Cloud Computing Technology:
A Viable Option for Small and Medium-Sized Businesses

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Cloud Computing Technology (CCT) is a new way of leveraging the power of the Internet to provide software and infrastructure solutions to Small and Medium-Sized Businesses (SMBs) around the world. SMBs are rushing to the cloud to save time and money, increase efficiency, and gain a competitive advantage. This article examines potential benefits of CCT as applied to SMBs and explores implementation challenges that can be expected. Furthermore, this study reviews the specific application of CCT to SMBs, highlights developing technologies and trends, and lists some of the cloud-based services for SMBs. Finally this paper proposes a conceptual model for successful implementation of CCT in SMBs.

INTRODUCTION

Cloud computing is a general term for anything that involves delivering hosted services over the Internet. The history of cloud computing is the history of business computing & the internet. The Cloud Computing concept was coined by John McCarthy in 1961. However, organizations did not really begin using the cloud structure to serve their broader IT needs until 2009 (Lin & Chen, 2012). In the past few years, many companies have embraced CCT and are beginning to reap the rewards. Many of these companies are now using CCT to improve internal efficiencies (Folinas, Manijas, & Graham 2013; Shacklett, 2010; Schramm et al., 2011; Marston et al., 2011). Cloud-based technology can spur numerous benefits for organizations such as capital investment savings, simplified operations, scalability, improved information visibility, sustainability, and enhanced accuracy and reliability (Hackett, 2016).

Cloud computing usage is expanding rapidly, finding adopters in a number of new business domains. Many SMBs have started to recognize the power of cloud computing. A recent study conducted by Microsoft Corporation revealed that 78 percent of small businesses will have adapted cloud computing by 2020. A report by IDC predicted that SMBs cloud spending would grow by nearly 20 per cent the next five years (International Data Corporation, 2018). SMBs have different IT requirements and often face different IT challenges than do large enterprises. SMBs IT resources, including budget and staff are often highly constrained. CCT is especially practical for smaller organizations because it reduces IT resources and the time spent managing them. Instead of relying on expensive hardware, software and people to

manage them, small businesses can take advantage of CCT's availability, reliability, security, scalability, flexibility, and more.

Several studies have identified reasons for SMBs to migrate to cloud and described the impact of CCT as it is adopted by SMBs. According to the Microsoft survey, among those SMBs that were using CCT, getting new software applications faster, reducing IT workload, and improving IT collaboration were mentioned as important benefits of moving to CCT (RighScale, 2017). Popular applications used by SMEs included hosted desktop, storage and back-up, accounting and billing, Human Resources and Customer Relations Management. According to an IBM survey of 2,000 mid-size companies, 66 percent of mid-size companies planned to implement cloud computing projects in 2017. 75 percent planned to do this in conjunction with IT Infrastructure improvements (Secure ITnet, 2017).

According to a 2016 Gartner report, Cloud computing technology is perhaps the most promising and anticipated technology to come around in a number of years (Smith, 2016). For some SMBs, making a heavy move toward a cloud structure is a way to significantly cut hardware costs. For others, CCT streamlines operations and speeds up development cycles. Properly planned and implemented, CCT has the potential to drastically improve operational efficiency of SMBs. A recent survey found out that majority of SMBs (80 percent) would prefer to get a single bill for all their communication consumptions. This is a perceived benefit for SMBs to move all communication services to a single main service provider (Secure ITnet, 2017).

As with any new technology deployment, there are a number of issues to consider and overcome. "Going to the cloud" is not as easy or straightforward as many users may believe. Successful deployments require in depth analysis of users, including desired business outcomes (cost savings, speed to market, and increased service levels) and services needed (Smith, 2016). This study discusses the advantages and disadvantages of implementing CCT for SMBs, and examines challenges which SMBs face when adopting cloud based solution. Additionally, this paper reviews different phases of CCT deployment in SMBs. Finally, the paper reviews common uses of CCT in SMBs and highlights time saving tools available from cloud-based services.

