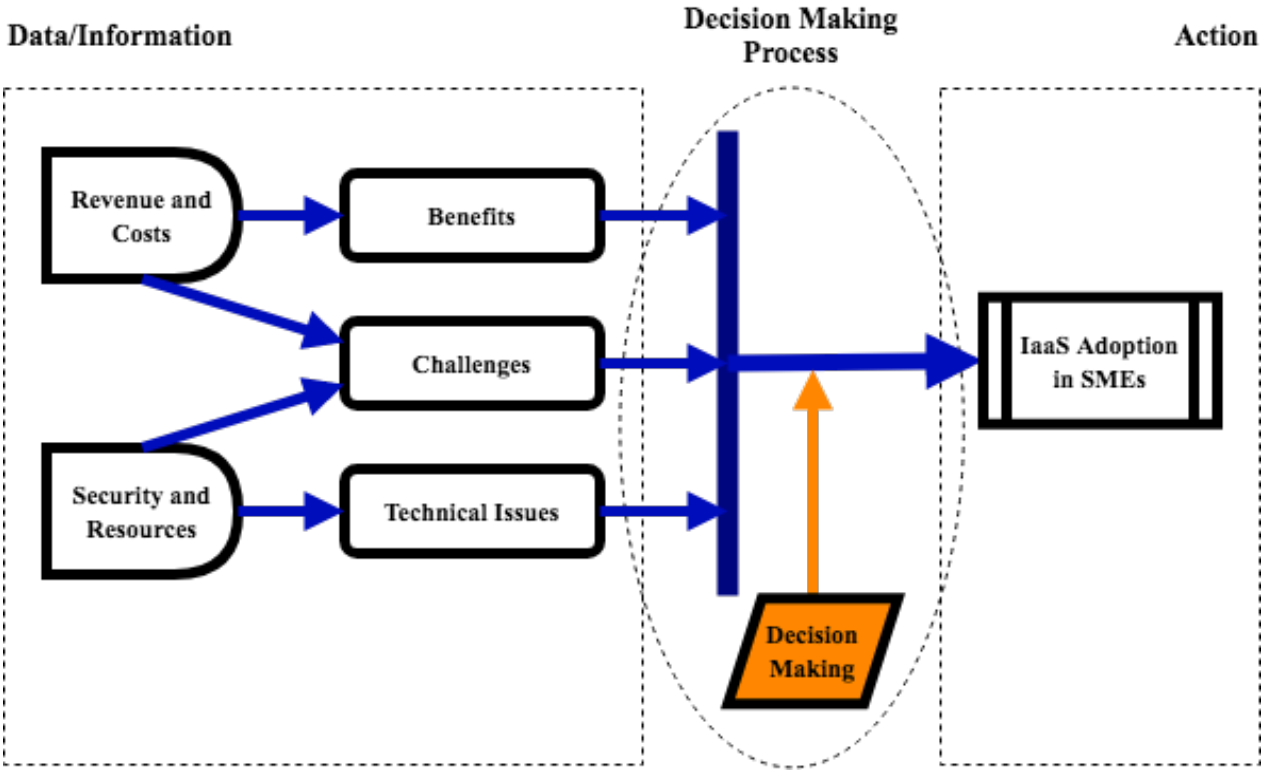

Figure 6. Conceptual Framework (Source: Author)

According to Adom et al. (2018) the conceptual framework as shown in Figure 6, outlines the researcher's worldview in explaining the natural progression of the research. As pointed out from

the reviewed literature, there are various factors that impact when making decisions to adopt a new technology such as IaaS service model. Figure 6 above presents an overall picture of the reviewed literature, key constructs, and theories that underpin the study in regard to the IaaS adoption process and reveals the relationships between the key concepts that are vital to SMEs adoption of IaaS.

The construction of a worldview in pictographic form as depicted in Figure 6 comprises three major aspects including Information, thought process, and action as the result. The information phase in the adoption of IaaS plays an integral role since it captures three major concerns that are benefits, challenges, and technical issues. While these three factors are considered distinct, the concerns for revenue and costs as well as security and resources are cross cutting that is they are highlighted as influencing the three factors differently. For instance, security and privacy have been outlined as being part of the benefits as well as challenges. The data/information are fed into the thought process where the decision to adopt or reject IaaS occurs among the SMEs.

The decision-making process as the second aspect towards action encompasses the various factors especially information obtained by the SMEs regarding IaaS challenges, and benefits. In the conceptual framework as shown in Figure 6, the relationships between the key concepts that are vital to SMEs adoption of IaaS feeds into the decision-making process. This is highlighted by the orange arrow. The consideration of the key constructs influences the decision for or against the IaaS adoption. Inasmuch as the decision direction is not apparent, the revenue and costs resulting from IaaS adoption can be a source of challenge or benefits to the SMEs. Similarly, the highlighted technical concerns especially security and privacy issues as well as resources such as in-house expertise are part of the identified challenges which also impact technical capacities of the SMEs to adopt IaaS. The consideration of these factors is vital in the decision-making processes which determines whether a business will make a positive or negative action toward IaaS adoption.

Based on the influence resulting from the information, the SMEs take Action to adopt IaaS or reject it as a business enablement tool. Inasmuch as the decision direction is not apparent, the revenue and costs resulting from IaaS adoption can be a source of challenge or benefits to the SMEs. Given the highlighted technical concerns, security and privacy issues as well as resources

especially in-house expertise are part of the identified challenges which also impact technical capacities of the SMEs to adopt IaaS. The consideration of these factors is vital in the decision-making process which determines whether a business will adopt IaaS or not.

As identified in the literature, there is low adoption of IaaS as well as other cloud models in Singapore despite its benefits to the SMEs. This is indicative of greater influence on the challenges, and technical issues that the businesses possess regarding IaaS. To explore this phenomenon, this study focused on the IaaS adoption among the SMEs in media and advertisement industry.

2.15 Chapter Summary

Identification of Gaps and Research Questions

From the literature, it is apparent that the IaaS plays very important roles despite the limited adoption among the SMEs. Notably, businesses rely on the IaaS to enhance their growth potential given the increased focus on the development of applications and other core businesses. Additionally, the literature has revealed that the resource-saving capability that is associated with IaaS is necessary for improving business competitiveness. Another use of the IaaS that is apparent from the reviewed literature is the ability of the business to scale up or down the operations depending on the market needs when using IaaS. Inasmuch as these are necessary aspects for the business success, the concern for the use of IaaS among the SMEs which has received considerable attention among scholars and practitioners has led to limited adoption among the SMEs. It is therefore important that the study provide an insight into the perception of the practitioners on the use of IaaS to provide a wider picture of IaaS adoption.

IaaS, as well as other cloud models, are considered to be a new disruptive technology in the market. The literature has pointed out the various benefits that make its (IaaS) adoption preferable among the business across various industries. The limited adoption of IaaS among the SMEs in the media and advertisement industry points to the need to explore the phenomena and determine the prevalent understanding among the players in regards to the factors that drive such decisions. Further, the research shows that, unlike other large firms in Singapore, SMEs are lagging behind despite the evidence that they stand a chance to gain from the adoption of the IaaS. Inasmuch as there are studies that focus on the factors that drive the adoption of IaaS, the exploratory research

is limited to reveal the in-depth factors that affect the SMEs within the Media and Advertising industry in particular.

Another aspect considered is the set of challenges that are associated with the adoption of the IaaS. The extant studies emphasized the concerns over security and privacy issue as a barrier to cloud adoption. Other challenges highlighted include resource constraints and a lack of internal staff expertise. Most of the managers in the SMEs rely on limited capital to run their businesses. As a result, the additional expenditure that is required to adopt cloud base services continues to be a challenge. Studies have focused on examining cloud adoption challenges from a general perspective with limited emphasis on IaaS, this study explores these challenges with a specific focus on the IaaS. Based on the existing gaps in the extant literature, the main questions that this study sought to answer are as under:

1. What factors drive the adoption of IaaS among the SMEs in Singapore's Media and Advertisement Industry?
2. What challenges do SMEs in Singapore's Media and Advertisement Industry face in their quest to adopt IaaS?
3. Would IaaS be a possible and workable IT solution for SMEs in Singapore's Media and Advertising Industry as a key business enabler or business enablement tool?

3.0 Methodology

The research methodology is a roadmap that provides the guidelines on the rules, design, methods and other principles followed in undertaking the study. According to Denzin and Lincoln (2018), the methods and assumptions used in research are valuable in critiquing and replication of the study. This chapter explains the philosophical approaches, research design, study population, sampling, data collection and analysis. Further, the validity and reliability, as well as the ethical issues applied in the conduct of the present study, are outlined.

3.1 Research Philosophy

Research is located in a given paradigm to guide and inform the whole process of the knowledge enquiry. Killam (2013) noted that research is shaped by a set of beliefs and everybody has a unique way of thinking and seeing the world through their coloured lens which affects our decisions and actions. In explaining the philosophical stance, it is important to first understand the terms of ontology, axiology and epistemology that guided the overall approach to the process of knowledge enquiry.

3.1.1 Ontology

Scotland (2012) noted that ontology as a philosophical paradigm encompasses the assumptions that a researcher needs to make to conclude that a phenomenon makes sense or is real. It implies that the researcher must be aware of his or her belief system regarding the existence or being an attempt to investigate or explore reality. Ahmed (2008) in examining the ontological assumptions posited that the researcher seeks to answer two main questions when seeking to understand the nature, existence, and structure of reality that are, what is there that can be known or what is the nature of reality? To explore the adoption of IaaS among the SMEs, it is assumed that the concepts can be understood based on the interpretation of stakeholders' response to gain an insight into their thoughts and perception of meanings. Therefore, this study employed the constructivist ontology which focuses on a social world of meanings to explore the adoption of IaaS among the SMEs (Ahmed, 2008; Killam 2013).

3.1.2 Axiology

Axiology involves making decisions that are guided by personal ethics and values in the process of enquiry (Killam, 2013; Schroeder, 2008). It implies that the researcher must be guided by an adequate design of what is right or wrong pertaining to the research especially, the researcher, respondents, and the audience who receives the report. As Mertens (2010) put it, axiology asks about the nature of moral behaviour and ethics as apparent in the research process. The researcher further revealed that the beliefs of the researcher exerted a considerable influence on the ontological assumption that what they perceived to be the nature of reality. In the present study, the researcher attempted to remain largely objective by relying on the views of the research participants to provide a richer understanding of the research issue. The freedom accorded the interviewees during the research process demonstrated the attempt by the researcher to uphold ethical standards which were further considered in the interpretation and presentation of the outcomes.

3.1.3 Epistemology

Mertens (2010) contended that epistemology also seeks to provide an insight into the nature of knowledge as well as the relationship between the participant and the investigator. The process of knowledge acquisitions requires that the parties to research that are the researcher, and the respondents collaborate to enhance the validity or rigour of the study. As Kivunja and Kiyuni (2017) rightly pointed out, the participants and the researcher need to collaborate as a basis of knowledge acquisition. Notably, the investigator extends the knowledge through reporting with a deeper understanding guided by the analysis. Therefore, in answering the question of how we know what we know, the researcher seeks to emphasize on the reasoned understanding of the sense of experiences. The exploratory approach in understanding the adoption of IaaS among the SMEs emphasized the sense of the experience of the main players in the media and advertising industry. Therefore, the study will rely on Interpretivism as the appropriate epistemology to excavate knowledge that answers the main research concerns. It implies that the responses and opinions of the research participants will be the basis of obtaining knowledge regarding the adoption of IaaS as the social phenomena under study.

3.1.4 Philosophical Stance

Mack (2010) pointed out three main philosophical orientations that are applicable in social research, namely positivism, interpretivism, and critical paradigm. In positivism, the researcher seeks to prove or disprove a hypothesis with a strong emphasis on statistical data (Mack 2010). The adoption of IaaS by SMEs is one of the complex business decisions that involve security and privacy challenges, among others. The complexity and uniqueness of business situations make them unsuitable areas of research using positivist philosophy which mainly rely on hypothesis and generalizations (Goldkuhl, 2012). This is based on the belief that social reality can be observed and generalized to explain occurrences in the natural world. Ontological positivists argued that social reality can be measured with certainty while epistemologically, the relationship between variables can be tested given their existence of fixed relationships (Somasundaram and Karlsbjerg, 2003). On the contrary, the development of the paradigm resulted in post-positivism which claims that there is no absolute objectivity in the study of reality (Mack, 2010). The positivist paradigm has been criticized for the apparent weakness regarding claims of objective truth in studying social reality.

Cohen et al. (2007) argued that scientific approaches cannot provide an absolute truth in examining a social phenomenon given the wide ignorance of morals and values that inform behaviour. The researcher further noted that even if the theories that seek to explain the causal relationships are simpler and precise, the complexity of interrelationships and factors that interact to determine behavioural outcomes will compromise the existence of absolute truth. As a result, the need to explain the social phenomenon such as the adoption of cloud computing among the SMEs requires a constructivist approach. On the other hand, the critical paradigm focuses on the emancipation as the basis of understanding reality. The overemphasis on elitisms limits application in the present study since the social reality cannot only be understood on the political perspectives (Cohen et al., 2007).

In this case, the proponents of critical paradigm believe that social transformation occurs through a lived experience. This approach cannot adequately underpin the study on the adoption of cloud computing given the various internal and external factors that come into play in understanding the SMEs. Notably, the present study sought to answer a more qualitative research question which were exploratory in nature. The researcher's intention to rely on the interpretivistic perspective informed the choice of the philosophical stance as outlined in the subsequent sections.

An Interpretivist approach assumes that the social world is in a cycle of continuous transformation and information can only be accessed realistically through social constructs which have no relationship to each other (Hesse-Biber & Leavy, 2010). It implies that there is a need to understand the social reality from the perspective of other people. Ontologically, the experience varies between people in a social context which result in an interpretation of reality (Mack, 2010). The direct experiences of other people inform the development of truth. The epistemological aspects of the interpretive paradigm claim that knowledge originates from situations that cannot be attained through simplistic interpretation. The epistemological interpretivist emphasizes on the need to understand the subjective meaning.

Therefore, the reliance on the interpretivist paradigm provides an opportunity to learn more about the subject based on the perceptions and experiences of the respondents. This enabled the researcher to generate new insights regarding the factors that influence the adoption of IaaS among the SMEs in the Media and Advertising industry in Singapore. In this case, the need to understand the adoption of IaaS among the SMEs in the Media and Advertising industry is context-based.

Technology undergoes constant changes due to innovations and dynamics in the market environment. These changes have made the approaches used by firms to leverage their competitiveness to be highly dynamic. Therefore, the application of interpretivist philosophy in this context acknowledges the ever-changing nature of the business environment. Landiyanto (2018) accentuated that the qualitative approaches associated with the interpretivist philosophy are credited for research in business due to the high level of trustworthiness and accuracy of the findings. The use of interpretivist approaches to underpin the present study could improve the theoretical as well as the descriptive accuracy that is necessary for exploring the adoption of IaaS

by the SMEs in the Media and Advertising industry in Singapore. The review of the literature on the interpretivist philosophy conducted by Antwi and Hamza (2015) also revealed that the data gathering methods associated with the interpretivism paradigm such as interviews enhance the contact between the researcher and the researched (participants). This is vital in the exploration of the present research issues whereby prolonged contact with the researched (participants) would enable the respondents to provide richer insights into the information gathered from the interviews.

This approach to research is normally associated with the involvement and understanding of the human interest in the topic of study. Interpretivist philosophy states that human complexities cannot be studied simply through quantitative variables. The subjective meanings, thus it is important to be able to accept that everyone is different and has a different perspective towards the same topic and focus more on the meaning of the research instead (Neuman, 2006; Pasian, 2017; Saunders et al., 2012). Interpretivism allows for a closer and enriched understanding of how IaaS will be beneficial for use by SMEs in Singapore that operates within the Media and Advertising industry.

Goldkuhl (2012) further attempted to highlight two main attributes of the interpretivist paradigm that is, interpretation of the reality and relations to the practice field. Given the contextual orientation, the interpretation of a social reality involves an iterative process whereby meaning is created by an in-depth understanding of the whole as well as the parts that make up the whole (Goldkuhl, 2012). Additionally, the researcher and the researched (participants) have to engage actively during the data generation to become co-creators of the resulting knowledge (Kivunja and Kiyuni, 2017). The outcomes of the study are based on the subjective interpretation of the meaning from the perspective of the researched participants. This is based on the interpretive tradition that accommodates the different worldviews.

The collection of data and its analysis to generate knowledge is largely based on the context, therefore, the researcher can only understand a social phenomenon, in this case, the adoption of IaaS among the SMEs in the Media and Advertising industry through reflexive research practice. Creswell and Creswell (2017) outlined three main features that guide the application of constructivist or interpretivist philosophy including approaches to sense-making, expression of

views, and origins of meaning in conducting a study. In this case, the researcher obtains the views of the participants through open-ended interview prompts which allowed for flexibility and revelation of deeper meanings. The sense-making feature implies that the researcher interprets the views of the respondents to create subjective meanings. Finally, the interaction between the researcher and the researched results in the generation of meaning (Creswell and Creswell, 2017). The features outlined informed the collection, interpretation, and presentation of data from the field to understand the adoption of IaaS among the SMEs in Singapore's media and advertising Industry.

3.2 Qualitative Research Designs

The need to provide an in-depth understanding of the IaaS adoption among SMEs from the perspective of the actors necessitates the use of qualitative approaches in this study. The ensuing relationship between the researcher and the practitioners was vital in providing valuable details to guide insights into the social phenomenon. The qualitative approach enabled the researcher to engage in active conversation with the participants which resulted in an in-depth understanding of the phenomenon. This limited the mass surveys used in collecting quantitative data which results in unreliable information from the respondents. According to Edmonds and Kennedy (2016), researchers use various generic designs to conduct qualitative study including narrative research, grounded theory, ethnography, case study, and phenomenology. Meanwhile, the scholars acknowledge the aim of qualitative research to reveal and understand a given phenomenon (Creswell & Creswell, 2017).

This section outlines the different qualitative research designs, foundation considerations, and data procedures to arrive at the selected design. De Vaus (2001) pointed out that research design refers to the logical structure that seeks to answer the why and what of the study. Further, research demonstrates that research design is a logical progression that encompasses the stages of a study from the formulation of the problem to the presentation of findings (Maxwell, 2008). There are various research designs including narrative research phenomenology, grounded theory, ethnography and case study (Creswell and Creswell, 2017).

3.2.1 Narrative Research

Creswell and Poth (2016) pointed out that narrative research involves collecting information in the form of storytelling to order the meanings based on the participants' experiences chronologically. Further, Edmonds and Kennedy (2016) posited that narrative design entails four main approaches including exploring the experiences of a single or small number of participants, collecting through their (respondents) storytelling, restorying and validation to ensure the meanings and interpretations are accurate. The narrative research is mainly considered to be appropriate when there is a need to understand the subject (participants) rather than the situation. The bases of analysis as highlighted by Edmonds and Kennedy (2016) including the structure of experience, storytelling, and how individual stories interact with cultural narratives among other do not meet the objectives of the present study.

3.2.2 Grounded Theory

Astalin (2013) posit that grounded theory involves a systematic and flexible approach that results in the generation of theory from the data. Inasmuch as the process lacks a predetermined theory in mind, it stems from the analysed data. Further, Edmonds and Kennedy (2016) affirmed that grounded theory does not require the presentation of theory a priori since it is expected to emerge from the data. While this approach is similar to phenomenological research, the grounded theory focuses on developing theory from the field data. As a result, there are considerable difficulties associated with justifying its application definitively. The lack of a commonly accepted approach to a grounded theory makes it an unsuitable approach for the present study.

3.2.3 Ethnography

Creswell and Poth (2016) pointed out that ethnography focuses on culture and culture-sharing as a basis of developing stories. It implies that ethnography focuses on aspects of the social system such as social life and culture to provide an insight into the observed behaviour among the selected population. The approach requires that the researcher become part of the target population to understand the cultural cues and receive accurate information based on the beliefs and experiences of members in the group being observed (Edmonds and Kennedy, 2016). Given the need to understand a specific social phenomenon that is the adoption of IaaS for SMEs in media and advertisement industry, ethnography was not suitable for the present study. Additionally, Astalin

(2013) argued that ethnography is time consuming given the need for the researcher to spend a long time in data collection and fieldwork.

3.2.4 Case Study

Case study as a research design is seemingly similar to the narrative approach with significant variations in the focus of the study (Creswell et al, 2007). Another attribute of a case study involves a critical look into the context and detailed descriptions as a suitable approach to analyses. As Creswell and Poth (2016) pointed out, the single case serves as a basis of understanding a single event, activity or multiple programs. While the case study is suitable for providing in-depth analysis and understanding of the phenomenon, the present study did not focus on contextual conditions of the specific SMEs.

3.2.5 Phenomenology

Astalin (2013) argued that phenomenological research begins whenever there are gaps in knowledge that require explanations. The researcher further revealed that the phenomenological approach may not provide definitive explanations regarding the gaps in understanding. However, it increases the existing understanding of the Phenomena. In the words of Edmonds and Kennedy (2016) phenomenology when exploring the experiences of different people, the existing commonalities, and understanding of certain events among other aspects. As a result, the researcher can understand the composition as well as the core of lived experiences. This is what Creswell and Poth (2016) refers to as the description of the essence of the experience.

3.2.6 Research Design

Various approaches to qualitative research including narrative approach, phenomenology, grounded theory, case study, and ethnography are guided by distinct attributes. A summary of the approaches as discussed above can be provided on the bases of foundational considerations including the research focus, unit of analysis, nature of the research problem, and the disciplinary origins (Creswell and Poth, 2016). Table 4 below provides a summary of the five approaches in regards to the foundational considerations to inform the choice of phenomenology as the guiding research approach.

Table 4. Contrasting Foundational Considerations of Five Qualitative Approaches (Source: Creswell and Poth, 2016, p.104)

Foundational Considerations	**Narrative Research**	**Phenomenology**	**Grounded Theory**	**Ethnography**	**Case Study**
Research Focus of approach	Exploring the life of an individual	Understanding the essences of the experience	Developing a theory grounded in data from the field	Describing and interpreting a culture-sharing group	Developing an in-depth description and analysis of a case of multiple cases
Unit of analysis	Studying one or more individuals	Studying several individuals who have shared the experience	Studying a process, an action, or an interaction involving many individuals	Studying group that share the same culture	Studying an event, a program, an activity, or more than one individual
Type of research problems best suited for approach	Needing to tell stories of individual experiences	Needing to describe the essences of a lived phenomenon	Grounding theory in the views of participant	Describing and interpreting the shared patterns of the culture of a group	Providing an in-depth understanding of a case or cases
Nature of disciplinary origins	Drawing from humanities including anthropology, literature, history, psychology, and sociology	Drawing from philosophy, psychology, and education	Drawing from sociology	Drawing from anthropology and sociology	Drawing from psychology, law, political science, and medicine

Each of the designs highlighted in the table has similarities and differences. According to Petty et al. (2012), various strategies including narrative research phenomenology, grounded theory, ethnography and case study are applicable in the qualitative research. Forms of data collection, as well as the strategies for analyses, have been used in comparing the five approaches to qualitative research. Given (2008) pointed out that the qualitative data collection approaches are suitable for gaining an insight into the individual views as well as collective perspectives.

The inclusion criteria for the present study included three main factors. Notably, the four approaches that are narrative research, ethnography, phenomenology, and ground theory rely on the primary interview as an approach to data collection. Meanwhile, case studies entail multiple ways of data collection including observation and documents among others. Given the analytical strategies for the research approaches, narrative studies involve re-storying while phenomenology focuses on the essence of the responses. Ethnographic studies require the description of culture based on the experiences of the researcher while a grounded theory is largely guided by coding procedures. Creswell and Poth (2016) argued that the various qualitative research designs have similarities and differences as highlighted in Table 5 below:

Table 5. Contrasting Data Procedures of the 5 Qualitative Approaches (Source: Creswell and Poth, 2016, p. 105)

Data Procedures	**Narrative Research**	**Phenomenology**	**Grounded Theory**	**Ethnography**	**Case Study**
Forms of data collection	Using primary interviews and documents	Using primary interviews with individuals, although documents, observations, and art may also be considered	Using primary interviews with 20 to 60 individuals	Using primary observations and interviews but perhaps collecting other sources during extended time in the field	Using multiple sources such as interviews, observations, documents, and artefacts
Strategies of data analysis	Analyzing data for stories, "restorying" stories, and developing themes, often using a chronology	Analyzing data for significant statements, meaning units, textual and structural description, and description of the "essence"	Analyzing data through open coding, axial coding, and selective coding	Analyzing data through the description of culture-sharing group and themes about the group	Analyzing data through a description of the case and themes of the case as well as cross-case themes

Given the foundational considerations of the various approaches as well as the data procedures, the present study relied on phenomenology as the appropriate design. The research involved the collection of primary interviews with individuals using semi-structured interviews. In the present

study, phenomenology was appropriate given the need to understand the essence of the lived experience among practitioners based on the perceptions of the respondents in the media and advertisement industry.

To gain an insight into the IaaS adoption among the SMEs, the study sought to collect data from individuals with shared experience in the media and advertisement industry. The company selection was guided by the number of experiences in the industry as well as the digital adoption. As a result, individuals with the desired experiences were contacted for this study to gain an in-depth understanding including considerable years of service in the industry, job functions in the information technology, and located in Singapore. Similarly, the SMEs were considered based on IaaS adoption, not involved in merger and acquisition, and not linked to the big players in the industry.

The main aim of the study was to explore the adoption of IaaS among the selected SMEs in Singapore's Media and Advertising industry. Specifically, the study focused on five SMEs based on a predetermined selection criterion that is experience and reliance on cloud-based technology to conduct business activities as guided by the phenomenological approach. Given the research question, this study sought to answer the question regarding which factors influence the IaaS adoption among the SMEs in the media and advertising industry. As a result, the unit of analysis is the individual with the experience in the media and advertisement industry. The perceptions and opinions of the interviewees were the basis of interpretation.

Meanwhile, as stated, the epistemological exploratory work allows for a deeper insight into the social reality that the researcher seeks to study. The choice of key personnel within the organizations (researched participants) to participate in the interview process necessitated relying on individuals that could be reached for consent within the available time due to their availability (Harvey, 2011). The inclusion criteria of the research participants for the present study included three main factors. Firstly, the respondents have the requisite knowledge of the IaaS as well as other cloud services used in the Media and Advertising industry. Secondly, the participant had to be serving or had served in the SME sector in Singapore. Lastly, the position (current or past) of

the respondent enabled him or her to be part of the decision making in IT sourcing or had relevant knowledge of the IT sourcing responsibilities.

Given the need to get an in-depth understanding of the adoption of IaaS among the SMEs in Singapore, the researcher relied on primary data collected through semi-structured interviews whereby the inquiry involved a total of five SMEs in the media and advertisement industry. Additionally, the approach is suitable when the researcher cannot manipulate the behaviour of the respondents or when there are contextual issues that the study incorporated (Baxter and Jack, 2008). Extant studies indicate that inductive approaches enable the researcher to begin the inquiry process from the current theoretical knowledge in developing a hypothesis regarding testable realities (Barratt et al., 2011; Eisenhardt and Graebner, 2007; Mueller and Urbach, 2017). Notably, the research approach which is phenomenology determined the course and direction adopted by the researcher in examining the variables in the study. The rationale for the application of the exploratory approach is to enable the researcher to describe the essence of a lived experience (Iosifides, 2018; Fox and Alldred, 2015; Creswell and Creswell, 2017; Creswell and Poth, 2016).

3.3 Data Collection

The phase of data collection is an important part of the research process that provides answers to the research question. The main types of data sources used in research are primary and secondary data. The primary data refers to the first-hand information gathered from the field while the secondary data can be obtained from archives, reports, and journals among others (Heaton, 2008). Both primary and secondary data were used to address the stated research objectives. The study collected primary data using semi-structured interview questions which allow for flexibility of the research focus. The process involved interviewing employees from five SMEs in Media and advertisement industry in Singapore using semi-structured interview questions. Most of the interview sessions took a maximum of sixty minutes to limit inconveniences since most of the SMEs in the media industry are highly engaged in their work processes. Evidence-based data and literature will be acquired from company reports, newspapers, online databases, and journals. On the other hand, thematic analysis of the data collected was conducted to provide an insight into the research issue. The coding process also involved assigning of a numerical value to the phrases and sentences based on similar themes to inform the interpretation processes (Petty et al., 2012).

Given the outlined criteria, interviews with fifteen participants from five different organisations were conducted. A semi-structured interview agenda was used to guide the process based on a pre-defined coding scheme in ensuring confidentiality and anonymity of the participants and their organisations. The flexibility of the interview session also enabled the study to capture unknown aspects regarding the adoption of the IaaS among the SMEs in the media and advertising industry. The use of semi-structured interviews enabled the respondents to freely provide information. This was consistent with the research conducted by Baxter and Jack (2008) which revealed that the systematic collection and analysis of data required the use of effective research instruments.

In this study, the semi-structured interview agenda consisting of fourteen (14) questions. The questions acted as a guide to engage the research participants in meaningful data collection conversation regarding their opinions, views, and experiences in the adoption of IaaS. Based on the responses, the researcher prompted the respondents during the interview sessions to collect in-depth information on the various concerns. The fourteen (14) questions were divided into three main sections including an introductory part, concerns on benefits of IaaS, and challenges. These sections enabled the respondents to give their views towards both business and technical concerns, IaaS as an enablement tool, security of the technology, and other aspects related to its adoption in the firm which was the main focus of the objectives of the study. The highlighted areas represented the key issues that impact the adoption of cloud computing models among the SMEs given their unique characteristics. The resulting data were valuable in understanding the main research concern that is IaaS adoption among the SMEs in Singapore's Media and advertising industry. The responses were valuable since they were aligned with the research aim and objectives.

The rationale for the limited number of questions was to allow the participants to express themselves more freely in a focused set of questions concerning the topic and be able complete the interview within the stipulated time of sixty minutes. Baxter and Jack (2008) pointed out that the semi-structured interview may subject the study to voluminous data that limits the descriptive accuracy and compromised the quality of data. Therefore, the reliance on the fourteen (14) questions to answer the three main research questions as outlined in section 1 (under the statement of focus) aimed at limiting the collection of unnecessary information.

To capture the responses, the researcher took notes during the interviews with a particular emphasis on the keywords. The reason for reliance on note-taking was based on the suggestion by the respondents who considered audio or video recording as inappropriate given the sensitivity of their organisation's specific strategies towards technology adoption. Therefore, to limit anxiety and collect rich information from the respondents, the researcher relied only on note-taking. The notes were updated immediately after the interview sessions and re-verified with the participants to ensure that the perspectives of the participant are accurately captured. Note-taking may result in the reduction of anxiety and failure by the respondents to share their experiences, especially on sensitive issues which could result in a more positive experience during the interview (Christie et al., 2015; Hartley, 2002).

Moreover, the research participants expressed their comfort with notetaking in the initial stage of seeking appointments before they agree to participate in the interviews. The resulting interpretations of the sentiments were shared with the research participants as part of the member checking to ascertain the validity and trustworthiness of the outcomes. This provided further insights into the perspectives of the respondents on the adoption of IaaS among the SMEs in the media and advertising industry. Due to the sensitivity of the context the interviews (data collection) were undertaken in an environment of the participant choosing, mainly to ensure that the researched participants were comfortable and will thus feel unpressured, safe and be able to provide a non-bias reply to the questions posted (Doody and Noonan, 2013; Malta, 2009; Minichiello et al., 2008; Opdenakker, 2006).

As Saunders et al. (2012) pointed out, data obtained from the field is analysed through three main stages that are a reduction, display, and conclusion. The application of thematic analysis involved the use of NVivo software to assist in the process of coding and organization of data. Research indicates that qualitative data involves a process of organizing the field data to provide meaning in a manner that increases the understanding of the social phenomenon (Zamawe, 2015). Meanwhile, Hilal and Alabri (2013) pointed out that the use of NVivo in the analysis of qualitative data enables the study to attain the professionalism that is necessary for obtaining critical insights into the research issues. In this case, the software provided an effective solution to analysis that

limited the manual tasks and created more time to observe the tendencies as well as themes that informed the study outcomes.

3.4 Sampling Method and Sampling Population

Unlike quantitative studies, qualitative research requires less vigorous and structured sampling procedures (Saunders & Townsend, 2016). This is due to the need to rely on expert opinion in attaining saturation and ensuring that the data from the filled adequately answers the research questions. Qualitative studies rely on non-probability sampling to select the sample size that can provide the expected redundancy in the findings (Morrow, 2007). The present study adopted a purposive sampling method to identify fifteen participants from five SMEs in the Media and advertisement industry. Mason (2010) pointed out that a sample size of fifteen and above is necessary for obtaining the saturation required without redundancy in the research findings. The minimum number of research participants were selected to ensure adequate information is retrieved during the interview process.

Research by Infocomm Media Development Authority (IMDA) revealed that there are 220,100 SMEs in Singapore (Department of Statistics Singapore, 2017). Meanwhile, there are 2,200 SMEs in the media and advertisement industry. The study further revealed that 85% of the SMEs in Singapore are homegrown. While no official statistics are indicating the actual number of SMEs which are locally owned in the media and advertisement industry, it can be deduced from the above statistics that the SMEs comprise about 1,870. The research by the Networks Asia (2018) pointed out that only 14% of the SMEs consider the use of cloud computing especially IaaS in Singapore. It implies that about 262 SMEs in the media and advertisement industry use IaaS despite its significance in improving the business performance.

Given the nature of the target population and the intended study, the study chose a sample of fifteen participants from five homegrown SMEs that met the selection criteria to participate in this study. The company selection was guided by the number of experiences in the industry as well as the digital adoption. As a result, the researcher contacted individuals with the desired experiences fulfilling the following criteria:

- Minimum 5 years working experiences within the Media and Advertising Industry. The need for a five-year minimum experience was guided by the desire to interview individuals who had the requisite knowledge of the research concerns that are IaaS and the cloud services used in the media and advertising industry.
- Job Functions either Business or Information Technology Related. The need for specific job functions was aimed at selecting participants who held key positions and had a role in decision making especially in regard to IT sourcing.
- Currently based in Singapore. The location was necessary to enable the researcher to physically access the respondents without having to travel abroad given the resource constraints and convenience.

From organizations that fulfil the following characteristics:

- The organization will have to be based in Singapore. This criterion was justified based on increased digitization of SMEs in Singapore and the location of the researcher for ease of data collection. The organization will have to be an SME (Small Medium Enterprise). The study focused on the SMEs given the low adoption of cloud services despite increased benefits associated with digitised strategies.
- The organization will have to be in the Media and Advertising Domain or Industry. These criteria were guided by the need to focus on a sector that demonstrated increased reliance on innovation and technology.
- The organization is in the process of adopting or already using Cloud Technology specifically Infrastructure as a Service (IaaS). This was aimed at accessing relevant and adequate information on the research issue.
- The organization is currently not going through any M&A (Merger and Acquisition). The organisations that are on the trajectory of being part of another company, adopting IaaS may not be in their strategy given the complexities in the transition process and lack of direct involvement in business decisions.
- The organization is not owned by the big players of the Media and Advertising Domain or Industry such as WPP Group or McCann World group. This criterion was underpinned by the need to ensure that the SMEs involved in the study were independent in their decisions for digital strategies.

The present research design was guided by the components highlighted by Maxwell (2008) including goals, methods, research questions, validity, and conceptual frameworks. The main aim of the study was to explore the adoption of IaaS among the selected SMEs in Singapore's Media and Advertising industry. Specifically, the study focused on five SMEs based on a predetermined selection criterion that is experience and reliance on cloud-based technology to conduct business activities.

Confidentiality and privacy dictate that the names of the selected organisations to participate in this research were not identified. These SMEs were selected based on experience as well as focus on digital technology use. The samples size is justified given the suggestions from extant studies to use a sample size of between fifteen and twenty for purposes of attaining the necessary saturation (Isaac and Michael, 1995; Mason, 2010; Johanson and Brooks, 2010; Van Belle, 2011). Therefore, respondents from the five organisations took part in the study. Meanwhile, to uphold the confidentiality, the names of the SMEs were coded using alphabets while the respondents were coded using numeric. For this purposive sample group the following sections provides some information about the selected organisations and the participants;

3.4.1 Organisation A – Three Participants

Four participants were contacted for the interview but only three accepted to participate. Of the three were digital content manager, web developer, and database administrator. All the participants had over four years' experience in the business and demonstrated outstanding passion for their work. Meanwhile, the organisation had a budget for cloud computing.

3.4.2 Organisation B – Three Participants

In the second organisation, B, the three participants who agreed to take part in the study included IT security specialist who served in the business as the marketing manager, digital content manager, and a hardware engineer. They demonstrated passion for integrating cloud services siting its relevance in the dynamic business environment and the need to sharpen focus on digitisations. The interviews were conducted at two different locations which were considerably relaxed and away from the business premises.

3.4.3 Organisation C – Three Participants

In organisation C, there were a few challenges to find respondents due to their work commitment. Meanwhile, only two respondents completed the interviews without a rush. The third respondent had limited time to answer the questions which necessitated that the interviews lasted for only forty-five minutes. The organisation had less than fifty-five employees and there were no budget allocations for cloud services. While the interviewed employees had more than five years of experiences in their previous organisations, they had served in their current positions and organisation for less than two years.

3.4.4 Organisation D – Three Participants

The respondents in the organisation were very cooperative and passionate in their work as well as the research. The three people that were contacted readily agreed to participate but requested that the interview be conducted away from the business premises. After the selection of a mutually convenient place, the interviewees attended as per the schedule. Inasmuch as the organisation had only been operational for less than five years, they were considering cloud computing with their limited budgets. The participants were all members of the IT department with over five years' experience.

3.4.5 Organisation E – Three Participants

The business had limited experience in the industry given the limited period of operation. The three participants who were contacted to participate in the study turned up at the agreed location. Two of the research participants were computer hardware engineer while the third was an IT project manager. They demonstrated acceptable knowledge in their responses and openness regarding their operations. Like other cases, all the interviews were conducted at different periods away from the business premises upon the request of the respondents.

3.5 Pilot Study

Leon et al. (2011) suggested that pilot studies are undertaken to examine the feasibility of a larger-scale study. Results achieved in the Pilot Study provided a critical insight that proved valuable in adjusting the research instruments to focus on the adoption of IaaS among the SMEs in the Media and Advertisement industry. A pilot study involving two participants was carried out to pre-test the research instruments and gauge their appropriateness was conducted before the actual research. Through the pilot study, the various themes that were identified guided the restructuring of the questions/prompt for the interviews and also the resurfacing of new questions / prompts on areas that were initially not taken into consideration. For instance, the SMEs competitiveness, the results of the pilot study revealed that SMEs that adopted IaaS demonstrated increased competitiveness as they relied on the technology for strategic planning. The pilot study informed the development of several themes out of which four were eventually incorporated in the main study which also formed part of the concepts outlined in section 2.13. For instance, benefits of the IaaS, challenges facing SMEs in their efforts to adopt IaaS, Technical concerns, and Business enablement are the major themes that were eventually used in the main study. This shows the contribution of the pilot study to the main study. Meanwhile, the diverse views from the respondents resulted in different sub-themes as highlighted in section 3.6.5. The use of these themes in final study was based on the analysis and recurrence of the views expressed by the respondents. It is through the steps identified from section 3.6.2 to 3.6.5 that these themes were identified and used in the study.

Given the drivers to adoption of the IaaS, the pilot study revealed that cost management and internal expertise act as key drivers in the adoption of IaaS among the SMEs in the media and advertisement industry. The findings also demonstrated that the SMEs experience various challenges in their attempt to adopt IaaS and other cloud-based services. The main sources of the challenge included limited technological availability among the SMEs, lack of technical skills to operate the new technology, and lack of trust. As a result, the SMEs experienced challenges using the new platforms which compromised their perception on the usefulness of the IaaS. Additionally, the pilot study revealed that the SMEs considered cost-saving and scalability of the platform as benefits that are obtained from the study.

3.5.1 Tune-up from Pilot Study

Two main issues that emerged from the study including the ambiguity of the questions that resulted in a constant quest for clarification. Another emerging concern was the incongruence between the apriori codes and the intended themes. To address these issues, the researcher revised the semi-structured interview questions to ensure clarity and alignment with the themes to achieve the set objectives and answer the main research questions. The revised questionnaires (Annex - 1) have been used to undertake the study and obtain rich data.

3.6 Data Analysis

While the various approaches to qualitative data analysis such as analyst triangulation, data triangulation, peer review, member checking, theory triangulation, persistent observation, thick description, reflexivity, prolong engagement, negative/deviant case analysis, external audit etc. have been considered in this study (Barusch et al., 2011; Creswell and Poth, 2016), the reflexive approach is relatively dominant in the research processes. The critical analysis conducted by May and Perry (2014) revealed that reflexivity is not a method but a thought process that aids interpretation of a social phenomenon based on the perception of others. Given the iterative process that has been used in the current study, the researcher was able to deconstruct and reconstruct the information obtained from the field without undermining the opinions of the research participants. It was due to the need to rely on a theory-driven approach to coding that other approaches were considered inappropriate for the present study (Kawulich, 2016).