CLOUD COMPUTING TECHNOLOGY AND TRENDS

Cloud Computing Technology
The term "cloud" is used to refer to different types of platforms for distributed computing – a cluster of servers, network, software, interface, etc. which users require to execute a particular task. "Computing" refers to the delivery of this package as a service which users can utilize as they wish (Information Technology & Systems, 2017). The user does not need to Owen a massive computing infrastructure. Rather, the user can utilize a similar infrastructure, owned by a third party, and pay only for the amount of computing they actually use. This pay-per-use model allows for convenient, on-demand network access, and time saving in building huge computing infrastructure. It allows the user to concentrate efforts on critical business activities (Mell and Grance, 2011). The user accesses information online in a 24/7 format from a variety of devices – desktop, laptop, tablet, and smartphone (Bask, 2015).

As demonstrated in Figure 1, cloud infrastructure is an umbrella which covers both the hardware and software necessary for 24/7 pay-as-you-go service.

Essential Cloud Characteristics
The National Institute of Standards and Technology (NIST) describes five characteristics of a cloud computing model. These are paraphrased below and shown on Figure 2 (Mell & Grance, 2011):
1. **On-demand self-service**. Server time, network storage, and other computing resources are obtained and configured as needed. No human interaction with the service provider is required.
2. **Broad network access**. The service is accessed over a network using multiple platforms (e.g., mobile phones, tablets, laptops, and workstations).

FIGURE 1
CLOUD COMPUTING TECHNOLOGY


Source: Information Technology & Systems, 2017

3. **Resource pooling**. Resources are pooled to serve multiple users. No user has exclusive use of the underlying hardware or software resources Physical and virtual resources are assigned and reassigned dynamically according to demand.

4. **Rapid elasticity**. Resources scale rapidly up and down with demand, since they are elastically provisioned and released.

5. **Measured service**. Metering is used to automatically optimize resource use (e.g., storage, processing, bandwidth, and active user accounts). There is a direct relationship between use and cost.

Cloud Deployment Models

There are three popular cloud computing deployment models described in NIST Special Publication 800-145 (Mell & Grance, 2011) are shown on Figure 3 and described below:

1. **Public Cloud**. Cloud infrastructure is owned by a 3rd party organization and is made available to the general public or a large industry group. This is a cost effective way to offer IT solutions, especially for small and medium-sized businesses. As shown on Figure 3, some of the leading public cloud providers include Amazon Web Services (AWS), Microsoft Azure, IBM SoftLayer, Google Compute Engine, and Rackspace.

2. **Private Cloud**. The cloud infrastructure is provisioned for exclusive use by a single subscriber. It may be managed either by the organization or by a third party, and the infrastructure may exist either on-site or off-site. Private clouds provide greater control and security over the cloud infrastructure. The other reasons for building private cloud are strategic decisions or control of operations. This type of deployment model is often ideal for larger organizations.

FIGURE 2
ESSENTIAL CHARACTERISTICS OF CCT
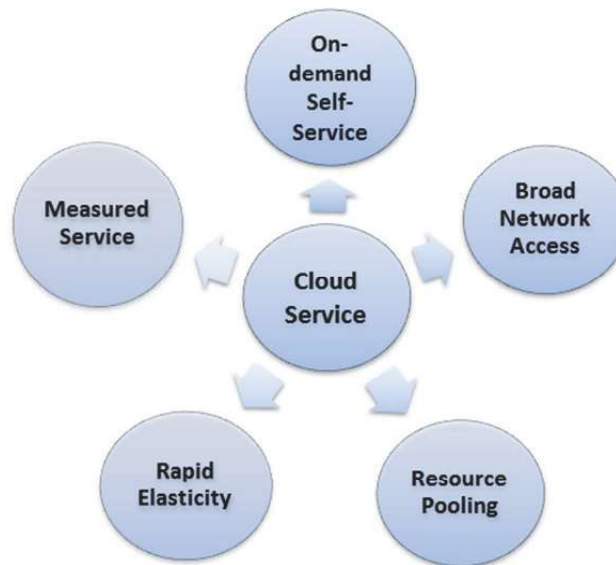
3. **Hybrid Cloud**. This is a composite of a public and a private cloud, with orchestration and automation between the two. A public cloud is utilized for non-critical information and peak workloads that must scale on demand, while sensitive information is kept on a private cloud controlled by the organization. The hybrid cloud computing model is the most common method of cloud deployment within a large organization.