3.6.1 Approaches and Selection

The data were analysed using a thematic approaches which identifies the patterns and meanings of interest in the collected data (Clarke and Braun, 2016). To achieve the research aims, the theory-driven coding was adopted as the most appropriate approach since the study relied on TAM and TOE model to underpin the research processes. Other approaches such as the use of prior research and inductive code development were not appropriate given the limited research on IaaS adoption among the SMEs as well as the need to adopt iterative analysis process (Kawulich, 2016). Therefore, the following steps outlined by Braun and Clarke were followed in the process of data analysis.

3.6.2 Step One: Organising and immersion

In this stage, the researcher organised data in terms of the structure and alignment. The transcriptions from the research participants were arranged by having each question as a first heading while the responses as the normal style. This was necessary to enable the auto coding which put all responses for a particular question as a node. While reading and re-reading the content to enable an immersion into the responses, the researcher conducted several Queries involving various phrases to see how they were mentioned, and the context. The ordering process, as well as the familiarisation, resulted in understanding data based on the word clouds. The organisation of the data sets further provided an insight into the links that informed the coding process by identifying themes and sub-themes that answer the research questions (Clarke and Braun, 2016).

3.6.3 Step Two: Generating Initial Codes

The research revealed that coding can be manual or through computer-enabled technics (Clarke and Braun, 2016). Coding was mainly done through NVivo Software which enabled the researcher to tag and name the texts selected from the uploaded data. Zamawe (2015) pointed out that NVivo enhanced the accuracy of qualitative data analysis. This is due to the software alignment with the thematic approaches to data analysis. Inasmuch as the thematic analysis is subjective, necessary efforts were put in place to ensure the researcher remains objective in the interpretation of data to draw conclusions based on the views of the researched participants. The coding process resulted in the identification of aspects in the data that deviated from the dominant story as well as factors that were aligned to the intended accounts.

3.6.4 Step Three: Identification and Review of themes

Inasmuch as Clarke and Braun (2016) considered the searching of themes and reviewing as different stages in thematic analysis, the adoption of an iterative process enabled the researcher to undertake the two processes concurrently. In this case, the different codes were placed into themes based on meanings and patterns of occurrence. The identification and review of themes were based on the criteria suggested by Kawulich (2016) which included the purpose of the research, conceptual congruence, exhaustive, and mutual exclusiveness. In the process of reviewing themes, sub-themes were created and merged in line with the purpose of the research as well as conceptual

congruence. As a result, various themes were identified and categorised on how they fit into the research to answer the research questions.

3.6.5 Step Four: Naming Themes

After an adequate mapping of the identified and reviewed themes, the researcher focused on refining the themes to ensure a coherent scope and content alignment. Notably, the process resulted in four themes that had been identified from the pilot study with changes on the sub-themes based on the views of the respondents. Table 6 below outlines the themes identified from the analysis.

Table 6. Themes and Sub-themes Identification (Source: Author)

Theme	**Sub-Theme**
Benefits of IaaS adoption	• Information security • Cost-effectiveness • Storage capacity • Competitive advantage
Challenges facing SMEs due to IaaS adoption	• Security of the information • Switching providers
Technical and Non-technical concerns	• Human resource capabilities • Lack of awareness
Business Enablement with IaaS adoption	• Operations • Planning

The changes to the sub-themes were further guided by the analytical approach which revealed new insights that were different from those highlighted in the pilot study. Clarke and Braun (2016) highlighted that themes should have working titles that give readers an idea of the content of analysis. In the present study, the naming and refinement of themes were largely guided by the basis of analysis as stated above.

Benefits of IaaS adoption: The benefits resulting from the adoption of IaaS based on the perception of the respondents. Four sub-themes including cost-effectiveness, competitive advantages, information security, and storage space were grouped under benefits from the respondents' views highlighted in Table 7 below.

Table 7. Respondents' View on Benefits of IaaS adoption with Sample Data (Source: Author)

Theme	Benefits: As one of the identified themes, benefits refers to the gains that were revealed by the respondents due to the adoption of IaaS in their businesses
Sub-themes	Sample code statements
Information security	…considering that IaaS is insight dependent, it is difficult to trespass and access information of a given company unless one of the employees or the service providers volunteers. Safety is one of the strong points for IaaS… … insight is one of the strong points that underpins the application of IaaS. With such an impeccable security system, it has become difficult to hack the systems. Moreover, the providers are vigilant to offer reinforcement in case of any breach…
Cost-effectiveness	…we don't incur maintenance costs and other expenses related to information infrastructure. It is now the role of the providers to do it for us and the cost is spread so we don't really see its impacts… … many providers and businesses are getting into it to save on costs and scale-up and down based on the business needs…
Storage capacity	…this is advantage because you get sufficient space for data from which to draw specific insights in the market… …our operations cannot be limited by lack of storage space thus cloud service provides the ability to meet the scalability needed instantly…. …we have more space and unlimited storage,…
Competitive advantages	…the IT experts are relieved of manual data entry and its repetition in order to handle other demanding tasks. The cascade allows for brainstorming and the creation of an innovation platform that works to beat the competitors in the game…

The table above only gives a brief insight into the concept of benefits as captured in the thematic analysis. Detailed coverage for each of sub-themes is found in Annex1. Meanwhile, from the first identified theme, benefits of cloud adoption to the SMEs, various sub-themes including increased competitiveness, improved information security, reduced costs, and access to larger storage capacity.

Challenges resulting from IaaS adoption in SMEs: The challenges that are experienced by the SMEs in the present themes are decision variables for their continuity as well as to the peers planning to adopt IaaS. In this case, two sub-themes were identified that are security concerns and the switching costs of providers as summarised in the table below. As apparent in the previously explained theme (benefits) the security aspect is considered as a challenge. Additionally, switching providers is a considerable factor in ensuring instances of vendor-lock and ability to access better deals in the market as highlighted in Table 8 below.

Table 8. Respondents' View on Challenges resulting from IaaS adoption in SMEs with Sample Data (Source: Author)

Theme	Challenges : Refers to negative experiences that face SMEs due to IaaS adoption
Sub-themes	Sample code statements
Security concerns	…they claim that it's impermeable but the configuration I have seen in other places when I worked at a consultancy shows a lot of possible holes… …misconfigurations that occurred make us vulnerable to attacks and because they control much of the things on the space, we've got little to do in protecting ourselves…. …the privacy issue is another thing that is daunting, the cloud providers never give you control over the network and they sometime fail to configure their security standards. The effect is that when data breach occurs and the network is exploited, it's the customers that suffer. Even worse, the clients will blame you and you lose the good customers yet you don't have control over the network. You can do your part well but still if they (service providers) don't you'll still have problems…
Switching providers	…vendors are coming up with better deals and it's just good to be honest that I really think there should be an alternative to shift… …their network is also not very good so they cannot effectively cooperate to transfer our data. That will raise further security issues… …the terms may change and we may have problems so we get another provider to handle the work though currently we're considering the best in terms of experience in the market as well as cost especially ease of billing process so we don't incur hidden costs…

One of the intriguing outcomes of the analysis was that while the respondents suggested that security of their data was one of the drivers for its adoption, they acknowledged the weaknesses associated with lack of control as well as a privacy issue. It is on these bases that security appears both as a benefit and a challenge to the SMEs. Detailed coverage of the themes and sub-themes is annexed for further references to the analysis and coding process.

Technical and Non-technical issues: Given that adoption of new technology requires that technical capacities of the staff, as well as external aspects, are taken into consideration, this section entails various aspects that could not be subjected to sub-themes for ease of review and clarity as highlighted in Table 9 below.

Table 9. Respondents' View on Technical and Non-technical issues with Sample Data (Source: Author)

Theme	Technical and Non-technical Concerns
Definition	Sample code statements
These are internal and external factors that affect the decision of the SMEs to adopt IaaS as a new technology to improve performance outcomes.	…failure to effectively understand how IaaS works leads to charging of extra bills that makes the organization incur extra costs. Therefore, the operators have to go the extra mile of trying to decipher the environment and the billing system of IaaS… …the non-technical issues such as expectations come into play. The services within the cloud are vast and sometimes you don't need all of it, and you don't get the answers when you need it… …there are business and environmental challenges. For business I mean the cost saving which forms the basis of their campaigns is becoming less clear because the billing system is very complex and you may not be sure if you're really spending less than before… …the concerns of the much assumed cost saving are cropping in due to complex billing systems that we continue to experience. They're not what we were promised by the vendors or maybe these were not what we expected. The market is also not mature to ensure interoperability so vendor-lock remains a threat to the benefits that businesses expect to reap from the IaaS…

The combination of technical and non-technical factors that impact IaaS adoption is informed by the responses from participants. While technical capabilities have been outlined in the literature as a barrier to adoption of new technology, the participants largely tied the concern to other factors such as job loss and complexity in the billing process. This is the rationale for naming the emerging sentiments to fall under the broad category of technical and non-technical concerns.

Business Enablement with IaaS adoption is the last theme that was identified from the data besides emerging issues that sought to provide an insight into the use of IaaS among the SMEs. The decision to adopt a new technology among the business is guided by the role it plays in improving the business outcomes which was the basis of the responses regarding IaaS as a business enablement tool. The analysis and review of the themes resulted in two sub-themes under business enablement that are operations and planning as outlined in Table 10 below.

Table 10. Respondents' View on Business Enablement with IaaS adoption with Sample Data (Source: Author)

Theme	Use of IaaS among the SMEs in the media and advertisement industry to achieve the business objectives
Sub-themes	Sample code statements
Operations	…sometimes when the business is in its peak we tend to run out of storage but it's not only. I think when we finally adopt cloud we'll have solved some of these operational challenges though IaaS will also come with its share of problems such as loss of control and lack of privacy… …because IaaS enables scalability and remote working. Many employees can undertake business duties even during non-working hours anywhere, anytime without having to come to the premises… …expands the number of working hours without compromising on the individual employee's freedom at all. I see it as good also in terms of undertaking business operations… …instructions can be communicated and executed through the online platforms… …the use of IaaS provides an opportunity to monitor the progress of the operations towards attainment of the long-term goals…
Planning	…through cloud computing, information that is vital can be stored and communication can be enhanced by computer virtualization… …in this business we still rely on the in-house datacentre. Our planning is good and I know when we finally integrate cloud services we'll have a better platform for strategic planning… …with the IaaS we don't plan for contingencies that were time consuming and sometime the prospects failed significantly and resources waste ensues. Planning is very easy when we have the IaaS coz of the pay as you go…

3.7 Validity and Reliability

Validity and reliability are commonly associated with the quantitative data given the ability of the researcher to control the variables under study. Leung (2015) asserted that the different pathways in exploring human behaviour and the resulting variations in perception apparent in qualitative research compromise the concept of validity and reliability. Meanwhile, the reliability in qualitative research is based on the consistency of the research outcomes while validity refers to the appropriateness of the approaches used to arrive at conclusions (Golafshani, 2003; Leung, 2015).

In qualitative research, validity and reliability are important because they inform the design of a study by ensuring the incorporation of factors that influence the research process (Potter and Levine-Donnerstein, 1999; Riege, 2003). The term validity seeks to explain the extent to which a test or measure meets the outlined claims. In a broad categorisation, research is guided by internal and external validity which determines both the structure and relationship of the study outcomes to the real world situations respectively (Potter and Levine-Donnerstein, 1999; Riege, 2003). While internal validity focuses on justifying the conclusions based on the causal relationships, external validity is largely concerned with the generalizability of the study outcomes that is, how the study findings are applicable to other populations or different time periods. To ensure both internal and external validity, the study should be relevant to the real world without compromising the trustworthiness of the results arising from the outlined design. Meanwhile, trustworthiness entails different aspects such as credibility, dependability, confirmability as well as transferability (Cope, 2014; Shenton, 2004). Research shows that credibility involves the truth of the data to the extent that the findings can be recognised by persons who have similar experience (Cope, 2014; Shenton 2004). The achievement of credibility in the present study is guided by the methods used to collect data such as semi-structured interviews to capture the views of the participants for interpretation. On the other hand, confirmability focuses on the extent to which analysis represent the viewpoints of the respondents and not those of the researcher. In this study, the use of rich quotes from respondents shows the confirmability of the study. Transferability as an aspect of trustworthiness focus on the need to generalize the research outcomes which is also aligned to the external validity. However, given the exploratory nature of the study and that the study relied on a small sample size of 15 respondents, it is not possible to generalize the research outcome.

Meanwhile, the dependability aspect refers to constancy of data and findings when the research is replicated under similar conditions (Cope, 2014; Shenton, 2004). Further, authenticity of the research defines the essence of the experience in a way that readers can understand the emotions as expressed in the analysis. Similarly, the quotes played an important role in upholding authenticity in the present study.

There are various aspects of validity including content, construct, criterion, and face validity. Content validity focuses on the accuracy of the theoretical domain of the latent construct that it seeks to measure (Lakshmi and Mohideen, 2013). The achievement of content validity occurred through the development of a suitable methodology to explore the phenomenon. On the other hand, construct validity seeks to address the theoretical relationships between the variables to understand how the test measures the concepts (Peräkylä, 2011). In criterion validity, the researcher seeks to draw accurate results from the data and or behavioural aspects under study. This was realised through the application of Nvivo to manage the data and positive relationships resulting from the interaction with the interviewees. Lastly, face validity involves gauging whether the test is suitable for the aims set out in the study (Lakshmi and Mohideen, 2013).

Qualitative research methods also lack the rigour that is associated with quantitative approaches. Noble and Smith (2015) argued that regardless of the multiple perspectives and lack of standards to ascertain validity and reliability in qualitative research, the investigators can still attain credibility through the involvement of other studies, triangulation, and member checking among other approaches. Similarly, Maxwell (2008) pointed out that the qualitative studies are characterized by the threats of bias and reactivity which compromise their validity and reliability.

Member checking was conducted immediately at the end of each interview to confirm if the notes were taken and interpretations by the researcher reflect a true account of their (research participant's) views and opinions. Changes to notes taken and interpretation if any, were made immediately in the presence of the research participant to ensure the correctness of the changes made. The validity was also maintained through the clear documentation and justification of the study processes. Also, the study demonstrated integrity in undertaking the analysis to avoid biases, research revealed that it is not possible to eliminate variances in terms of values and preconceptions

that resulted in bias, the study ensured that the interpretations were based on context rather than personal ideas (Maxwell, 2008).

3.8 Ethics

Given (2008, p.273) defined ethics as

> "…the study of the frameworks underlying judgments of what is appropriate conduct and the substance of the judgments themselves."

Based on the above definition, the main ethical issues associated with the present study including anonymity, confidentiality, and consent. While the face-to-face interviews compromise the confidentiality and anonymity, the need to uphold these ethical standards is vital throughout the study. In this case, the researcher sought the respondents' approval to use pseudonyms where necessary to ensure that they remained anonymous. Given (2008) revealed that the use of pseudonyms in a qualitative study enabled the researcher to protect the identity of the participants from the public especially readers. Moreover, only the participants were capable of identifying their phrases from the research report.

There were no agreements with the respondents on the use of particular pseudonyms, therefore numerical numbers such as 1, 2, 3 etc. were used to refer to the respondents while protecting their identity as well as maintaining anonymity. The use of numbers to protect the identity of research participants had been applied by various studies including Friedrich-Baasner et al. (2018) in undertaking an empirical study on the adoption of cloud computing among the SMEs in Germany. The use of numerical numbers also enabled the study in avoiding the ethical issues that may result from the choice of pseudonyms such as the need to uphold the dignity of the participants (Given, 2008).

Another ethical issue that emerged in the research process is informed consent. Extant research on ethics revealed that informed consent was one of the principles that must be upheld in undertaking qualitative research since it had a direct impact on the participants (Baxter and Jack, 2008). The informed consent was practised at every stage of the interview process. For instance, after seeking

the informed consent through formal writing from the participants and undertaking a follow-up, the researcher sought the acceptance of the respondents especially when they demonstrated silence during the interview process. This was accompanied by a reminder at the beginning of the interviews that the participants had the right to withdraw at any point during the interview if they felt uncomfortable at any point in time and all collected data will be destroyed immediately. While cases of withdrawal were not observed in the present study, informed consent as an ethical principle is an integral issue. Given (2008) further pointed out that informed consent should be obtained in writing before the scheduled interview date for the success of the study.

The exploratory study involving the adoption of IaaS among the SMEs in the media and advertising industry, the researcher obtained the informed consent through writing and made follow up three days before the interview to ensure that the participants only participated based on willingness without any form of coercion. The respondents were further informed that the university supervisors may have access to the responses and the raw data for review purposes. Inasmuch as there was noticeable cooperation among the respondents, they turned down the request for audio recording but accepted to participate in member checking as part of the efforts to ensure that the information provided (data collected) were valid and a true reflection of the views of the participants.

Lastly, the consent form stated categorically that the responses were only to be used for academic research purposes. Since the researcher outlined the ethical issues in advance based on the principles of confidentiality, informed consent, and anonymity, variations in the policies among institutions were apparent. The study participants came from five different firms with significant differences in policies regarding ethical policies. In one instance, the researched participant obtained informal permission from management to participate in the researched study. In the other instance, there were no ethical regulations regarding their participation in the research. Meanwhile, the three ethical principles (anonymity, confidentiality, and informed consent) were upheld.

3.9 Limitations

Various methods were considered as important in conducting the analysis. However, the reflexivity was chosen based on the nature of collected data as well as the desired quality output. Braun and Clarke (2006) pointed out that codebook is relatively complex given the overemphasis on relationships between codes in the dataset. Additionally, coding reliability was not feasible since the researchers sought to employ thematic analysis based on conceptual congruence and other criteria as outlined. This made the reflexivity the most appropriate approach to the analysis. However, some limitations are attributable to the analysis used in this study. Firstly, the data collected demonstrated early closure which compromised the interpretation process and placement on codes. According to Kawulich (2016) premature closure is one of the noticeable pitfalls that compromise the comprehensiveness of the analysis. Since the sample size was relatively small, the data obtained from the field for analysis was adequate in answering the intended questions. The relatively small sample remains to be one of the major limitations that faced the reflexivity approaches in thematic analysis adopted for the present study.

4.0 Findings

The study sought to answer three main research questions which were developed from the main aim and objectives:

1. What factors drive the adoption of IaaS among the SMEs in Singapore's Media and Advertisement Industry?
2. What challenges do SMEs in Singapore's Media and Advertisement Industry face in their quest to adopt IaaS?
3. Would IaaS be a possible and workable IT solution for SMEs in Singapore's Media and Advertising Industry as a key business enabler or business enablement tool?

Out of the five SMEs that were represented in the present study four that had adopted or were in the process of adopting IaaS considered strategic operation as an enablement tool based on the increased productivity, improved process, and ability to scale the services based on the prevailing needs. On the contrary, the respondents from organisation C that still relied on the in-house IT demonstrated a lack of awareness on the importance of IaaS adoption. The quotes presented here to support the findings were selected on the basis on their suitability to address the research questions as well as the outcomes of the coding process. Notably, not all the suitable quotes have been included as part of the finding given the need for clarity. Meanwhile, a detailed coding outcome in Annex 3 provides an overall overview of the coding and most relevant quotes for further references.

The adopters (SMEs in the process of adopting or have adopted IaaS) argued that IaaS is a vital tool for business enablement given its advantages such as scalability and flexibility.

> "…similar to what I have just explained because IaaS enables scalability and remote working. Many employees can undertake business duties even during non-working hours anywhere, anytime without having to come to the premises. It expands the number of working hours without compromising on the individual employee's freedom at all. I see it as good also in terms of undertaking business operations" [Interviewee 3A]

One of the respondents from the organisation that was in the process of adopting the IaaS noted that:

> "…when the business is in its peak, we tend to run out of storage but it's not only this. I think when we finally adopt cloud, we'll have solved some of these operational challenges though IaaS will also come with its share of problems such as loss of control and lack of privacy" [Interviewee 2B]

Sentiments echoed by the respondents from the SME that had not adopted or was not intending to adopt IaaS also acknowledged its importance as business enablement in terms of the operations:

> "…our approach is enabling our operations to be smooth and each person is responsible for something. It's easy to hold someone accountable for anything that happens and the operations are okay because proper division of roles is great. I don't deny that cloud is enabling our competitors but we're still capable of being relevant to our customer demands" [Interviewee 15C]

Some of the participants agreed that IaaS adoption is an important tool for business enablement that will not only improve their competitiveness but also ensure business success in a challenging and highly competitive environment.

The respondents also revealed that IaaS is an enabling tool for strategic planning which is one of the main uses among the SMEs. In this regard, the study reveals various aspects that are associated with planning including its role in ensuring that business plans are timely and the products and services get faster into the market.

> "…competition is high in the market and proper planning at minimal cost is vital for our success. In using the IaaS I can say that it enables us to get faster to the market in a faster way and ensure our customers are satisfied" [Interviewee 1A]

Another respondent also pointed out that:

> "…with the IaaS we don't plan for contingencies that were time-consuming and sometime the prospects failed significantly and resources waste ensues. Planning is very easy when we have the IaaS coz of the pay as you go" [Interviewee 6B]

Other aspects that were outlined by the respondents including the ability to address the shifting demands, lack of the need to plan for contingencies when using IaaS and improving the customer experience as some use IaaS in planning. The following statements reveal the perception of responses on the use of IaaS as an enablement tool for planning.

> "…this included limiting the risks and using resources effectively. The IaaS is vital in planning because you're sure you to be resilient against risks unlike the traditional hardware. The flexibility and scalability associated with cloud is equally vital for planning our services in a way that enhances customer experiences" [Interviewee 9B]

> "…IaaS brings the flexibility we need to meet the shifting demands and business fluctuations in the current market. When the business is experiencing low customer traffic we can easily shift to the necessary aspects and change when the turnout is positive. The planning process is very flexible with the cloud and is vital for cost-effectiveness" [Interviewee 3A]

> "…through cloud computing especially, information that is vital can be stored and communication can be enhanced by computer virtualization, so we do a lot of stuff that improves the services to our clients. This is not possible without having enough time to plan. IaaS adoption provided the time we needed to strategically plan work and face the market more strongly" [Interviewee 13E]

Even among the respondents from the businesses that had not adopted IaaS at the time of the study acknowledged its importance regarding strategic planning:

> "…consider it so but in this business, we still rely on the in-house datacentre. Our planning is good, and I know when we finally integrate cloud services, we'll have a better platform for strategic planning" [Interviewee 2B]

The contrary views from the respondent on the role of IaaS as an enablement tool for strategic planning did not reveal weaknesses in planning but the loss of control as well as the risk of privacy and security.

> "…we work with our hardware and it's very convenient. Even the management here consider our approach to be okay with them. They don't see the need to invest in IaaS which expose them to risks such as loss of control as well as unauthorized access" [Interviewee 15C]

It implies that the general understanding of the IaaS concerning its importance in operations and planning as business enablement tool among the SMEs in Media and Advertising industry is positive and considering the responses from the four organisations which had adopted IaaS, the study participants did not reveal any negative perception regarding IaaS as a business enablement tool.

Given the third question, the views from respondents suggest that IaaS adoption is used as business enablement in terms of planning and operations among the SMEs that have adopted the model. Evidence from the literature supports the present findings on the use of IaaS as a business enablement tool for strategic planning in some aspects (Ahmad and Siddiqui, 2014; Budniks and Didenko, 2014; Tarmidi et al., 2014; Wilson et al., 2015). Further, Alismaili et al. (2016) analysed the factors that impact cloud computing from a business perspective and concluded that besides the technical aspects of IaaS and other cloud computing models, they are suitable tools for business enablement in regards to the needed flexibility among the SMEs, facilitating processes in operations, and improved ability to meet customer experience.

Similarly, Friedrich-Baasner et al. (2018) posited that cloud computing resulted in strategic importance to the SMEs though the study did not address the perceptions on the concept of enablement, especially in planning and business operations. Although the study reveal considerable similarities, there are new insights in regards to the strategic business approaches that have been revealed. The first is the limited concern for the contingency plans as a result of the IaaS adoption. In the extant studies, Ahmad and Siddiqui (2014) pointed out that the businesses that adopt any model of cloud computing rely on the service providers to maintain various aspects of data. This cannot be assumed to mean that the IaaS adoption requires the SMEs to avoid contingency planning as Friedrich-Baasner et al. (2018) pointed out.

The results from the study suggest that perception regarding the strategic importance of cloud computing, in general, is derived from its contribution towards business flexibility and cost reductions as will be discussed in the subsequent sections. The contrary opinions expressed by the respondents as outlined are also aligned with the findings in the study conducted by Jelonek et al. (2014). Among the outstanding findings outlined by the respondents, trust and control were more apparent. Given the present research, the respondents who expressed contradicting opinion did not dispute the strategic business enablement capabilities as a result of using IaaS. Instead, they only cited the loss of control and the possibility of unauthorised access. While these concerns are valid, they have no direct link to the use of IaaS as a business enablement tool for strategic planning and operation. It implies that all the participants likely acknowledge the use of IaaS to improve strategic planning and operations.

4.1 Factors that Drive the Adoption of IaaS among the SMEs

Factors that drive cloud adoption were explored based on benefits that SMEs realise after the adoption of IaaS. In this case, several factors were identified including competitive advantage, information security, cost-effectiveness, and storage space as drivers of cloud adoption.

4.1.1 Competitive advantage

The respondents acknowledged the stiff competition in the market which involves peers that are SMEs and other large business institutions.

The strong competition necessitated that the business engage in activities that resulted in cost-reduction relative to other businesses as well as differentiating their services and or products in the value chain. In the context of the present study, adoption of IaaS is part of the SMEs activity to pursue the use of IT resources in leveraging their cost structure and enhancing efficiency (Sigalas and Economou, 2013). Further, the competitive advantage occurs when the SMEs can address uncertainties from the external environment due to the improved information processing relative to their peers and other large enterprises. Therefore, the responses relating to the competitive advantages in the present study focused on the processes, management, and potential of the SMEs relative to their peers and other competitors within the business environment (Neirotti and Raguseo, 2017). The activity of the SMEs in this context is the adoption of the IaaS to leverage their information processing needs and provide a platform for pursuing growth opportunities through cost reduction and differentiations as under:

> "…industry has become more competitive than before and we've to play at the same league with giants and find our space. This is only possible if we can give our customers what they need and exceed it without using extra costs. IaaS has enabled the business to very competitive in this respect since we've no shortage of storage and we get sufficient support from our service providers" [Interviewee 4D]

> "…marketplace is becoming more competitive and the more the time the team has to concentrate on improving customer experience and getting more clients on board the better we're placed to stand out among peers" [Interviewee 5D]

> "…most manager are aware that the longer they keep cloud out of their services the higher the chances they'll be competed out. The larger companies have the resources to put up private spaces but we've got to deploy the public clouds and compete effectively in the market" [Interviewee 7A]

The findings on the role of IaaS in enhancing business competitiveness have also received considerable attention among research studies by Busch et al., 2014; Fakieh et al., 2016. Since the researchers focused on the SMEs in the Australian context, their study demonstrated that cost-saving accounted for 78% of the drivers which in turn resulted in improved outcomes, productivity, and a high level of business competitiveness (Fakieh et al., 2016). Mundim et al. (2000) affirmed that the SMEs operate in a highly competitive environment that is characterised by both local and global players. The limited resources compromise their ability to establish a strong and efficient in-house team. As a result, the collaboration that is associated with the use of IaaS which brings cloud service providers into the business is an opportunity to enhance competitiveness.

The study outcomes also suggest that the competitiveness as a driver for IaaS adoption is based on the ability to relieve the IT team of many duties associated with the traditional operation to create time so that they focus on core business activities.

> "…we have plans underway so we can relieve the IT team of some duties and they'll focus on the core business activities and make research count. We also expect that it will limit the costs because there'll be no paying monthly license as we currently do" [Interviewee 8C]

Other participants noted that:

> "…the integration of IaaS you can see that the IT staff are getting more time to concentrate on ways to deliver additional value. The associated cost-saving benefits such as annual tracking of annual license fees and efforts are more focused on customer experience" [Interviewee 3A]

> "…competitive advantage is all about carrying out things differently and uniquely. With the IaaS, the IT team is relieved of so many duties that give us more focus on customer experience and service improvements. We're no longer worried of the upgrades or patching" [Interviewee 11E]

These sentiments demonstrate that the competitiveness that SMEs seek relies on their abilities to concentrate on core business activities whereby they can focus on improving the customer experience. This research further suggests that the business reliance on the use of external services to co-conduct routines operation due to the cloud computing adoption is part of the strategy to free the staff of more time (Gentzoglanis, 2012). As a result, they (managers) can increase productivity by focusing on the core business activities such as product and service development or customer experience.

The results from the study also suggest that the cost concerns are equally linked to the competitive advantage as a driver for IaaS adoption among the SMEs in the Media and Advertising industry in Singapore.

> "…competitive advantage is all about carrying out things differently and uniquely. You get time to focus on research, get to the market faster than competitors and you stay ahead of the game. This is where IaaS comes it because it gives the flexibility and scalability you need to make business run effectively while limiting costs" [Interviewee 14D]

> "…cost effectiveness that's associated with IaaS is its main strength because many people share the cost and the configurations doesn't impact prices apart from the standardized charges. We're also susceptible to fluctuations that IaaS has since solved. These aspects make our business more competitive" [Interviewee 6B]

Previous research on the competitive advantage as a driver for cloud computing adoption among the United States of American (US) SMEs also support the idea that when the business limits cost constraints, it stands a better chance to compete in the market (Truong, 2010). Moreover, the arguments advanced by Boychev (2014) on the ways to increase competitiveness through cloud

computing adoption also affirms that cost reduction is vital in increasing business competitiveness. In this case, the business managers use cloud services to improve the quality of service while reducing the associated costs.

Notably, the SMEs that had not adopted the IaaS acknowledged that the competitive pressure is likely to build up as most of the peers are considering IaaS to reduce costs while increasing the quality of their services in the market.

> "…issues that I feel can compromise competitiveness when you let other people have control over your valuable data. We better guard it because customers are our most valuable assets and be responsible for whatever happens rather than get other people taking care of it. It's our responsibility you know. Though we see a lot of our peers are getting into the IaaS and other clouds and I know the competitive pressure will soon built up" [Interviewee 15C]

The SMEs, unlike other large business organisations, suffer from the limited resource base that compromises their effectiveness in meeting the customer demands or remaining competitive. Research showed that the adoption of IaaS enables the SMEs to operate without investing in their own computing resources (servers, storage and network equipment) or even the need to recruit additional staff which is a burden to the business (Truong, 2010). Therefore, the cost reduction as stated by the respondents is one of the main drivers to adoption of IaaS since it provides an opportunity for the businesses to leverage their competitiveness.

4.1.2 Cost Effectiveness

The concept of cost-effectiveness has received considerable attention which prompted the need to separately consider it as a sub-theme. For instance, the word tree in Figure 7 below shows the context in which the respondents mentioned the word most:

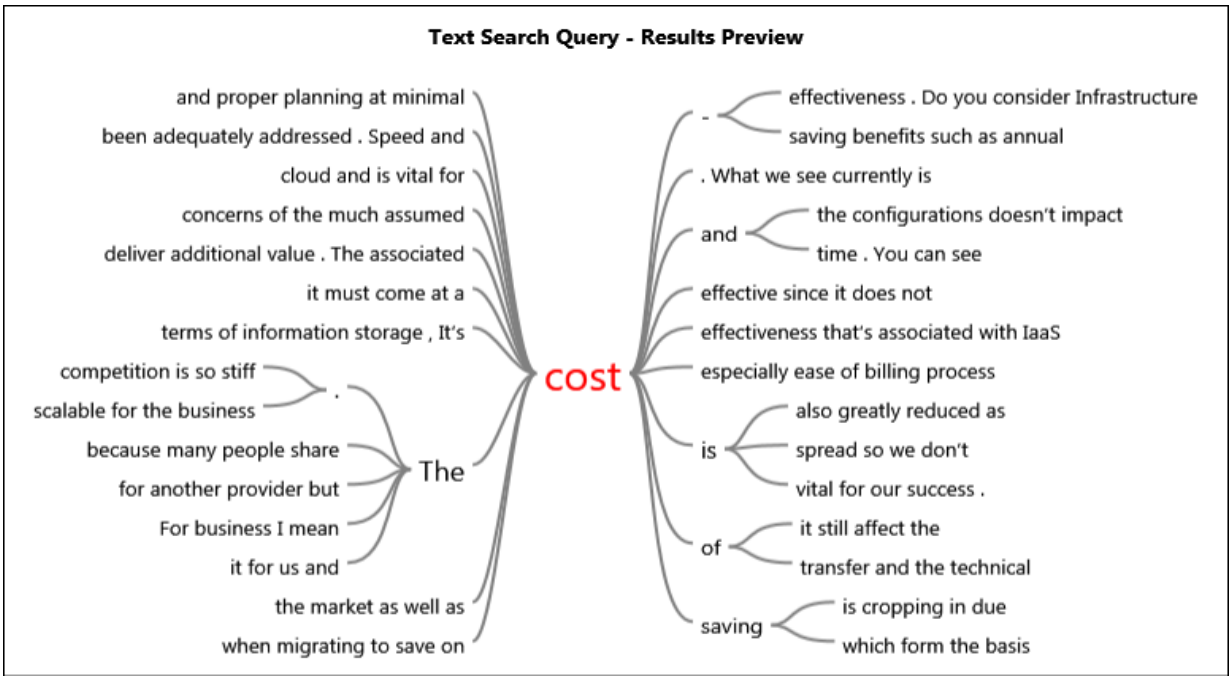

Figure 7. Word counts as captured in the Text Search Query (Source: Author)

As a driver for adoption, the cost-effectiveness was apparent among the study participants in which they considered the use of IaaS to be vital in keeping the costs low for business success. The results further demonstrate that the IaaS adoption enables the SMEs to spread the costs as well as avoid the upfront charges associated with the internal IT infrastructure.

> "…now have unlimited storage space, we don't incur maintenance costs and other expenses related to information infrastructure. It is now the role of the providers to do it for us and the cost is spread so we don't really see its impacts" [Interviewee 12E]

> "…this business we serve niche customers and we strive to ensure they're satisfied so they act as lead to other clients. The competition is stiff and it's the reason we're considering

> IaaS to limit costs and enable us remain very competitive. For now we have sufficient team to deal with these concerns but after the business grows, IaaS will be very important so we can limit upfront costs and access extra capacity without spending more capital" [Interviewee 2B]

The concerns regarding the relationship between cost-effectiveness and adoption of cloud services have been examined in the literature for this study. According to the studies by Kondo et al. (2009), the cloud adoption results in high levels of scalability and reliability at considerably low costs to the clients. The finding is further supported by Ercan (2010) who argued that the adoption of cloud services enables the businesses under budget to avoid the upfront capital needed to acquire network and computer devices. It was apparent from the SMEs that had adopted IaaS and those that had the intention to adopt it in future that the cost-effectiveness was one of the major drivers. The associated costs outlined also involved other aspects such as maintenance, operations, scalability, and hardware purchasing.

In the maintenance of the IT equipment which is the bulk of operation costing for IT budgets, it's the vendors who are in charge and we need not worry about the capabilities in our IT department and the costs that come with it.

> "…IaaS brings the flexibility we need to meet the shifting demands and business fluctuations in the current market. When the business is experiencing low customer traffic we can easily shift to the necessary aspects and change when the turnout is positive. The planning process is very flexible with the cloud and is vital for cost-effectiveness" [Interviewee 3A]

> "…cost is also greatly reduced as we no longer pay monthly or annual subscriptions" [Interviewee 5D]

> "…pay-as-you-go is great even if it may seem complex it saves a lot that would go into the business unnecessarily" [Interviewee 5D]

Given the above responses, studies among the SMEs in the African Sub-Sahara conducted by Abubakar et al. (2014) revealed that cost concerns are both the drive for adoption as well as the challenge which should not inform the decision to adopt IaaS.

4.1.3 Storage

The storage space was also considered as a driver for cloud adoption among the representatives interviewed. The analysis revealed that respondents considered IaaS as a valuable tool which offered unlimited space, sufficient space, or large capacity that is not feasible with the in-house capabilities.

> "…several benefits that come with the IaaS adoption such as scalability and maintenance costs. Our operations cannot be limited by lack of storage space thus cloud service provides the ability to meet the scalability needed instantly. Currently the risk of disruption has been well addressed through backups and setting up physical location of servers in different geographical areas. In maintenance, it's the vendors who are in charge and we need not worry about the capabilities in our IT and the costs" [Interviewee 3A]

Another participant noted that:

> "…have unlimited storage space; we don't incur maintenance costs and other expenses related to information infrastructure. It is now the role of the providers to do it for us and the cost is spread so we don't really see its impacts" [Interviewee 13E]

While other factors that acted as a drive for IaaS adoption received contrary opinions among the respondents especially from those who represented businesses that had no intention or had not adopted IaaS, storage as a benefit received general acceptance. The findings are supported by Grossman (2009) who examined the on-demand capacity to conclude that the cloud-based services can successfully manage a petabyte. The businesses that rely on the traditional database cannot effectively manage such extents of large data. As a result of the adoption of IaaS, the respondents acknowledged the vast capability of the model to accommodate large data given its large storage.

This is vital because it spreads the charges and relieves the SMEs of the constant desire to update or upgrade the system. Bhardwaj et al. (2010) in explaining the deployment of IaaS affirmed that the process involves the building and configuration of the virtual machine which is then hosted at the provider's raw storage. It implies that it is the role of the vendor to provide hardware where the clients' application is stored. The competition in the business space has, therefore, necessitated the building of large capacity which makes it efficient for the SMEs to keep their data in the storage space.

4.1.4 Information Security

The analysis showed that some of the respondents perceived IaaS as an important source of information security. In the various cases, the interviewees cited IaaS as a way of dealing with cybersecurity threats given its insight dependent features. It implies that IaaS provided an opportunity to safely store customer information. As a drive for adoption, this is vital given the operations of SMEs that involves niche customers. Various responses showed that the participants valued the IaaS due to their perception of the safety of their information in the cloud space.

> "…with such an impeccable security system, it has become difficult to hack the systems. Moreover, the providers are vigilant to offer reinforcement in case of any breach" [Interviewees 14D]

> "…cloud especially the IaaS is getting better with time because the vendors are aware of the threats are, they are trying to ensure best practices among the customers to ensure all possible vulnerabilities are addressed" [Interviewee 3A]

> "…also gives us the assurance of the infrastructure protection especially when our hardware components fail" [Interviewee 7A]

> "…not so sure because we've seen the cloud service providers be much more promising in terms of protecting the data for the customers. But, I cannot predict what future holds because you know those hackers are also getting smarter by day" [Interviewee 7A]

From the four responses, the IaaS is viewed as one of the secure spaces to store the SMEs data. The findings are also supported by the study conducted by Abubakar et al. (2014) which revealed that the IaaS adoption eliminated upfront charges as well as a reduction in maintenance costs. Similar studies by Akin et al. (2014) on impacts and challenges on cloud computing revealed that the adoption of IaaS reduces the financial investments needed in physical assets.

Meanwhile, the respondents also demonstrated their uncertainty about the future security of the IaaS and other cloud models as many businesses are seeking to adopt cloud services making it an attractive ground for cybercriminals.

> "…businesses are learning to embrace IaaS because of the obvious benefits and the need to go by the trends in the market. The more it becomes valuable to the cybercriminals. So far, the protection against attacks is very good but we cannot rule out such possibilities in the future" [Interviewee 5D]

The concern regarding the information security as a driver for IaaS adoption has also received considerable attention among research studies such as Kaisler and Money, 2011; Khan and Al-Yasiri, 2016; Morgan and Conboy, 2013; Nkhoma et al., 2013; Wiedemann and Strebel, 2011. Even with the vast number of studies on cloud security, there are no common grounds in viewing the information security as either a challenge or a drive for the protection that SMEs need to survive in the market. According to Kuyoro et al. (2011), the security provided by IaaS is basic that compromises the confidence that business owners should have in adopting the IaaS. On the contrary, the findings in the study conducted by Bhardwaj et al. (2010) demonstrated that cloud adoption improves the security of data from clients compared to the traditional approaches to data management. Based on the findings in the present study as will be discussed further, there is a mixed perception regarding the information security as a drive for adoption or a challenge.

4.2 Challenges in IaaS adoption

The analysis revealed three main sub-categories of challenges associated with the IaaS adoption including security, switching providers as well as technical and non-technical concerns among the staff within the SMEs.

4.2.1 Security Challenges

The information security in the cloud space is one of the concerns that received considerably mixed reactions among the interview participants from different SMEs in the Media and Advertising industry in Singapore. While others considered the desire to improve the security of their clients by adopting IaaS, some of the respondents expressed the fear of allowing the cloud service providers in charge of the sensitive business information without retaining control over its access. The three sentiments echo the contradiction that was apparent even among the respondents from a similar organisation.

> "…privacy issue is another thing that is daunting, the cloud providers never give you control over the network and they sometimes fail to configure their security standards. The effect is that when data breach occurs and the network is exploited, it's the customers that suffer. Even worse, the clients will blame you and you lose the good customers yet you don't have control over the network. You can do your part well but still if they (service providers) don't you'll still have problems" [Interviewee 2B]

> "…we've a limited visibility and our threat detection is vastly delayed. I appreciate the transparency of our providers but I don't have the full visibility so our partnership in detecting and preventing threats is the only way out. Also, we didn't develop new application but you know the challenge of a lift and shift which expose us to vulnerabilities." [Interviewee 3A]

> "…providers' side is still developing and can result in serious security flaws especially those new entrants will leave holes in the configuration system as we also find it difficult to develop new apps when migrating" [Interviewee 12E]

The three respondents among other statements showed the existing concern regarding the security of the SMEs data in the cloud space especially IaaS. The research conducted by Lampe et al. (2013) in examining the relevance of security risks associated with cloud adoption in the finance industry outlined various factors including security monitoring as well as attacks on providers as significant in inhibiting cloud adoption.