Cloud Computing Service Models

There are three main models for the delivery of cloud computing services. Examples of each of the models are outlined below (Matsumoto, 2012):

1. **Software as a Service (SaaS)**: In this service model, applications are offered over a network (internet), accessible via browser or program interface. Since applications are delivered via on-demand software, they can be deployed quickly. This leads to ease of use and financial benefits. Examples of providers offering this type of platform are Google Apps (email, calendar, and documents), Salesforce.com, and Intuit's QuickBooks. Most SMBs only need to use SaaS tools. In case, they have more complex IT requirements, the other two categories of CCT might be used. Section VI of this paper further explores popular software services available to SMBs.

2. **Infrastructure as a Service (IaaS)**: This service model provides general purpose infrastructure support services, including database, storage capacity, networking, and other computing services. Users have control over operating systems and deployed applications. Examples are Amazon Web Services, CenturyLink, and Rackspace.

3. **Platform as a Service (PaaS)**: This service model provides the platforms including storage, servers, virtualization, and network that enable quick development and instant adoption of applications. The wait for suitable hardware and software for the application is eliminated. Users can employ the platform to build applications using languages, libraries, services, or tools supported by the platform service provider. Examples of this type of service provider include the Google App Engine and Windows Azure.

FIGURE 3
CLOUD DEPLOYMENT MODELS

Source: Promokap, 2017

Cloud Computing Trends

SMBs are moving to the cloud to save time and money, increase efficiency, and gain a competitive advantage. Several studies show the same trend. In 2018, RightScale conducted an annual survey of cloud computing trends. The survey asked nearly 1,000 professionals, where nearly 50 percent of the respondents represented small and medium size businesses, about their adoption of CCT. The study found that both public and private cloud adoption have increased in 2018. Public cloud adoption is 92 percent, up from 89 percent in 2017. Private cloud adoption is 75 percent, up from 72 percent in 2017. The overall portion of respondents using at least one public or private cloud is now 96 percent. The research also find out that while hybrid cloud usage has decreased as a top priority for enterprises, many more enterprises see public cloud as their top priority, up from 29 percent in 2017 to 38 percent in 2018 (Figure 4). Surveyed organizations leverage almost 5 clouds across both public and private. Additionally, according to the same 2018 annual survey by RightScale, a significant number of public cloud users are now using services beyond just the basic compute, storage, and network services. Serverless was the top-growing extended cloud service with a 75 percent increase in adoption up from 12 percent in 2017 to 21 percent adoption in 2018 (RightScale, 2018).

According to the same report, companies that provide cloud computing services are also growing rapidly and all saw increased adoption in 2018. For example, Amazon Web Services (AWS) spurred the first wave of cloud computing services with some simple computing and storage services in 2006. A decade later, AWS operates as an $11 billion run-rate. In 2018, AWS holds a significant lead in adoption rate at 68 percent of respondents. Adoption of Microsoft Web Services (Azure) grew from 34 to 45 percent of respondents and Google Web Services grew to 19 percent to maintain third position. Finally, Oracle grew to 10 percent, and IBM Cloud grew from 10 to 15 percent (RightScale, 2018).

FIGURE 4
CLOUD ADOPTION, 2018
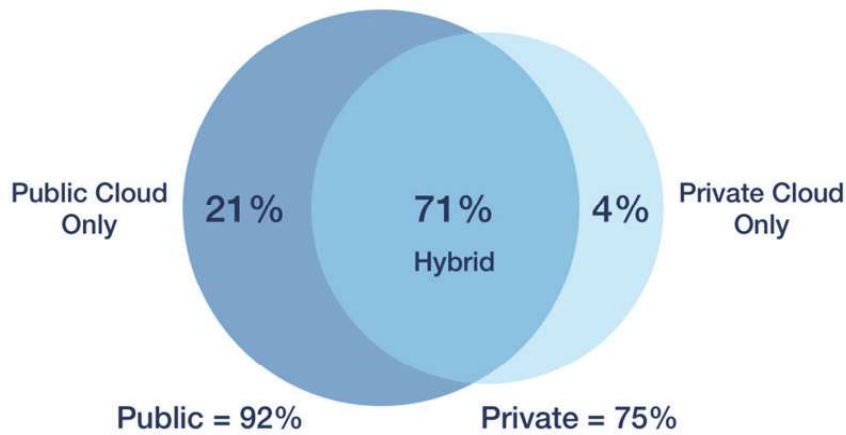
Source: RightScale 2018 State of the Cloud Report