The findings as outlined by the interviewees also supported the challenge due to existing flaws in IaaS. Further, Heinle and Strebel (2010) researched of IaaS determinants on enterprises also concluded that the monitoring approaches are still in their infant stage thus leaving considerable security flaws. Among the SMEs that expressed no intention to adopt IaaS, some have highlighted that security challenges were the major concern and reason behind their rejection of the technology.

> "…this is one of the reasons it's not part of our consideration. The market maturity to really offer the protection we need is not yet in place. I know our peers are likely to rush into it but when they're hit hard with hackers, it will be difficult to ascertain the source because the public model ensures that the resources are shared. You don't even know the location of the hardware or who's accessing your data so we'd better work with our in-house team. Unlike when you have to depend on the external party for everything, upgrading, and maintenance you the risk is not good especially for us dealing with very few trusted customers. You lose one due to security breach you lose the rest" [Interviewee 15C]

The study conducted by Kuyoro et al. (2011) largely supported the present finding regarding security as a significant challenge that affects IaaS adoption. In their findings, the researchers revealed that the multi-tenancy approaches, as well as the resource pooling, present new challenges that enable cybercriminals to exploit the system. Cybersecurity challenges accentuate that there is a need to forge a strong partnership among vendors, clients, cloud service providers, and other stakeholders to provide feasible solutions to the cloud security challenge.

Further, Nkhoma et al. (2013) in examining the factors that contributed to the cloud computing adoption considered security as the main barrier. The concern for security as a challenge to the SMEs in adopting IaaS as outlined by the respondents included control, privacy, and misconfiguration.

> "…becoming more popular the higher the chance it will attract the cyber criminals. With the stiff competition within this space we expect the vendors to be more vigilant. Even though the government is supporting the course towards enhanced cyber security, we anticipate the providers to overlook very critical security concerns especially with the configurations which will expose our businesses to greater security risks" [Interviewee 6B]

> "…providers are in control of most of the functions and when there are flaws, it's the business to blame because customers are not aware of how we operate, they're only concerned with their security. If a breach occurs, we stand a chance to lose our most valuable customers. Privacy is also part of the foreseeable issues as IaaS and other cloud deployment models result in greater flexibility among workers" [Interviewee 4D]

Given the above responses, security issues appear to have considerable impacts on the decision to adopt or not to adopt cloud services given the small customer base among the SMEs. Other studies concerning the data stored in the cloud raised similar concerns regarding privacy, regulations guarding the security of information, as well as compatibility with applications (Carroll et al., 2011; Chebrolu, 2011; Leavitt, 2009). Besides the basic security features such as perimeter firewall in IaaS outlined by Kuyoro et al. (2011), the researchers acknowledged other risks including data loss and botnets that compromise the trust that SMEs have on the cloud service providers. This is also apparent in the study findings whereby the respondents pointed out the need to trust the IT service providers with the information of their customers.

> "…besides having less control create fears on privacy and likely data breaches because you need to trust the cloud service providers with very vital information" [Interviewee 7A]

It became apparent that security issues were constantly raised in each of the organisation as a challenge. It implies that the SMEs remain concerned with the data privacy whether they adopt IaaS or not.

4.2.2 Switching of IaaS Providers

The results suggest a significant concern among the SMEs regarding the challenges associated with their attempt to switch service providers. Among the issues raised were the inability of the SMEs to benefit from the competition existing in the market. It implies that the difficulties due to costs and vendor-lock makes changing the service providers to be very difficult. As a result of the challenges associated with switching the service providers, businesses are less likely to benefit from new deals that emerge given the entrants for fear of incompatibilities. This further implies that failures due to bankruptcy among the IaaS providers could adversely affect the continuity of the SMEs operations.

> "…vendors are coming up with better deals and it's just good, to be honest that I really think there should be an alternative to shift. Business is competitive and the cloud service is part of the business that its competition is beneficial to us because we get great deals" [Interviewee 12E]

> "…business needs are changing and because we're a small team remaining flexible is very important to us. The challenge here is vendor-lock whereby we've got difficulties changing the vendors. Some of the critical security aspects we'd want to retain but the providers make it difficult to introduce services from elsewhere" [Interviewee 3A]

> "…switching to another provider implies the transfer of all information and change of the daily operations and planning. The resources required to completely roll out a new platform is exorbitant and not easy" [Interviewee 13E]

The respondents expressed concerns regarding difficulties in switching the IaaS providers not because they had intentions to switch or experience problems with their current providers at the time of the study, but the views were an expression of immaturity within the cloud ecosystem.

As Interviewee 3A noted:

> "…it's not easy to move the applications across because the services don't always match. Sometime you'd wish to go for another provider but the cost of transfer and the technical capabilities are limiting you. Switching is not easy and this will soon be a problem because we can see the competition is stiffening and sometime, we'd want to work with cheaper and more efficient vendors" [Interviewee 3A]

Similar responses were also apparent in the sentiment below.

> "…the future is not known but the dynamics in the business environment may trigger such considerations. The ecosystem does not yet provide an opportunity for ease of migration and so vendor-lock is very high. Here we see very low possibilities of interoperability as this is an evolving phenomenon" [Interviewee 4D]

Vendor lock-in and difficulties in switching the providers would mean that SMEs are highly dependent on the cloud service provider with whom they initially sign up. As one of the significant challenges that compromise the adoption of IaaS, the literature revealed vendor lock-in which resulted in both technical and non-technical issue (Al-Badi et al., 2018; Bozman and Chen, 2010; Opara-Martins et al., 2016; Petcu, 2013).

Technically, the different platforms provided by different vendors do not provide standard interoperating capabilities which would make the portability of data and application across different vendors difficult for the SMEs. Further analysis of the interoperability and standardization issues which are aimed at eliminating vendor-lock reveals that there are still challenges in an attempt to develop the common standards that will allow for secure and effective transfer of applications and data between providers. (Arunkumar and Venkataraman, 2015; Bamiah and Brohi, 2011; Lewis, 2013; Harsh et al., 2012; Opara-Martins et al., 2016).

Non-technically, it suggests that it is more of a contractual issue. It is almost not possible to write contracts that can address every aspect of cloud service sold given the volatility and the constant changing facet of the economic environments. The incomplete contract is very likely to occur given situations which are unforeseen at the time of contract signing, this would make renegotiations difficult which would result in underinvestment of resources for SMEs to better advance their business positively. Moreover, change of service provider would likely incur substantial costs which would not be cost-effective for SMEs (Bamiah and Brohi, 2011; Klein et al., 1978; Kurze et al., 2011).

While the change in business needs necessitates that users of IaaS and other cloud-based services shift their operations, studies suggest that they (clients) also expressed concerns over the security of data when transferring from one provider to another (Arunkumar and Venkataraman, 2015; Lewis, 2013). Since the extant studies have covered the concerns for switching the cloud providers among the business that adopt IaaS, the present finding links the desire to shift service providers to the existing competition in the market.

4.2.3 Technical and Non-Technical Challenges

The technical concern raised by the interview participants mainly focused on the security of the business most of the employees lacked a complete understanding of the IaaS.

> "…as it is common with any new development, there is limited confidence in handling the Apps which remain to be part of our role among the team. Further concern that the cloud providers could be controlling the business errands since workload availability and performance of tasks depends on them" [Interviewee 11E]

> "…the security and control over the system are technical concerns due to IaaS adoption. Because we lose control over the way we used to detect and prevent threats and we have to collaborate with the IT providers which has not been very effective because they expect us to do our part and all will be okay. The collaboration in the delivery of technical aspects has not been very effective which a concern remains because they're not always available to be contacted on issues especially when they feel that is part of their role" [Interviewee 4D]

"…by the time we adopted cloud services, our IT team was not well prepared to handle the IaaS model, so they needed some basic training to get along with it. Their attitude came into question and I think some are still trying to accept it as the new way of operation. There's not much resistance parse but they just seemed to have an issue with some of its operations especially with the aspects they seem not to understand" [Interviewee 6B]

The responses from the three participants strongly suggest the security and availability of technical skills as the major concern among the SMEs. Annapureddy (2010) examined the IaaS security-related challenges and asserted that the technical concerns regarding IaaS impact both providers and users. For instance, the vendors face the difficulties associated with the configuration of servers and firewalls which require technical capabilities. Meanwhile, the users, in this case, the SMEs in the media and advertising industry take the responsibility to manage the calls they direct to the cloud. Even with the limited understanding of the IaaS infrastructure, the enterprise IT staff must cooperate with the technical team from the providers to uphold the safety of the information. The limited understanding on the part of the SMEs teams regarding how IaaS functions are one of the technical challenges as demonstrated in both the interview responses and the extant literature.

On the other hand, non-technical challenges facing the SMEs received a considerable response among the respondents. Some of the issues raised included the choice of the IT providers and resistance given the fear of job loss.

"…there are many service providers and many are claiming to be the best so choosing the best one. I think this is the challenge we're still trying to overcome. Also, when we lose control, several people in the department will be laid off. This is a concern for job loss because they'll be taking most of the roles so we've got little to handle" [Interviewee 8C]

"…staff here demonstrated what I will call resistance because they felt it is a threat to their jobs. It took time to make them understand that IaaS was going to benefit the business and employees at all. You know the move to cut costs has become part of the business approaches especially among SMEs like ours. Another non-technical issue is lack of effective ecosystem for cloud services and a few mature providers. The new entrants are rushing the business but

leaves a number of holes in security which can be very harmful to the business progress" [Interviewee 4D]

From the above responses, it is very clear that the respondents face the challenge regarding the choice of appropriate vendors and the resistance from the internal IT team given the anticipation of likely job loss with the adoption of IaaS as most of the day-to-day operations would likely be outsourced to the cloud service provider. As outlined above, the IaaS and other cloud adoption relieve the SMEs of major tasks as there is a shift in the control of the IT infrastructure to the vendors.

Another concern which formed a significant part of the responses was the cost. While the cost reduction and effectiveness acted as a drive to cloud adoption, the respondents also viewed the cost as a challenge due to the complex billing system. Notably, the interviewees reported a limited understanding of the payment model which they also considered to be contrary to their anticipated costs before adopting IaaS.

"…the concern of the much-assumed cost saving is cropping in due to complex billing systems that we continue to experience. They're not what we were promised by the vendors or maybe these are not what we expected they'd be. The market is also not mature to ensure interoperability so vendor-lock remains a threat to the benefits that businesses expect to reap from the IaaS" [Interviewee 9B]

"…failure to effectively understand how IaaS works leads to charging of extra bills that makes the organization incur extra costs. Therefore, the operators have to go the extra mile of trying to decipher the environment and the billing system of IaaS" [Interviewee 11E]

The outcome is a clear indication that most SMEs, especially in the present study, adopted the IaaS with an expectation of a considerable reduction in costs which given the complexities in the payment model results in more charges. Among the variables in the present study, the cost of the IaaS is one of the factors that appear as a drive for adoption and a challenge to the SMEs. Study conducted by Khajeh-Hosseini et al. (2010) in comparing the costs associated with cloud migration

between two companies revealed that in a period of over five years, the company that adopted IaaS would have spent 37% less than the peers using the traditional approaches. The researchers further highlighted difficulties in cost estimation and expensive contracts that are associated with cloud adoption. In their recommendation, the researchers stated that the decision to adopt IaaS should not be made based on financial incentives given the limited differences especially in the short term (Khajeh-Hosseini et al., 2010).

In the present study, most of the respondents had a limited experience since they worked in businesses that were either planning to adopt IaaS or had adopted for a short while. Meanwhile, their response regarding the complexities in the billing system and increased charges is aligned to the findings in the research literature. Leavitt (2009) in examining the cost related to cloud adoption pointed out that the users may not be aware of the bandwidth costs that are associated with the cloud. Concerning the complexity of the billing system, Kuyoro et al. (2011) argued that the adoption of cloud significantly reduces the cost of infrastructure while the communication costs are relatively higher given the elastic resource pooling.

The users of IaaS and other cloud models mainly look at the costs of infrastructure which informs their decision without critical consideration of the billing communication costs. The finding on the costs shows a limited understanding of both the charging and billing models among the SMEs. Some of the respondents acknowledged the lack of understanding regarding the billing system yet they still considered the adoption to be associated with increased charges.

> "…failure to effectively understand how IaaS works leads to charging of extra bills that makes the organization incur extra costs. Therefore, the operators have to go the extra mile of trying to decipher the environment and the billing system of IaaS" [Interviewee 11E]

> "…there are the business and environmental challenges. For business I mean the cost-saving which forms the basis of their campaigns is becoming less clear because the billing system is very complex and you may not be sure if you're spending less than before" [Interviewee 6B]

The responses above are also supported by Iosup et al. (2014) who focused on IaaS cloud benchmarking and concluded that the concern for cost models used in the commercial space especially sub-leasing has not been adequately addressed. Further, the review of the literature demonstrated that the hybrid cloud infrastructure costs remain to be a challenge since the cloud performance failed to sometimes meet the expectations. Other factors that have been mentioned to constitute technical and non-technical challenges included business interruptions, increased competitions which result in difficulties in making choices, and concerns over market maturity. Given the business interruptions, Lampe et al. (2013) accentuated that general outage are common occurrences that sometimes go uncompensated. While these aspects had limited attention among the interviewees, they form part of the concerns that affect the perception of IaaS among the SMEs.

There was considerable coverage of the technical and non-technical concerns as part of the challenges that affect IaaS adoption from the interview responses. Notably, various aspects including lack of in-house capabilities, vendor-lock problems, and inability to understand the billing systems among others were apparent.

4.3 Other Findings

Besides the outcomes of the study in regards to the challenges as well as drivers of cloud adoption among the SMEs in the media and advertising industry, the research also covered the willingness to switch back to in-house IT infrastructure. All the respondents expressed their satisfaction with the IaaS and considered the switching back to in-house infrastructure as detrimental to their growth and competitiveness.

> "…inasmuch as the in-house infrastructure was well understood and customized to the daily use of the company, IaaS has revamped the applications and refined the effectiveness with which information is handled. So, to speak, it is an upgrade. We have no intentions to regress" [Interviewee 14D]

> "…cannot do that now because it will mean going back to those costly and inconvenient operations that we already solved. In-house is good but we don't have the resources to even rely on private cloud model. This is a small business compared to our rivals and if we fail to

utilize the comparative advantage due to the IaaS services, we'll soon be competed out" [Interviewee 4D]

"…in-house was less effective in terms of saving on costs and time. Much of our IT team's efforts were focused on routines like upgrading and testing which added limited value to the course of business growth. So, I would not wish to get there now that we intend to grow and leverage our strengths in the market" [Interviewee 7A]

The question on the willingness to switch back to the in-house infrastructure brought about a new twist to the findings which revealed that IaaS adoption is a possible workable solution despite the different highlighted challenges. This is also apparent in the response below:

"…we've realized significant benefits since we adopted IaaS and our small IT team can now focus on areas that add business value. Getting back to the in-house team will mean taking another financial burden which we're not ready to shoulder now" [Interviewee 12E]

4.4 Summary of Findings

The above chapter has highlighted considerable insights into the factors that drive IaaS adoption, associated challenges and its use as business enablement among others. Responses have revealed the role of IaaS in enhancing scalability, flexibility, and seamless customer experiences through additional time to focus on other core business activities. It implies that SMEs benefit from improved security of their information in the cloud space, access to larger storage, and cost reductions. These vital aspects have leveraged business competitiveness in the industry. Meanwhile, the non-adopters have a limited understanding of these outcomes which acts as a barrier to their adoption of IaaS.

In regards to the challenges, the respondents acknowledged various factors including hidden costs, lack of control over the business data, and inadequate technical skills and knowledge on the IaaS. As pointed out, the cost and security concerns overlap as both a drive and a challenge to the SMEs. The findings further implied a concern on technical and non-technical aspects that compromise the willingness of the SMEs to adopt IaaS. However, a contradictory outcome on the intention to quit

showed that regardless of the challenges the benefits outweigh the disadvantages that businesses experience after the adoption of IaaS. The next chapter will advance the discussion covered in the findings section to give a more holistic view on the adoption of IaaS among the SMEs in the media and advertisement industry.

5.0 Discussions

This chapter aims to provide further explanation and discussion on the findings and emergent themes to explore the IaaS adoption among the SMEs in media and advertisement industry in Singapore. Besides explanations regarding the various themes identified from the responses, from the data collected and analysis, this chapter also include a proposed conceptual model which was developed to captures the key aspects in the thought process that could influence the decision on IaaS adoption.

The reliance on a qualitative approach to the study provided in-depth insights from practitioners in the industry. The analysis further showed considerable consensus with the extant literature regarding the contribution of IaaS to the SMEs business success in the technological era. Therefore, the limited adoption of IaaS among the SMEs despite its benefits as outlined in chapter 1 and 2 guided the development of questions to explore the research issue. As such, this study sought to achieve the four objectives as outlined below:

- Review or Investigation of Literature in the area of Information Technology as a business enabler or business enablement tool.
- Understand the key benefits of Infrastructure as a Service (IaaS) adoption for Small and Medium Enterprises (SMEs) in the Media and Advertising Industry in Singapore.
- Understand the key challenges of Infrastructure as a Service (IaaS) adoption for Small and Medium Enterprises (SMEs) in the Media and Advertising Industry in Singapore.
- Provide insights on whether Infrastructure as a Service (IaaS) adoption is a workable solution for Small and Medium Enterprises (SMEs) in the Media and Advertising Industry in Singapore.

As pointed out in the analysis and findings section, results of the study suggest that IaaS acts as a business enablement tool despite various challenges. The achievement of the above objectives can be traced through the thesis. This study sought to explore the adoption of IaaS among SMEs in Singapore's Media and advertisement industry.

The literature review highlighted significant concerns that influence cloud adoption based on the TAM and TOE models. The gaps identified including the limited understanding of the IaaS

adoption among the SMEs in the media and advertisement industry in Singapore have been addressed by the exploratory study outcomes. Given the benefits and challenges of the IaaS, the study results provide additional insights into the concerns among the stakeholders in the industry. The adoption decisions based on the cost considerations failed to meet the expectations of the customers. This is due to the lack of adequate understanding of the IaaS model especially the billing system.

As supported by the extant literature, cost as a factor has its benefits and challenges hence should not be used as the main determinant among SMEs to adopt IaaS. In the present study, the perception of upfront costs, maintenance, and investment in IT infrastructure was positive. On the contrary, the complex billing system resulted in increased communication charges that failed to meet the expectations of the SMEs in regards to the operation costs. Meanwhile, the analysis revealed that IaaS presents several benefits to the business including flexibility, increased competitiveness, and an opportunity to focus on core business activities alongside reduced costs.

These factors should be considered together in determining the adoption of IaaS as well as other cloud services. Security of the information also resulted in a mixed outcome among the respondents. Inasmuch as there were no cases of a data breach in the cloud space among the SMEs studied, the respondents still expressed the concerns regarding the possibilities of security compromises happening in the future. IaaS has a high-value proposition in many other aspects that create a competitive advantage. Meanwhile, the security weaknesses as expressed in the study and extant literature show the need for improvements among the cloud service providers.

Amidst the various challenges outlined in the study, an interesting issue is that the SMEs that had adopted cloud considered it to be a step toward leveraging their competitiveness. They further demonstrated the lack of intention to quit or rely on the in-house approaches to address the challenges. On the other hand, the respondents from SMEs that had not adopted IaaS or had no plans for adoption displayed a limited lack of knowledge regarding the benefits of IaaS as a business enablement tool. Meanwhile, they (respondents from the SMEs that had not adopted IaaS) acknowledge the existence of stiff competition and the need to effect necessary changes to remain relevant in the market.

The study has revealed that IaaS adoption is likely a workable solution for the SMEs in the media and advertising industry in Singapore. It is on this backdrop, the proposed conceptual model developed from the study findings and shown below in Figure 8 may help to inform the key stakeholders' thought process towards IaaS adoption as a key business enabler for their organisations. As stated, the research has demonstrated that IaaS is a workable solution for SMEs in the media and advertising industry given the respondent's unwillingness to get back to the in-house IT as a backward step which is a detriment to their competitiveness in the market.

The conceptual framework shown earlier in Figure 6 (Chapter 2) draws from the theories of cloud adoption including TOE and TAM discussed in the literature review section and the findings from the data collected in this study to establish an approach that is suitable for the SMEs in the media and advertisement industry in Singapore. Additionally the conceptual framework (Figure 6) explains three main stages that result in a better approach to the thought process in the adoption of IaaS that is perceived on the business needs, implementation requirements, and the IaaS adoption as the final stage. The steps are explained below in the proposed conceptual model developed shown in Figure 8 below.

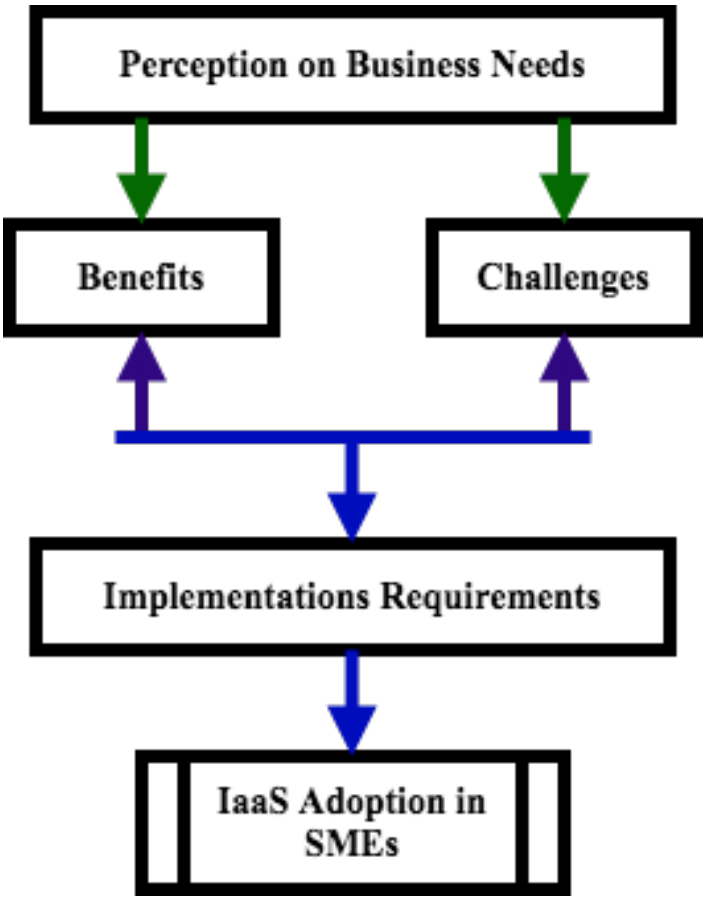

Figure 8. Proposed IaaS Adoption Decision Making Conceptual Model (Source: Author)

Explaining the Proposed IaaS Adoption Decision Making Conceptual Model

The proposed conceptual model which is shown above in Figure 8 was developed from the analysis of the findings based on the data obtained from the interviewees and the conceptual framework shown in figure 6 (chapter 2) that indicated three factors including challenges, benefits, and technical issues as decision-making variables which was derived from the literature review. The analysis as visualized in the model has revealed that IaaS adoption is informed by the perception of the business needs which guide the businesses to compare the challenges and benefits of the desired technology. The arrows in the model do not point to a causal relationship between the factors but are indicative of a thought process. For instance, the challenges and benefits do not lead to implementation requirements but point to the need to consider the two factors (challenges and benefits) before focusing on the requirements to adopt IaaS given the role of monitoring that the business play after adopting a cloud service. Therefore, the factors are linked as part of the thought

process to inform decision-making among the SMEs. The unique link as outlined in the model is reflective of the balance in the factors to ensure that the resulting decision to adopt IaaS gives priority to the unique context in which the business operates.

In the analysis of the results, the respondents who had the intention to adopt IaaS had a perception that IaaS creates benefits to the business and acts as a source of competitive advantage. Meanwhile, concerns for barriers especially loss of control, security challenges, and limited information compromise their ability to make a positive decision. It implies that the perception of the ability of the IaaS to address the business needs has an impact on the willingness to adopt IaaS. The arrows in the model show a link between the perception of the business and the two factors that are benefits and challenges associated with IaaS adoption. When the perception of benefits is dominant, the business will adopt IaaS. Meanwhile, when the challenges such as loss of control and concerns over insecurity are given weight in the decision, the SME will not adopt IaaS. For this reason, the arrows from the perception of needs pass-through benefits and challenges before reaching the implementation requirements.

Therefore, shifting the perception requires a piece of adequate information on the IaaS among the SMEs and the developments on how the IT providers are seeking to address weaknesses in the anticipated challenges. Most of the extant studies highlighted security as the main challenge that influences the adoption of the cloud service (Popovic and Hocenski, 2010; Truong, 2010). The present study has however revealed that there is an increase in security awareness from the organisation and advances in approaches towards cybersecurity by the cloud service providers which makes it a part of the benefits as well as a drive for cloud adoption. Meanwhile, the lack of control, trust, and the concerns over the protection of business data remains one of the security challenges that are raised by the interviewees. It implies that the factors that are benefits and challenges inform the perception of the stakeholders when seeking to adopt IaaS. Focusing on the understanding of these challenges is of paramount significance in the process of IaaS adoption among the IaaS.

Further, adequate consideration of the challenges and benefits also determines the requirements that should be in place before the adoption of IaaS. The analysis of the responses from the interview

has demonstrated that the employees especially IT staff had limited understanding of IaaS and the underlying technology and processes. With a clear understanding of the usefulness of IaaS to the business, the SMEs need to define measures that are necessary to adopt the IaaS. The technical weaknesses, as well as a considerable lack of understanding regarding the cloud services, are informed by the inadequate training and an opportunity to test the services before integration. Therefore, implementation requirements as deduced from the responses are at the centre of the model. It implies that the SMEs decision is largely guided by the concerns for human and capital resources to make decisions on IaaS adoption.

The analysis revealed that the concern of costs of using the IaaS especially communication is relatively higher than the expectations among the SMEs. The problem is exacerbated by the difficulties in understanding the payment models. On the other hand, the results show that the users consider the costs to be lower than the internal approaches because they no longer budget for maintenance, upgrading, and management of the physical systems that are on-premises. It implies that the SMEs would require resources to facilitate the implementation of IaaS adoption. This makes implementation requirements an integral aspect in determining the IaaS adoption.

Additionally, the resources are vital in providing the necessary training so that the employees are well conversant with both the technical and non-technical aspects of the IaaS. The IT capabilities are part of the implementation requirements that should be considered, factored in and improved to enable the SMEs to benefit from the adoption of IaaS. One of the identified drivers for the adoption is that the resulting flexibility will ensure that the IT personnel get sufficient time to focus on the core business activities such as developing new IT solutions. There is a need to ensure adequate IT capabilities in terms of both the human and the infrastructure to support further improvements. It is only through these existing abilities within the SMEs that both the cost savings as well as the flexibility of the staff can result in constructive benefits and influence the decision-making process to adopt IaaS. In the quantitative analysis conducted by Jelonek et al. (2014) the IT resources contribute about 64% in the realization of other benefits of cloud computing including organisational, technical, and financial. Therefore, the capabilities within the business for SMEs in terms of the resources and the IT capabilities are vital in making a decision for adoption.

Finally, the adoption decision to adopt IaaS is the last step outlined in the model. The proposed model indicates the integration of factors in making business decisions to adopt the technology. The arrows in the model show the flow of factors considered in the adoption of IaaS among the SMEs studied. Notably, the decision process entails key aspects such as the perception of business needs which are viewed based on the benefits and challenges that are vital in the adoption of IaaS among the SMEs. It is based on these considerations that the businesses implement IaaS to suit business needs. Meanwhile, the model can be manipulated to suit the specific situation in business since the decision-making process may vary from one business entity to another. While the decision thought model has been specifically developed from data obtained from the SMEs, it can be applied to larger firms in their approach to technology given the transferability of the framework.

The considerations in the proposed conceptual model (Figure 8) are not without negative implications. Some of the common weaknesses include the reliance on the responses from a few organisations to conclude even though IaaS is one of the evolving technologies that expose businesses to different experiences. For instance, other SMEs in the other sectors may experience a different set of challenges and benefits that influence their decision to adopt IaaS.

Another weakness of the proposed conceptual model (Figure 8) is that technology is an evolving phenomenon with constant changes. Therefore, the concern for adoption is subject to the application only under certain context. As revealed in the literature, there is considerable improvement in the security of the cloud through partnerships to set common standards that will limit vulnerabilities (Lampe et al., 2013). In such cases, most of the security concerns raised by the interviewees in the present research may not be applicable in other contexts. This model is a simplified reality in the decision-making process among the SMEs under study. The dynamic nature of the technological space may render the proposed conceptual model (Figure 8) irrelevant by introducing other approaches to decision-making. However, the proposed conceptual model (Figure 8) is important in understanding the approaches that the SMEs can rely on to make relevant decisions in the adoption of IaaS moving forward.

The proposed conceptual model (Figure 8) was developed purely from an exploratory study to explain the adoption of IaaS for SMEs in the media and advertisement industry. The approach used in the development of the model was intended to gain an insight into the research issue from the actors (practitioners) perspectives. Meanwhile, the application of the proposed conceptual model (Figure 8) requires caution as the constructs will need further testing to ascertain its plausibility. The framework has not been statistically proven which limits its application. Since testing of the proposed conceptual model (Figure 8) was not within the scope of the present study, other researchers can test its applicability using statistical approaches. In essence, the focus of this study was to create a model as part of the objectives arising from the findings and analysis.

The findings in the present study also provides a valuable insight into the theory specifically the TAM and TOE models that has been integrated into the research. In view of the TOE model, the IaaS adoption is the technological context which seek to enable the SMEs fulfil their business needs (Kumar et al., 2017). The adoption of the technology results in benefits including increased information processing as well as growth opportunities that are vital in differentiating the business services and products. On the contrary, the technical capabilities among the SMEs are part of the challenge that compromise the decision to adopt IaaS. Amadin et al. (2018) pointed out that lack of technical competence may act as a basis of resisting technology. Therefore, an adequate understanding of the technological context is necessary for decision to adopt IaaS technology.

The organisational context focused on the firm specific characteristics that support innovation. In the context of the present study, cultural aspects such as the SMEs practices that support IaaS adoption influence the perception on the business needs (Skafi et al., 2020). They also act as a challenge to the adoption decisions particularly if they are not supportive of IaaS adoption. Finally, the environmental factors such as security and government efforts impact the perception of IaaS adoption among the SMEs. The security issues arise as an environmental threat with broader influence among the adopters and non-adopters given the magnitude of their impacts. Meanwhile, government efforts to address the security issues through policy initiatives contribute to how the SMEs make decisions regarding their decisions to adopt IaaS.

Based on the proposed framework and the findings in the study, the TOE model mainly focus on the perception on business needs as well as the challenges and benefits. However, these are not the only aspects of decision making among the SMEs. TAM model seeks to address the implementation requirements which can be broadly categorised into the perceived security and scalability of the IaaS to address emergent challenges (Gangwar et al, 2015). In as much as the theory neglects the immediate external environment, it provides an insight into the behaviour and attitudes of stakeholders to implement innovation. The perception of usefulness is vital in determining the implementation requirements.

Additionally, perceived scalability is part of the implementation requirement factor in the framework that is explained by TAM model given the dynamics in the environment in which the SMEs operate. The dynamic nature of demand for the business services make scalability especially in information processing to be an important factor for SMEs in considering the implementation requirements. It is also apparent that perceived security as outlined in TAM model is insufficient in explaining the IaaS adoption decisions. Arguably, the integration of both TOE and TAM models to create the proposed framework result in synergistic effects when considering the decision to adopt IaaS which requires that external factors as well as usefulness and scalability issues are taken into consideration (Chathurika, 2019).

6.0 Conclusion and contribution

The outcomes of the research provide critical insight into the adoption of IaaS for small and medium enterprises in the media and advertisement industry in Singapore. This chapter seeks to highlight the key outcomes of the current study. The various sections are highlighted as under:

6.1 Achievement of the Research Aim

The research aimed to explore the adoption of IaaS among the SMEs in Media and Advertisement industry to inform the decision-making process that will improve their performance. Further, the study sought to develop a conceptual model that increased the understanding of the process of adopting IaaS as one of the new technologies with the potential to improve business competitiveness. Through the literature review and primary research, it is apparent that the aim of the study has been adequately met. For instance, the analysis of the primary data has revealed the perception of employees in the SMEs regarding the challenges and benefits associated with IaaS adoption. On the other hand, the reliance on study outcomes and theoretical models specifically TOE and TAM resulted in the development of the proposed conceptual model (Figure 8) reflects the situations facing SMEs in the Media and Advertisement Industry.

The review of the literature has provided valuable insight into the gaps that the present study sought to fulfil. Notably, various themes identified in the literature review guided the development of the thesis and also informed the discussions on the findings. In essence, the review of the literature to explore IaaS as a business enabler has been adequately achieved throughout the process of the study. Generally, the adoption of the IaaS among SMEs in Singapore's media and advertisement industry has been successfully studied based on the perception of the study participants.

6.2 Contribution to Knowledge

The review of the key literature and analysis of the responses outlined various areas that are considered for future research. To my knowledge, this is the first qualitative study that sought to integrate TOE and TAM models in exploring the IaaS adoption among SMEs in the media and advertisement industry in Singapore. The special attempt to integrate variables of the two models has revealed an overlap between the challenges and benefits as either barriers and/or drivers in the quest by the SMEs in the media and advertisement industry to adopt IaaS. For instance, the study

has revealed that information security, as well as cost concerns as factors for relative advantage in the models, have an overlapping effect in the decision-making process of the SMEs. Inasmuch as the work by Gangwar et al. (2015) sought to integrate the two models in determining cloud adoption, this study varies from their attempt due to reliance on in-depth interviews and a particular focus on IaaS which is considered to be the basic model of cloud computing.

Another contribution that is apparent in the present study involves the lack of intention to quit from IaaS despite claims regarding challenges. As outlined in the discussion section, the SMEs that had already adopted IaaS pointed out challenges associated with the technology but had no intention of going back to the in-house IT solutions. This shows that the adoption of IaaS is one of the vital trends that leverage business competitiveness despite internal and external challenges. Therefore, awareness regarding challenges and/or benefits play a significant role in determining the adoption of IaaS among practitioners. There is a consensus between this finding and the research conducted by Stansfield and Grant (2003) on e-commerce which demonstrated the need for internet and e-commerce awareness for future survivability of SMEs. Lack of awareness due to limited information available to the SMEs in the media and advertising industry contributes to the low levels of IaaS adoption. This study has revealed that the knowledge and capabilities within the SMEs play an important role in determining the decision to adopt IaaS.

The proposed conceptual model (Figure 8) further provides an insight into the decision-making thought processes based on the factors that inform IaaS adoption amongst the SMEs studied. This research has demonstrated that the SMEs can adopt IaaS amidst challenges given the high levels of benefits associated with it. The challenges that act as barriers to IaaS adoption are limited compared to the benefits of increased competitiveness and increased efficiency. Meanwhile, the awareness is an important aspect in weighing the challenges against benefits to make an informed decision based on the business context. It is for this reason that none of the participants considered going back to in-house IT infrastructure after adopting IaaS as a viable alternative to leverage competitiveness. Since this study has revealed that IaaS adoption is a workable solution to the SMEs in the media and advertisement industry, the acquisition of knowledge is necessary to inform the decision-making thought process outlined in the proposed conceptual model (Figure 8).

Therefore, future research can explore on the applicability of the proposed conceptual model (Figure 8) to establish its usefulness in the adoption of other cloud services.

Overall, the study outcomes add to the bulk of knowledge on the adoption of technology especially IaaS as a business enablement tool. Given the role of IaaS, the study has added to the existing knowledge regarding the efficiency of cloud technology in improving operations and ensuring increased competitive advantage among the SMEs. Similarly, the insights from the respondents have revealed the other benefits of IaaS including improved flexibility, increased storage space, and scalability among others. It implies that there are practical benefits that SMEs will gain upon the adoption of IaaS which results in variation between the adopters and non-adopters.

6.3 Contribution to Practice

This study contributes to practice in three main ways. Firstly, the study has provided the practitioners with valuable insight into the adoption of IaaS which has received limited considerations especially among the SMEs in Singapore's media and advertisement industry. As pointed out in the background to the study, the increased government investment in ensuring SMEs adopt cloud technology continue to face slow response given the limited understanding regarding the benefits. In the present study, the players in the industry especially early adopters of IaaS have demonstrated its significance as a business enablement tool. This is apparent in the common response among the SMEs that had already adopted or are in the process of adopting IaaS and had no intention to resort to in-house IT Infrastructure. It implies that the benefits of IaaS such as scalability resulting from increased storage, reduction in costs, and the ability to improve competitiveness are vital for the success of the business.

Secondly, the responses from one of the non-adopters in the researched participants demonstrated limited information regarding IaaS and desire to maintain the status quo. Similar concerns were also apparent among the adopters especially in regard to limited knowledge in the billing systems. These findings suggest the need for increased awareness regarding the role and functions of IaaS. While the government has assumed a significant role in fronting the awareness and provision of financial resources, the challenges outlined in the present study will inform the stakeholders on the best approaches to address the low adoption trends. In this case, the involvement of the service

providers to train and create awareness among the SMEs based on the business needs is necessary for improving the adoption of IaaS since they increase the knowledge base among the stakeholders. Therefore, the present study has surfaced an opportunity for service providers and other stakeholders to create awareness and improve adoption of IaaS and other cloud models among SMEs in the media and advertisement.

The proposed conceptual model (Figure 8) is vital for practitioners in understanding the approaches to IaaS adoption. For instance, service providers in reaching out to SMEs need to consider how they perceive the effects of IaaS on business customers. This is followed by an understanding of challenges and benefits to the businesses. The SMEs can also gain from the model by clearly asking valid questions regarding the business needs as a basis of decision-making. Unlike independent models of TAM and TOE which focus on wider factors, the consideration of the proposed conceptual model (Figure 8) as an integration of the TOE and TAM gives a simple but useful approach to decision-making among the practitioners. Therefore, through the use of the pragmatic model, managers should consider a balance of challenges and benefits of IaaS to inform their decisions for business improvements.

The proposed conceptual model (Figure 8) highlights key areas that inform the decision-making. The change from reliance on in-house capabilities to the cloud service (IaaS) requires careful consideration of challenges and benefits from both business and technological changes for a more holistic perspectives. The proposed conceptual model (Figure 8) provides an insight into the thought process and key factors that inform decision making to adopt IaaS. Further, the proposed conceptual model (Figure 8) is a thought process that captures major concerns that can be contextualized to guide the decision-making process. This is a contribution to practitioners since it highlights key factors that inform the decision-making process based on the concerns raised by the stakeholders in the industry. Meanwhile, the model is not prescriptive but it is flexible in its application to decision-making processes regarding technology adoption among SMEs.

6.4 Implications of the Study

The findings in the present study have valuable implications for various stakeholders including SMEs in different industry, IaaS providers, Government and industry regulators, and customers. The integration of the TAM model and TOE framework provided a possible basis for improved understanding of the prediction of decision-making behaviour among the SMEs. Research shows that the integration of TAM and TOE enables the researchers to develop comprehensive frameworks that improve the understanding on the factors that affect adoption of cloud computing especially IaaS for the present study (Tripopsakul, 2018). Therefore, the constructs of TAM such as perceived usefulness and scalability provide intermediating role that makes it valuable to the businesses, especially SMEs. The management efforts to improve performance gaps and information processing needs require an understanding based on the integrated models which leave no gaps when considering factors for decision making.

The decision-making regarding cloud computing is a top-down process given that managers know the performance gaps that compromise their level of competitiveness (Gangwar et al., 2014). In the context of SMEs, the managers also play other roles which necessitate that the decision-making process for IaaS adoption is considered based on external and internal factors, to ensure that the adoption and implementation decision is guided by a wider consideration of the factors as outlined in the decision framework to ensure an increased resilience to the environmental and social challenges that compromise their pursuit of growth opportunities in the industry. An appropriate decision-making process will eliminate the need to switching which is characterised by barriers such as vendor lock (Khan and Al-Yasiri, 2016).

The findings in the present study are also useful to the government and the policymakers in the industry. The regulatory gaps in IaaS and other cloud model adoptions may have contributed to the low adoption given the concerns over security issues. The SMEs lack incentive to invest in IaaS adoption despite the various benefits such as improved information processing and greater opportunity for growth (Neirotti and Raguseo, 2017). Research shows that success in the adoption of cloud computing should be guided by cooperation and coordination among business stakeholders (Gangwar et al., 2014). In the present study, the industry is less regulated in terms of security, pricing, and switching providers. The government need to formulate policies that will

hold individuals and or businesses responsible for security breaches. The policies should also address the gaps in pricing and switching providers to enables the SMEs operate within the regulations. Further, the policies should seek to improve availability of information to the SMEs alongside other initiatives to address the challenges that prevent the SMEs from accessing IaaS and other cloud computing models.