Usage of cloud computing service models has also shown a significant growth. According to a 2017 reports from Gartner, Infrastructure as a Service (IaaS), is projected to grow 32 percent in 2018 to reach $45.6 billion. Software as a Service (SaaS) is expected to grow 19 percent to reach $55.1 billion. The SaaS market is expected to experience a lower growth due to maturity of SaaS offerings and the acceleration in the buying of popular products such as CRM and financial applications (Gartner Report, 2017).

ADVANTAGES OF CCT FOR SMBs

Cloud computing can bring big positive changes to SMBs and is redefining the way SMBs do business. Those changes have been realized by many of today's SMBs owners. Following are some of the benefits SMBs could realize by migrating to the Cloud-based service.

1. **Reduced Costs -** One of the most obvious benefits of moving everyday business to the cloud is that it can provide SMBS with significant savings. Cloud computing drastically lowers capital investment levels for hardware and software in small and medium-sized companies. A decrease in rack space, power usage, IT requirements, etc. means lower installation, maintenance, hardware, upgrade and support costs. The replacement of on-site solutions with the cloud computing model has the potential to deliver immediate benefits to users, including no server to maintain, no IT infrastructure to set up, no up-front licensing fees, and no software programs to buy, install, and maintain.(Lavoie, 2015). SMBs can acquire IT resources that were not possible in the past.

2. **Greater Integration -** CCT creates multiple opportunities for simplified integration where Cloud-adapted SMBs have the option of integrating with various cloud-based providers. Cloud computing allows most organizations less resource-intensive ways to get the applications they need to run in their businesses. For SMBs, the cost of deploying software applications such as Customer Relationship Management (CRM), Enterprise Resource planning (ERP), Project management (PM), and other sales, marketing and accounting applications on the premises is expensive. It is more cost effective if you have these applications in the cloud. Another big advantage of using cloud for SMBs is that they do not pay for the resources they have not used. Cloud vendors allow the flexibility of payments based on usage of resources (Hosseinian-Far, et al., 2018; Bask, 2015).

3. **Improved workplace Collaboration** – Collaborative computing can increase productivity and helps businesses build a better business (Attaran, 2007). Cloud computing also improves collaboration for SMBs. Employees can easily work from the same master document and can easily save and access various files through the cloud. Additionally, business owners can easily track and manage individual progress on assignments from anywhere at any time. For those SMBs that have employees in different geographic locations, CCT allows dispersed groups of people to meet virtually and share information, which enhances employee and organizational productivity.

4. **Increased Flexibility** – CCT makes it easier for small-business owners to manage their business at any time of day, from anywhere. CCT allows users to access their files anytime, anywhere, using any device. CCT offers more flexibility in terms of hardware and software. CCT offers virtually unlimited storage space for small businesses. One can store a massive amount of data cheaply and acquire resources on demand. Companies can scale up or down depending on demand, eliminating the need for massive investments in local IT infrastructure. Managing resources is easier in the cloud. Computing resources can be deployed very quickly, bringing ease of use and financial benefits. The technology gives users the ability to choose IT resources in a way that can grow over time or change instantaneously, as needs change. Moreover, utilizing cloud services allows small businesses to receive automatic updates of software and applications. They are freed from the burden of managing software and can focus on the core of their businesses.

5. **Enhanced Reliability** - CCT allows for provision of reliable services, delivered through data centers and built on servers. Often, the cloud appears as a single point of access for all of a consumer's computing needs. In addition, cloud computing provides for better business continuity planning by protecting data and systems. Cloud service providers have advanced strategies to ensure that mission-critical data is backed up and protected in a secure and safe location. Data redundancy is built-in by cloud storage solutions so that the files are always obtainable, even in times of network downtime, power failures, etc. Cloud storage gives SMBs the ability to conduct business in a way that minimizes down time and loss of productivity (King, et al., 2014).