The findings also have an important implications to the service providers. The present study reveals that part of the challenges that SMEs adopter face is lack of a clear insight into how the IaaS will contribute to their business needs. As a result, they wait for early adopters which are larger enterprises to gain an understanding on the role of IaaS and other cloud computing models. The late adoption compromises the SMEs ability to leverage their competitiveness as well as their ability to address uncertainties due to business dynamics (Vasiljeva et al., 2017). Therefore, service providers should provide valuable information to the SMEs to enhance their understanding of how the cloud computing services contribute to the business challenges. Providers should strive to provide information regarding their services to improve acceptability among customers.

As pointed out, IaaS adoption is a business enablement tool since it improves the performance and enables the SMEs to effectively meet their information needs (Joseph et al., 2015; Quint & Kratzke, 2016). When the decision to adopt IaaS is made by the management based on the constructs of the framework, the business experiences positive outcomes. This contributes to the increase in competitiveness whereby SMEs can pursue growth objectives especially expansion of the customer bases despite competition from the large firms that enjoy economies of scale and have large resource pool. Additionally, the study findings shows that adoption of IaaS enables the SMEs to become more efficient by changing the minimum economy of scale which is vital in ensuring that despite the small size of the SMEs, they can effectively compete the industry leaders at the same prices. Therefore, adoption of IaaS by the SMEs could be a strategic approach to enable the business improve its performance outcomes and pursue growth opportunities amidst stiff competition.

6.5 Limitations of the Study

Inasmuch as there are considerably interesting results from the study, it is not without limitations. The data sources and sample size present one of the main limitations of the study. Since all the data used were from companies in Singapore, the unique economic features which creates a more favourable environment eliminate external concerns that may be viewed as challenges among SMEs in a different environmental setting. As this study uses the qualitative approach, it is not possible to generalise from the outcomes but it is possible to look at some of the processes of transferability (Petty et al., 2012). Additionally, the study results are based on a small sample size which is not representative of the SMEs in the industry (Christie et al., 2015). Further, the process of sampling was non-probability which necessitated to a large extent that the researcher works with the respondents who agreed to participate. The self-selection bias is part of the limitations of the present study due to the sampling process.

The study is also subject to limitations due to its narrow scope. The specific aim of the research was to explore the adoption of the IaaS among the SMEs in Singapore's media and advertisement industry. As apparent from the extant literature, several factors regarding technology acceptance among the SMEs including attitude and intention (Wiedemann and Strebel, 2011). Of the three aspects outlined by Wiedemann and Strebel (2011), the study only focused on adoption to explore factors that contribute to slow response from SMEs despite increased government commitment. Therefore, the present research remains inconclusive but provides a critical insight that is valuable in understanding the IaaS adoption among the SMEs.

6.6 Recommendations

The study has revealed critical insight into the adoption of IaaS despite the outlined limitations. Given the results and findings, various recommendations can be identified to aid the adoption of IaaS as an evolving technology that holds considerable significance to the success of the SMEs in a highly competitive environment. The following recommendations are put forward:

SMEs should consider IaaS as a business enablement tool. The results have suggested a practical impacts of IaaS including scalability and flexibility benefits which are necessary for SMEs to effectively compete for their peers and large businesses in the sector. It implies that IaaS provides workable solutions that will positively impact business success. The most apparent aspect outlined in the study is the lack of willingness among the adopters to quit or resort to their in-house technology after adopting IaaS. Therefore, as a basic cloud service model, SMEs should embrace IaaS for enabling them to meet customer demand while adequately addressing the competitive pressure in the business environment. In considering the IaaS, SMEs decision-making process should be largely guided by the business needs to avoid overemphasis on the challenges and benefits which are overlapping upon adoption of the technology.

There is need for re-alignment and focus on government efforts to promote adoption of IaaS. The study outcomes show that the perception of challenges resulting from the adoption of technology as well as lack of information is key barriers to acceptance among the SMEs. It suggests that overemphasis on the financial resources and campaigns on the benefits of cloud computing while overlooking business contexts or the perception of the managers on the outcomes of adoption can only yield limited success. While the adoption of new technology is a process, the government efforts should be aligned to specific business need and focus should be on the anticipated benefits alongside the provision of financial resources. When these factors are adequately addressed, there will be a considerable increase in the rate of adoption of IaaS as well as other cloud service models among SMEs in Singapore.

Finally, there should be service provider involvement in efforts to improve IaaS adoption among the SMEs. The outcomes of the study have shown a considerable paradigm shift in the control of the information infrastructure of the SMEs upon adoption of IaaS, increased gaps in understanding

on vendor lock challenges, and lack of awareness on technological aspects. While most of these are attributable to limited technical capacities among the SMEs personnel, they reveal inadequate consultations between the customers (businesses) and the service providers (vendors). Given that cloud technology is an evolving phenomenon, some of the challenges cited as the bases of failure to adopt IaaS are only due to lack of information. Therefore, there is a need for effectiveness and clarity in communications by the service providers on how to create awareness to ensure the customer needs are aligned to the cloud services providers. As a result, vendors will be better positioned to identify specific business needs and inform the SMEs on the technological aspects that are vital in addressing the existing challenges.

6.7 Potential future areas of Research

The process of conducting the research has revealed several areas that warrant further studies to ensure a comprehensive understanding of the technology adoption especially IaaS among the SMEs. Firstly, future research should focus on conducting a similar study on a relatively larger scale with a wider scope. The SMEs are likely the backbone of most of the economies and the trends in low adoption of new technology does not only affect the media and advertisement industry but also the rest of the economic sectors. Given the apparent numerical dominance of SMEs, larger samples from different industries and the inclusion of more factors such as intention and attitudes will yield more reliable information that can guide policy formulation. Additionally, the widening of the scope will also bring fresh insight into the perception of challenges and benefits for improved decision-making among the stakeholders.

Secondly, building on this research, there is merit in the application of a multi-theoretical approach in quantitative studies examining the adoption of IaaS among SMEs. The reliance on qualitative data especially perceptions result in outcomes that are not generalizable. The use of TAM and TOE in future research should entail quantitative data to inform decisions from a numerical point of view. This is vital in ensuring valid generalisation of results and outcomes of the study. While Gangwar et al. (2015) provided a valuable insight into the concept of a multi-theory approach in examining cloud adoption, their study focused on a general understanding of cloud adoption. It is, therefore, important that specific cloud service models are examined to guide comprehensive decision making among the stakeholders. Further, IaaS as a cloud service model is an evolving

technological aspect, the data collected for the present study may be obsolete given the evolutionary nature of technology. Therefore, a longitudinal study is beneficial in understanding the trends and providing recommendations that are useful over a considerable period.

6.8 Final Thoughts

The motivation for the present study was instigated by the constant widening of the gaps between IT and business needs within organisations. The resulting lack of understanding among the SMEs became evident in the slow adoption of IaaS and other cloud service models in Singapore despite constant efforts by the government to support the adoption initiatives. As a result, the researcher sought to explore the adoption of IaaS among the SMEs in media and advertisement industry from an interpretivist perspective that provided access to information through established relationships with the participants. While the DBA journey involved a considerable number of challenges and interesting encounters, the research aims and objectives have been adequately accomplished.

Notably, the literature review resulted in critical insights that offered tangible directions in the formulation of themes and identification of the gaps that were relatively hidden from the causal view on the balance between IT and business needs. The primary data obtained from semi-structured interviews further provided relevant information that has been analysed and interpreted to aid in the development of a valuable proposed conceptual model (Figure 8) as well as guide recommendations to stakeholders in the industry. This has been accompanied by identification of gaps for future research to promote a comprehensive understanding of the SMEs adoption of IaaS as a business enablement tool.

Overall, the research process shows my commitment to the aim through maintaining focus on the questions and the objectives set at the beginning of the study. Since all the areas of the research have been addressed and recommendations outlined, the bulk of the task will be left to practitioners and other stakeholders to take into consideration these factors in their decision-making process.

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Annex 1 - Interview Agenda for Infrastructure as a Service (IaaS) Adoption

1. Please introduce yourself, your business and your career experiences.
2. Do you consider Infrastructure as a Service (IaaS) a key enablement tool for your business strategically (planning)?
   Yes [ ] No [ ]
   Please elaborate further
   _____
3. Do you consider Infrastructure as a Service (IaaS) a key enablement tool for your business tactically (operations)?
   Yes [ ] No [ ]
   Please elaborate further
   _____
4. Do you consider Infrastructure as a Service (IaaS) as a component of competitive advantage to your business?
   Yes [ ] No [ ]
   Please elaborate further
   _____
5. What are some of the benefits that using Infrastructure as a Service (IaaS) creates to the business?
   _____
6. What are some of the challenges you experience / experienced due to Infrastructure as a Service (IaaS) adoption?
   _____
7. Are there technical concerns from other staff members (employees or co-workers in your organization) regarding the adoption of Infrastructure as a Service (IaaS)?
   Yes [ ] No [ ]
   Please elaborate further
   _____

8. Cyber Security has been a big and hot topic over the last couple of years, do you foresee any related challenges with the adoption of Infrastructure as a Service (IaaS)?

   Yes [ ] No [ ]

   Please elaborate further

   _____

9. Are there non-technical concerns from other staff members regarding the adoption of Infrastructure as a Service (IaaS)?

   Yes [ ] No [ ]

   Please elaborate further

   _____

10. Are the Infrastructure as a Service (IaaS) providers readily available to provide the level of required support?

    Yes [ ] No [ ]

    Please elaborate further

    _____

11. Over the course of your usage with your current Infrastructure as a Service (IaaS) providers, have you thought about switching to another provider?

    Yes [ ] No [ ]

    Please elaborate further

    _____

12. Would you consider any attempts to switch Infrastructure as a Service (IaaS) providers easy?

    Yes [ ] No [ ]

    Please elaborate further

    _____

13. Over the course of your usage with your current Infrastructure as a Service (IaaS) providers, have you thought about switching back to in-house Infrastructure?

    Yes [ ] No [ ]

    Please elaborate further

    _____

14. Do you have any other information/thoughts on Infrastructure as a Service (IaaS) adoption that has not been captured in the questions above?

_____

Annex 2 - Informed / Research Consent Form

An Exploratory Study on the Adoption of Infrastructure as a Service (IaaS) for Small and Medium Enterprises (SMEs) in the Media and Advertising Industry in Singapore

My name is Stanley and I am a research student from the School of Business at Edinburgh Napier University. As part of my DBA programme, I am undertaking a research project for my dissertation. The title of my project is: ***An Exploratory Study on the Adoption of Infrastructure as a Service (IaaS) for Small and Medium Enterprises (SMEs) in the Media and Advertising Industry in Singapore***

This study will explore:

- *Adoption of infrastructure as a Service (IaaS) as a possible business enablement tool for Small and Medium Enterprises (SMEs) within the Media and Advertising Industry in Singapore*

The findings of the project will be useful/valuable to better-informed stakeholders on the suitability towards the adoption of technology specifically Infrastructure as a Service (IaaS) for their organisation.

I am looking for volunteers to participate in this research. There are no criteria (e.g. gender, age, or health) for being included or excluded – everyone is welcome to take part

If you agree to participate in the study, you will be asked to participate in the data collection process through a face-to-face interview. The whole procedure should take no longer than 60 minutes. You will be free to withdraw from the study at any stage, you would not have to give a reason, and all data collected upon your withdrawal will be destroyed immediately.

All data will be anonymised as much as possible, but you may be identifiable from tape recordings of your voice. Your name will be replaced with a participant number or a pseudonym, and it will not be possible for you to be identified in any reporting of the data gathered. All data collected

will be kept in a secure place (stored on a computer that is password protected and encrypted) to which only I have access. These will be kept till the end of the examination process, following which all data that could identify you will be destroyed.

If you would like to contact an independent person, who knows about this project but is not involved in it, you are welcome to contact Dr Janice McMillan and/or Dr Gerri Matthews-Smith. Their contact details are given below:

- Dr Janice McMillan – J.McMillan@napier.ac.uk
- Dr Gerri Matthews-Smith – G.Matthews-Smith@napier.ac.uk

If you have read and understood this information sheet, any questions you had have been answered, and you would like to be a participant in the study, please now see the consent form.

Research Consent Form

An Exploratory Study on the Adoption of Infrastructure as a Service (IaaS) for Small and Medium Enterprises (SMEs) in the Media and Advertising Industry in Singapore

Edinburgh Napier University requires that all persons who participate in research studies give their written consent to do so. Please read the following and sign it if you agree with what it says.

1. I freely and voluntarily consent to be a participant in the research project on the adoption of IaaS among the SMEs in the media and advertising industry of Singapore.
2. The broad goal of this research study is to explore the adoption of IaaS among the SMEs in the media and advertising. Specifically, I have been asked to voluntarily respond to the questions from the researcher, which should take no longer than sixty minutes to complete.
3. I have been told that my responses will be anonymised. My name will not be linked with the research materials, and I will not be identified or identifiable in any report subsequently produced by the researcher.
4. I also understand that if at any time during the interview I feel unable or unwilling to continue, I am free to leave. That is, my participation in this study is completely voluntary, and I may withdraw from it without negative consequences. However, after data has been anonymised or after the publication of results, it will not be possible for my data to be removed as it would be untraceable at this point.
5. Additionally, should I not wish to answer any particular question or questions, I am free to decline.
6. I have been allowed to ask questions regarding the interview and my questions have been answered to my satisfaction.
7. I have read and understood the above and consent to participate in this study. My signature is not a waiver of any legal rights. Furthermore, I understand that I will be able to keep a copy of the informed consent form for my records.

Participant's Signature Date

I have explained and defined in detail the research procedure in which the respondent has consented to participate. Furthermore, I will retain one copy of the informed consent form for my records.

Researcher's Signature Date

Annex 3 - Coding and Outcomes

Themes	Sub-themes	Code/Statement
Benefits	Competitive advantage	Reference 1 - 3.62% Coverage "Competitive advantage is all about carrying out things differently and uniquely. With the IaaS, the IT team is relieved of so many duties that give us more focus on customer experience and service improvements. We're no longer worried of the upgrades or patching" <Files\\Participant 12E> - § 2 references coded [5.86% Coverage] Reference 1 - 4.04% Coverage "the competition is getting steeper and we face giants who're well established and have obvious resource advantage. The IaaS has given us a window to concentrate on business growth, get to the market faster, and improve customer experience. This is important because we can now compete well on these fronts." Reference 2 - 1.82% Coverage "Business is competitive and the cloud service is part of the business that its competition is beneficial to us because we get great deals." <Files\\Participant 13E> - § 2 references coded [6.54% Coverage]

Reference 1 - 3.46% Coverage

“The IT experts are relieved of manual data entry and its repetition in order to handle other demanding tasks. The cascade allows for brainstorming and the creation of an innovation platform that works to beat the competitors in the game.”

Reference 2 - 3.07% Coverage

“IaaS is the best that we have shopped for and the virtualization quality has enabled the execution of instructions in an in tandem fashion by linking several employees regardless of their geographical location”

<Files\\Participant 14D> - § 1 reference coded [4.35% Coverage]

Reference 1 - 4.35% Coverage

“Competitive advantage is all about carrying out things differently and uniquely. You get time to focus on research, get to the market faster than competitors and you stay ahead of the game. This is where IaaS comes it because it gives the flexibility and scalability you need to make business run effectively while limiting costs.”

<Files\\Participant 15c> - § 1 reference coded [7.46% Coverage]

Reference 1 - 7.46% Coverage

“There are issues that I feel can compromise competitiveness when you let other people have control over your valuable data. We better guard it because customers are our most valuable assets and be responsible for whatever happens rather than get other people taking care of it. It’s our responsibility you know. Though we see a lot of our peers are getting into the IaaS and other clouds and I know the competitive pressure will soon built up.”

<Files\\Participant 1A> - § 1 reference coded [3.09% Coverage]

Reference 1 - 3.09% Coverage

“The IaaS has been helpful in reducing the maintenance costs because you just need to get your computers running while you avoid the extra costs. That way our business is becoming competitive.”

<Files\\Participant 2B> - § 2 references coded [4.50% Coverage]

Reference 1 - 3.09% Coverage

“In this business we serve niche customers and we strive to ensure they’re satisfied so they act as lead to other clients. The competition is stiff and it’s the reason we’re considering IaaS to limit costs and enable us remain very competitive.”

	Reference 2 - 1.41% Coverage “greater work flexibility which translated to improved productivity among employees who could work from anywhere” <Files\\Participant 3A> - § 1 reference coded [3.31% Coverage
Cost-effectiveness	<Files\\Participant 11E> - § 1 reference coded [1.26% Coverage] Reference 1 - 1.26% Coverage “It’s cost effective since it does not require the installation of underlying infrastructure” <Files\\Participant 12E> - § 1 reference coded [2.65% Coverage] Reference 1 - 2.65% Coverage “we don’t incur maintenance costs and other expenses related to information infrastructure. It is now the role of the providers to do it for us and the cost is spread so we don’t really see its impacts.” <Files\\Participant 14D> - § 1 reference coded [0.78% Coverage] Reference 1 - 0.78% Coverage

“The installation of the infrastructure is relatively cheap.”

<Files\\Participant 1A> - § 2 references coded [2.21% Coverage]

Reference 1 - 0.84% Coverage

“limited infrastructure and the work is very flexible”

Reference 2 - 1.37% Coverage

“Service providers have many things to help us and we operate effectively at low costs”

<Files\\Participant 2B> - § 2 references coded [3.23% Coverage]

Reference 1 - 1.75% Coverage

“the upfront you need when using IaaS is less compared to the costs of purchasing hardware and maintaining it to serve the business purpose”

Reference 2 - 1.47% Coverage

“many providers and businesses are getting into it to save on costs and scale-up and down based on the business needs”

<Files\\Participant 3A> - § 2 references coded [2.57% Coverage]

Reference 1 - 1.06% Coverage

“benefits that come with the IaaS adoption such as scalability and maintenance costs.”

Reference 2 - 1.51% Coverage

“In maintenance, it’s the vendors who are in charge and we need not worry about the capabilities in our IT and the costs”

<Files\\Participant 5D> - § 2 references coded [2.53% Coverage]

Reference 1 - 1.07% Coverage

“The cost is also greatly reduced as we no longer pay monthly or annual subscriptions.”

Reference 2 - 1.46% Coverage

“pay-as-you-go is great even if it may seem complex it saves a lot that would go into the business unnecessarily.”

<Files\\Participant 9B> - § 1 reference coded [1.46% Coverage]

Reference 1 - 1.46% Coverage

“much significance is the limited costs of operations because we work with the pay-as-you-go model.”

	Information security	"it ensures the safety of the information within an organization" Reference 2 - 3.12% Coverage "Considering that IaaS is insight dependent, it is difficult to trespass and access information of a given company unless one of the employees or the service providers volunteers it. Safety is one of the strong points for IaaS" <Files\\Participant 12E> - § 1 reference coded [2.46% Coverage] Reference 1 - 2.46% Coverage "Considering that IaaS is insight dependent, it has been difficult to trespass and access information of a given company unless one of the employees or the service providers volunteers it" <Files\\Participant 13E> - § 1 reference coded [0.63% Coverage] Reference 1 - 0.63% Coverage "Safety is one of the strong points for IaaS" <Files\\Participant 14D> - § 2 references coded [3.93% Coverage] Reference 1 - 0.73% Coverage

“IaaS ensures the safety of information through cloud.”

Reference 2 - 3.20% Coverage

“Insight is one of the strong points that underpins the application of IaaS. With such an impeccable security system, it has become difficult to hack the systems. Moreover, the providers are vigilant to offer reinforcement in case of any breach”

<Files\\Participant 3A> - § 2 references coded [3.72% Coverage]

Reference 1 - 0.99% Coverage

“There are backups and the providers are working hard to protect their customers.”

Reference 2 - 2.73% Coverage

“cloud especially the IaaS is getting better with time because the vendors are aware of the threats are they are trying to ensure best practices among the customers to ensure all possible vulnerabilities are addressed.”

<Files\\Participant 5D> - § 1 reference coded [2.01% Coverage]

Reference 1 - 2.01% Coverage

“The more it becomes valuable to the cybercriminals. So far, the protection against attacks is very good but we cannot rule out such possibilities in the future”

<Files\\Participant 6B> - § 1 reference coded [0.87% Coverage]

Reference 1 - 0.87% Coverage

“It’s highly reliable and will run even when the server goes down”

<Files\\Participant 7A> - § 2 references coded [5.07% Coverage]

Reference 1 - 1.63% Coverage

“It also gives us the assurance of the infrastructure protection especially when our hardware components fails”

Reference 2 - 3.44% Coverage

“I’m not so sure because we’ve seen the cloud service providers to be much promising in terms of protecting the data for the customers. But, I cannot predict what future holds because you know those hackers are also getting smarter by day”

<Files\\Participant 9B> - § 2 references coded [3.84% Coverage]

	Reference 1 - 0.42% Coverage “we also see better protection” Reference 2 - 3.42% Coverage “I think it’s one of the most secure approaches to deal with the security threat. This doesn’t mean they are not vulnerable to attack, it only shows that IaaS and other cloud based infrastructure can be trusted to uphold security of data.”
Storage space	“We now have unlimited storage space” <Files\\Participant 13E> - § 1 reference coded [1.08% Coverage] Reference 1 - 1.08% Coverage “Containerization improves performance due to lack of the hypervisor layer.” <Files\\Participant 14D> - § 2 references coded [2.11% Coverage] Reference 1 - 0.66% Coverage “IaaS is efficient in terms of information storage.” Reference 2 - 1.45% Coverage

“This is advantage because you get sufficient space for data from which to draw specific insights in the market”

<Files\\Participant 2B> - § 1 reference coded [1.34% Coverage]

Reference 1 - 1.34% Coverage

“You’ll get larger capacity for less and the business management can focus on growth and other core business.”