6. **Improved Competitive Advantage** – CCT gives SMBs access to enterprise-class technology and allows them to act faster than big, established companies. A pay-as-you-go service and cloud business applications mean SMBs can run with the big enterprises, disrupt the market, and remain lean and efficient.

7. **Reduced Carbon Footprint** - CCT is also environmentally friendly and economical. It has less environmental impact (reduced carbon footprint) and saves a lot of energy and space. When SMBs cloud needs fluctuate, server capacity scales up and down to fit. So the organization only uses the energy it needs and does not leave oversized carbon footprints. According to several studies, cloud computing data centers, on average, produce 95 percent less carbon compared to on premise data centers (Pillai, 2011).

OBSTACLES TO RAPID ADOPTION IN SMBs

Cloud technology has several advantages for SMBs. However, the organization adopting cloud has to keep aware of several limitations. Winkler reviewed cloud security challenges and discussed cloud computer security techniques and tactics (Winkler, 2011, 2012). There are numerous challenges in applying cloud computing technology for SMBs in a way that allows for its significant and rapid growth. The 2017 state of the cloud survey conducted by Rightscale identified lack of resources/expertise, lack of time, difficulty of managing costs, and security concerns as the most important cloud challenges facing small businesses (RightScale, 2017). The following section summarizes these challenges:

1. **Lack of Sufficient Resources** – Lack of training/expertise is one of the biggest hurdles to rapid adoption of CCT in SMBs. Small business owners tend to make decisions in isolation without the benefit of advice from competent IT professionals (Feltham, Feltham, and Barnett, 2005). Such firms often do not have advanced IT support staff in-house, and it is rare that small business owners deviate from insular decision-making to listen to the advice of outside IT professionals. It is also the case that small businesses typically do not have the financial resources to hire advanced IT professionals in-house.
2. **Lack of Time to Implement New Initiatives** – Lack of sufficient time is also a major hurdle to rapid adoption of CCT in SMBs. Small businesses are often understaffed and overextended (Mazzarol, 2003), leaving very little slack time to implement new initiatives. Even though cloud computing could bring a small business considerable benefits, implementation is often passed on due to lack of time for the firm's leaders to even consider the prospect.
3. **Costs management** – There are other hurdles to rapid adoption – in particular the costs of maintaining the cloud and the speed of uploading files. Cloud costs can increase rapidly, especially for customizations to meet business needs. Large files can take a long time to upload, generating frustration and inconvenience for day-to-day business operations. Other hurdles include governance and control, the complexity of building a private cloud, and performance issues.
4. **Security/Data Control**– Another hurdle to rapid adoption of CCT in SMBs is security/data control. The cloud is, by its nature, an open and shared resource. Sending data on a publicly accessible communication system have the danger of cyberattackers tapping the communication line and stealing or corrupting data from disk storage. Three of the top cloud security issues facing small businesses are legal issues, compliance, and loss of control over data (Gonzalez et al., 2012). Moreover, deterioration of the quality of service of a cloud provider is another big concern. Finally, failure of communication at SMBs organization will cut off a cloud service.

PHASES OF CLOUD COMPUTING DEPLOYMENTS IN SMBs

Implementing an effective cloud computing strategy requires time and effort since many parts of the company will be impacted. Many companies have failed with the deployment of cloud computing because of the failure of developing a cloud strategy rooted in the delivery of IT services which are linked to business process outcomes. Furthermore, many businesses don't know how to initiate their cloud projects. Before deploying cloud services in an organization, the place where cloud services will add business value needs to be identified. Thereafter, a scalable deployment approach needs to be planned.