<Files\\Participant 3A> - § 1 reference coded [1.23% Coverage]

Reference 1 - 1.23% Coverage

“Our operations cannot be limited by lack of storage space thus cloud service provides the ability to meet the scalability needed instantly.”

<Files\\Participant 5D> - § 1 reference coded [0.91% Coverage]

Reference 1 - 0.91% Coverage

“More storage space, more flexibility, and more scalable for the business”

<Files\\Participant 9B> - § 1 reference coded [0.59% Coverage]

		Reference 1 - 0.59% Coverage “we have more space and unlimited storage,”
Challenges	Security	Reference 1 - 2.75% Coverage “They claim that it’s impermeable but the configuration I have seen in other places when I worked at a consultancy shows a lot of possible holes” <Files\\Participant 12E> - § 1 reference coded [2.92% Coverage] Reference 1 - 2.92% Coverage “The providers’ side is still developing and can result in serious security flaws especially those new entrants will leave holes in the configuration system as we also find it difficult to develop new apps when migrating.” <Files\\Participant 15c> - § 2 references coded [3.28% Coverage] Reference 1 - 2.37% Coverage “This is one of the reasons it’s not part of our consideration. The market maturity to really offer the protection we need is not yet in place” Reference 2 - 0.91% Coverage

“You lose one due to security breach you lose the rest.”

<Files\\Participant 1A> - § 1 reference coded [2.67% Coverage]

Reference 1 - 2.67% Coverage

“Misconfigurations that occurred make us vulnerable to attacks and because they control much of the things on the space, we’ve got little to do in protecting ourselves.”

<Files\\Participant 2B> - § 2 references coded [7.79% Coverage]

Reference 1 - 6.29% Coverage

“The privacy issue is another thing that is daunting, the cloud providers never give you control over the network and they sometimes fail to configure their security standards. The effect is that when data breach occurs and the network is exploited, it’s the customers that suffer. Even worse, the clients will blame you and you lose the good customers yet you don’t have control over the network. You can do your part well but still if they (service providers) don’t you’ll still have problems.”

Reference 2 - 1.50% Coverage

“The security threats associated with the cloud space is also on the increase because hackers are targeting this space”

<Files\\Participant 3A> - § 1 reference coded [4.53% Coverage]

Reference 1 - 4.53% Coverage

“Yeah, we’ve a limited visibility and our threat detection is vastly delayed. I appreciate the transparency of our providers but I don’t have the full visibility so our partnership in detecting and preventing threats is the only way out. Also, we didn’t develop new application but you know the challenge of a lift and shift which expose us to vulnerabilities.”

<Files\\Participant 4D> - § 4 references coded [8.11% Coverage]

Reference 1 - 2.18% Coverage

“The providers are in control of most of the functions and when there are flaws, it’s the business to blame because customers are not aware of how we operate, they’re only concerned with their security”

Reference 2 - 1.80% Coverage

“Future security challenges will still surface because many businesses are going for cloud services and it will soon become a very attractive area for cybercriminals.”

Reference 3 - 2.28% Coverage

“If a breach occurs, we stand a chance to lose our most valuable customers. Privacy is also part of the foreseeable issues as IaaS and other cloud deployment models result in greater flexibility among workers”

Reference 4 - 1.84% Coverage

“They’ll access our data through other computer and even the service providers pose the threat to our data privacy. These will likely affect the business even in future”

<Files\\Participant 6B> - § 2 references coded [6.78% Coverage]

Reference 1 - 2.32% Coverage

“We lost more control over IT within the business set up. We are also concern over the security and data privacy. I think the vendor lock issues are also affecting us so much.”

Reference 2 - 4.46% Coverage

“Becoming more popular the higher the chance it will attract the cyber criminals. With the stiff competition within this space we expect the vendors to be more vigilant. Even though the government is supporting the course towards enhanced cyber security, we anticipate the providers to overlook very critical security concerns especially with the configurations which will expose our businesses to greater security risks.”

		<Files\\Participant 7A> - § 1 reference coded [2.19% Coverage] Reference 1 - 2.19% Coverage "Besides, having less control creates fears on privacy and likely data breaches because you got to trust the Cloud Service providers with very vital information."
	Switching Providers	linked to the underdeveloped ecosystem so we have vendor-lock kind of scenario Reference 2 - 1.74% Coverage "vendors are coming up with better deals and it's just good to be honest that I really think there should be an alternative to shift" Reference 3 - 2.72% Coverage "Switching to another provider implies the transfer of all information and change of the daily operations and planning. The resources required to completely roll out a new platform is exorbitant and not easy" <Files\\Participant 13E> - § 1 reference coded [3.03% Coverage] Reference 1 - 3.03% Coverage

“Switching to another provider implies the transfer of all information and change of the daily operations and planning. The resources required to completely roll out a new platform is exorbitant and not easy.”

<Files\\Participant 14D> - § 1 reference coded [3.69% Coverage]

Reference 1 - 3.69% Coverage

“The idea of switching to another provider implies the transfer of all information and change of the daily operations and planning. There lies a risk of loss of the information or its leakage altogether. These are some of the compromises that companies are not willing to give into”

<Files\\Participant 1A> - § 2 references coded [5.77% Coverage]

Reference 1 - 2.18% Coverage

“Their network is also not very good so they cannot effectively cooperate to transfer our data. That will raise further security issues.”

Reference 2 - 3.59% Coverage

“No, It will not be easy because we don’t want to get many people involved with our data. The IaaS and any other cloud-based service are characterised by privacy issues. I would not wish to get many people handling this data”

<Files\\Participant 2B> - § 1 reference coded [3.23% Coverage]

Reference 1 - 3.23% Coverage

“The terms may change and we may have problems so we get another provider to handle the work though currently we’re considering the best in terms of experience in the market as well as cost especially ease of billing process so we don’t incur hidden costs”

<Files\\Participant 3A> - § 2 references coded [7.56% Coverage]

Reference 1 - 2.74% Coverage

“The challenge here is vendor-lock whereby we’ve got difficulties changing the vendors. Some of the critical security aspects we’d want to retain but the providers make it difficult to introduce services from elsewhere.”

Reference 2 - 4.82% Coverage

“it’s not easy to move the applications across because the services don’t always match. Sometime you’d wish to go for another provider but the cost of transfer and the technical capabilities are limiting you. Switching is not easy and this will soon be a problem because we can see the competition is stiffening and sometimes we’d want to work with cheaper and more efficient vendors.”

<Files\\Participant 4D> - § 1 reference coded [3.26% Coverage]

Reference 1 - 3.26% Coverage

“The future is not known but the dynamics in the business environment may trigger such considerations. The ecosystem does not yet provide an opportunity for ease of migration and so vendor-lock is very high. Here we see very low possibilities of interoperability as this is an evolving phenomenon.”

<Files\\Participant 5D> - § 3 references coded [8.75% Coverage]

Reference 1 - 2.79% Coverage

“I know we trust the providers but the rivalry and competition is worrying when we cannot shift providers due to high costs and poor ecosystems. We’re kind of tied to the vendor yet there is need to deploy more services.”

Reference 2 - 3.34% Coverage

“Good deals emerge everyday but the vendors are very different. With the level of competition increasing among the vendors you see deals you really like but you’ve got no easy way to switch because of the contract terms, costs, and capabilities in-house are missing.”

Reference 3 - 2.62% Coverage

“The cloud services are varying and their terms are not the same I cannot promise to stick only with one provider especially if they don’t meet the business needs, I’ll have to quit and find better alternative”

<Files\\Participant 6B> - § 1 reference coded [3.62% Coverage]

Reference 1 - 3.62% Coverage

“The vendor–lock is also apparent and the interoperability is yet to be achieved so you can imagine how long we’ll get stuck by just a single provider because of immaturities in the ecosystems. The standards are quite different and we’ve got to work with it anyway.”

<Files\\Participant 8c> - § 1 reference coded [6.59% Coverage]

Reference 1 - 6.59% Coverage

“There are many service providers and many are claiming to be the best so choosing the best one. I think this is the challenge we’re still trying to overcome. Also when we lose control, several people in the department will be laid off. This is a concern for job loss because they’ll be taking most of the roles so we’ve got little to handle.”

Technical and Non-technical aspects	<Files\\Participant 11E> - § 2 references coded [4.19% Coverage] Reference 1 - 0.74% Coverage "Cloud billing offers a challenge since it is granular" Reference 2 - 3.46% Coverage "Failure to effectively understand how IaaS works leads to charging of extra bills that makes the organization incur extra costs. Therefore, the operators have to go the extra mile of trying to decipher the environment and the billing system of IaaS." <Files\\Participant 12E> - § 1 reference coded [1.60% Coverage] Reference 1 - 1.60% Coverage "The business aspects remains what returns on investment are to expect as we've seen complexities in the billing processes" <Files\\Participant 13E> - § 1 reference coded [3.70% Coverage] Reference 1 - 3.70% Coverage "The failure to effectively understand how IaaS works leads to charging of extra bills that makes the organization incur extra costs. Therefore, the operators have to go the extra mile

of trying to decipher the environment and the billing system of IaaS."

<Files\\Participant 14D> - § 1 reference coded [2.79% Coverage]

Reference 1 - 2.79% Coverage

"There is need for the employees to understand the environment and the billing systems that revolve around IaaS. The additional costs that are incurred as a result of ignorance infringe significantly on the budget"

<Files\\Participant 15c> - § 1 reference coded [1.14% Coverage]

Reference 1 - 1.14% Coverage

"I have already mentioned market maturity which is a critical issue"

<Files\\Participant 1A> - § 1 reference coded [3.01% Coverage]

Reference 1 - 3.01% Coverage

"The non-technical issues such as expectations come into play. The services within the cloud are vast and sometimes you don't need all of it, and you don't get the answers when you need it"

<Files\\Participant 2B> - § 1 reference coded [1.45% Coverage]

Reference 1 - 1.45% Coverage

“The challenge that will accompany this trend is the overload either from the side of the provider or the customer.”

<Files\\Participant 4D> - § 2 references coded [8.03% Coverage]

Reference 1 - 6.13% Coverage

“The staff here demonstrated what I will call resistance because they felt it is a threat to their jobs. It took time to make them understand that IaaS was going to benefit the business and employees at all. You know the move to cut costs has become part of the business approaches especially among SMEs like ours. Another non-technical issue is lack of effective ecosystem for cloud services and a few mature providers. The new entrants are rushing the business but leave a number of holes in security which can be very harmful to the business progress”

Reference 2 - 1.90% Coverage

“Many are available but the mature service providers are few and their charges are relatively higher. The market is becoming competitive and we expect many to enter the space”

<Files\\Participant 5D> - § 3 references coded [4.93% Coverage]

Reference 1 - 1.37% Coverage

“Most of the vendors in the market are not mature enough and they don’t meet expectations as you would think”

Reference 2 - 1.79% Coverage

“They can expose you to vulnerabilities due to misconfiguration because we never develop any new apps when migrating to save on cost and time.”

Reference 3 - 1.77% Coverage

“You can see the concern here as the business transition such challenges are expected and they can really damage business and its reputation.”

<Files\\Participant 6B> - § 1 reference coded [3.51% Coverage]

Reference 1 - 3.51% Coverage

“There are business and environmental challenges. For business I mean the cost savings which forms the basis of their campaigns is becoming less clear because the billing system is very complex and you may not be sure if you’re really spending less than before”

<Files\\Participant 7A> - § 1 reference coded [3.18% Coverage]

Reference 1 - 3.18% Coverage

“Non-technical issues are just with the many providers some who claim to give very competitive prices and the ecosystem remains unstandardized. This is very worrying because we cannot easily shift in case we want to.”

<Files\\Participant 8c> - § 2 references coded [9.24% Coverage]

Reference 1 - 2.65% Coverage

“we know there is loss of control, and security issues that come with the adoption but we’re yet to see the extent when we adopt the IaaS.”

Reference 2 - 6.59% Coverage

“There are many service providers who also claim to be the best. I think this is the challenge of choice which we’re still trying to overcome. Also when we lose control, several people in the department will be laid off. This is a concern for job loss because they’ll be taking most of the roles so we’ve got little to handle.”

<Files\\Participant 9B> - § 1 reference coded [5.46% Coverage]

Reference 1 - 5.46% Coverage

"Yes, the concerns of the much assumed cost saving are cropping in due to complex billing systems that we continue to experience. They're not what we were promised by the vendors or maybe these were not what we expected. The market is also not mature to ensure interoperability so vendor-lock remains a threat to the benefits that businesses expect to reap from the IaaS."

Business Enablement	Operations	<Files\\Participant 11E> - § 1 reference coded [3.08% Coverage] Reference 1 - 3.08% Coverage "I think the Instructions can be communicated and executed through the online platforms. Moreover, the use of IaaS provides an opportunity to monitor the progress of the operations towards attainment of the long-term goals." <Files\\Participant 12E> - § 1 reference coded [3.18% Coverage] Reference 1 - 3.18% Coverage "Instructions can be communicated and executed through the online platforms which is vital for our operations. Moreover, we rely on the large sources of info to monitor the progress of the operations towards attainment of the long-term goals" <Files\\Participant 13E> - § 1 reference coded [2.79% Coverage] Reference 1 - 2.79% Coverage "Cloud computing is the single word that could be used to define operations when it comes to IaaS. The platform offers the ability to process, store, and compute data as manipulation dictates."

<Files\\Participant 14D> - § 1 reference coded [3.49% Coverage]

Reference 1 - 3.49% Coverage

“Instructions can be communicated and executed through the online platforms. Moreover, they can be utilized to monitor the progress of the operations towards attainment of the long-term goals. In my view our operations are more effective than before we adopted IaaS.”

<Files\\Participant 15c> - § 1 reference coded [5.92% Coverage]

Reference 1 - 5.92% Coverage

“Our approach is enabling our operations to be smooth and each person is responsible for something. It’s easy to hold someone accountable for anything that happens and the operations are okay because proper division of roles is great. I don’t deny that cloud is enabling our competitors but we’re still capable of being relevant to our customer demands.”

<Files\\Participant 1A> - § 1 reference coded [3.98% Coverage]

Reference 1 - 3.98% Coverage

“It is also good for the operation because you get to scale up based on the needs in the market. The resources are limited and IaaS is very good in improving the operations. We have a

lesser burden to allow us to focus more on the business operations”

<Files\\Participant 2B> - § 1 reference coded [3.56% Coverage]

Reference 1 - 3.56% Coverage

“Sometimes when the business is in its peak we tend to run out of storage but it’s not only this. I think when we finally adopt cloud we’ll have solved some of these operational challenges though IaaS will also come with its share of problems such as loss of control and lack of privacy.”

<Files\\Participant 3A> - § 1 reference coded [4.98% Coverage]

Reference 1 - 4.98% Coverage

“Similar to what I have just explained because IaaS enables scalability and remote working. Many employees can undertake business duties even during non-working hours anywhere, anytime without having to come to the premises. It expands the number of working hours without compromising on the individual employee’s freedom at all. I see it as good also in terms of undertaking business operations”

<Files\\Participant 4D> - § 1 reference coded [2.16% Coverage]

Reference 1 - 2.16% Coverage

“The IT team can now focus on developing products and improving customer experiences because the bulk of the work on storage and networks are addressed by the service providers including maintenance”

<Files\\Participant 5D> - § 1 reference coded [2.35% Coverage]

Reference 1 - 2.35% Coverage

“most of the operations are done by them (Cloud Service providers), we control very little here so enabling operations not really our part anymore since many services are done by them (vendors).”

<Files\\Participant 6B> - § 1 reference coded [3.94% Coverage]

Reference 1 - 3.94% Coverage

“it enables the business operations because you get the time to focus on business growth, customer needs, and research on trends in the market place. These were not possible given the burden on maintenance, storage and other roles when our team was to have everything done within our means.”

<Files\\Participant 7A> - § 1 reference coded [4.66% Coverage]

Reference 1 - 4.66% Coverage

“When you free the IT team of those many tasks such as patching and testing which consume huge amounts of time you’re simply empowering them to focus more on business growth so they work on customer experience and analysis of how to approach the stiff competition. This is basically how the IaaS is beneficial to us.”

<Files\\Participant 9B> - § 1 reference coded [2.33% Coverage]

Reference 1 - 2.33% Coverage

“They’ve got access to data 24/7 and they effectively respond to customer needs. Overall, our operations are improved and we can see greater benefits forthcoming.”

Planning	<Files\\Participant 11E> - § 1 reference coded [1.73% Coverage] Reference 1 - 1.73% Coverage “Through cloud computing, information that is vital can be stored and communication can be enhanced by computer virtualization” <Files\\Participant 12E> - § 1 reference coded [4.79% Coverage] Reference 1 - 4.79% Coverage “Through cloud computing especially, information that is vital can be stored and communication can be enhanced by computer virtualization, so we do a lot of stuff that improves the services to our clients. This is not possible without having enough time to plan. IaaS adoption provided the time we needed to strategically plan work and face the market more strongly.” <Files\\Participant 13E> - § 1 reference coded [2.97% Coverage] Reference 1 - 2.97% Coverage “IaaS can be used in physical computation, scaling, and partitioning. These are important steps in the planning cascade since information is compartmentalized and appropriately arranged according to need.”

<Files\\Participant 14D> - § 1 reference coded [3.53% Coverage]

Reference 1 - 3.53% Coverage

“I have to attest that through cloud computing, vital information can be stored and accessed by those who need it. Additionally, communication has been enhanced by computer virtualization. These are the key tenets of planning that IaaS has made them to be relatively easier.”

<Files\\Participant 15c> - § 1 reference coded [4.12% Coverage]

Reference 1 - 4.12% Coverage

“We work with our hardware and it’s very convenient. Even the management here consider our approach to be okay with them. They don’t see the need to invest in IaaS which expose them to risks such as loss of control as well as unauthorized access.”

<Files\\Participant 1A> - § 1 reference coded [3.72% Coverage]

Reference 1 - 3.72% Coverage

“The competition is high in the market and proper planning at minimal cost is vital for our success. In using the IaaS I can

say that it enables us to get faster to the market in a faster way and ensure our customers are satisfied."

<Files\\Participant 2B> - § 1 reference coded [2.62% Coverage]

Reference 1 - 2.62% Coverage

"I consider it so but in this business we still rely on the in-house datacentre. Our planning is good and I know when we finally integrate cloud services, we'll have a better platform for strategic planning."

<Files\\Participant 3A> - § 1 reference coded [4.39% Coverage]

Reference 1 - 4.39% Coverage

"The IaaS brings the flexibility we need to meet the shifting demands and business fluctuations in the current market. When the business is experiencing low customer traffic we can easily shift to the necessary aspects and change when the turnout is positive. The planning process is very flexible with the cloud and is vital for cost-effectiveness."

<Files\\Participant 4D> - § 1 reference coded [2.55% Coverage]

Reference 1 - 2.55% Coverage

"Yes, we're no longer worried of the changes in demand because we can easily alter the plans according to the demands. Planning is less stressful because the IT resources are available and this is enabled by the adoption of the IaaS."

<Files\\Participant 5D> - § 1 reference coded [1.39% Coverage]

Reference 1 - 1.39% Coverage

"planning with IaaS is good because you are more flexible and you can meet the specific demands in the market."

<Files\\Participant 6B> - § 1 reference coded [2.95% Coverage]

Reference 1 - 2.95% Coverage

"With the IaaS we don't plan for contingencies that were time consuming and sometimes the prospects failed significantly and resources waste ensues. Planning is very easy when we have the IaaS coz of the pay as you go."

<Files\\Participant 7A> - § 1 reference coded [2.94% Coverage]

Reference 1 - 2.94% Coverage

"But I would say that for a long time we didn't see the need because we knew it would expose our customers to security

risks. Now, it's the trend and we use IaaS to inform both planning and operations"

<Files\\Participant 9B> - § 1 reference coded [4.68% Coverage]

Reference 1 - 4.68% Coverage

"This included limiting the risks and using resources effectively. The IaaS is vital in planning because you're sure you to be resilient against risks unlike the traditional hardware. The flexibility and scalability associated with cloud is equally vital for planning our services in a way that enhances customer experiences."