Gartner recently conducted a 12-month long survey of enterprises with cloud management strategies and identified the three phases of cloud adoption strategy described below and summarized in Figure 5 (Smith, 2016):
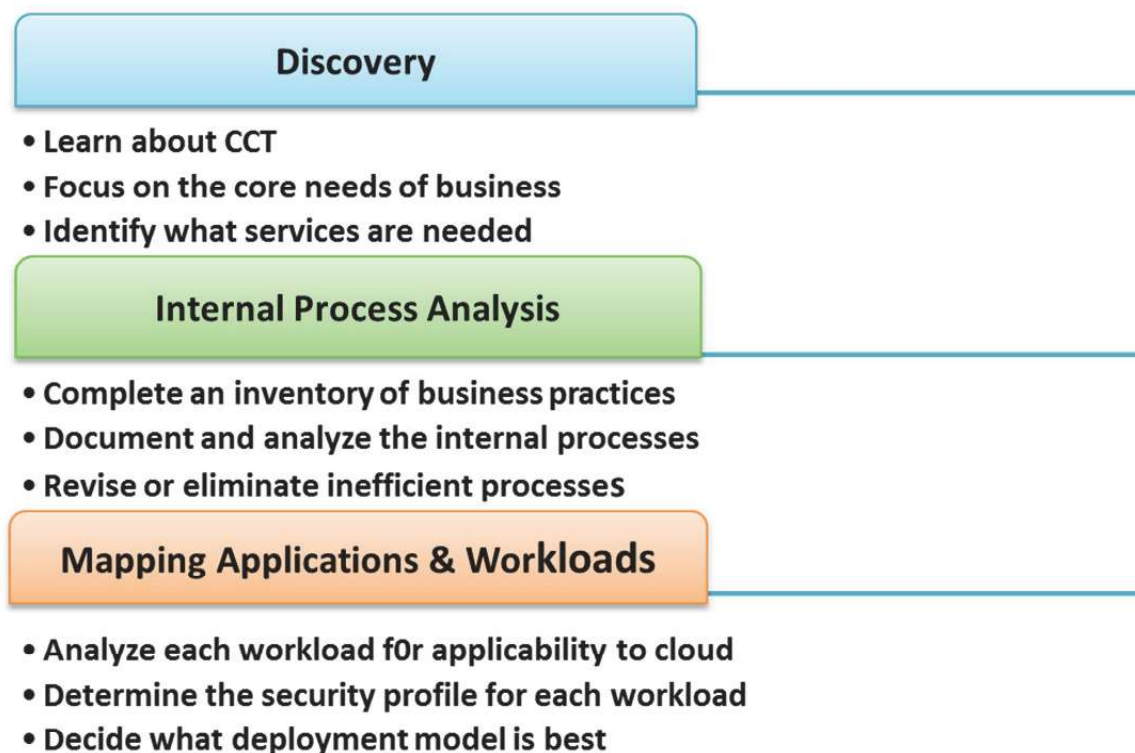
Phase 1- Discovery
Any business would like to grow and SMBs need to focus on the core needs of business to prosper. In this phase, companies learn about cloud technology and perform detailed analysis of their applications and of the services they need. Cloud computing focuses mainly on services, not on technology. Services can range from automated IT tasks, to IT services, to automated business processes. Delivery of CCT services to users is based on what they need. Consumers of the service place service requests, and they are billed for what they use. The most impactful deployments start with users fully understanding their desired business outcomes and then identifying the services that will be offered via a public and/or private cloud. Inefficiency to manage the IT environment can enhance risk and downtime that can risk IT investments. SMBs need to look at IT infrastructure needs and determine the changes they seek for their business. Questions such as what services users need, how much of each service will be consumed, when each service will normally be consumed, which users will consume each service, and what is a reasonable price for each service need to be answered.

Phase 2-Internal Process Analysis

In addition to learning about cloud technology, business process planning is critical for cloud implementation in a small business setting. SMBs often have no formal documentation of their business processes and how these processes impact their IT practices. In order to properly identify business issues and their implications for a cloud implementation, SMBs need to complete a thorough inventory of their business practices and processes. The tasks of individual workers and the flows of information through the enterprise need to be properly reflected in the new cloud infrastructure. Additionally, SMBs need to document and analyze the internal processes that will be affected by the selected cloud services. During this analysis, users should study the internal processes involved with offering the relevant cloud services. This might bring to light the need to flatten, reconfigure, realign, refine, or eliminate inefficient processes and target repetitive manual processes for automation. The types of security that will be applied to the deployment must also be addressed.

FIGURE 5
CLOUD COMPUTING DEPLOYMENT PHASES

Discovery

- Learn about CCT
- Focus on the core needs of business
- Identify what services are needed

Internal Process Analysis

- Complete an inventory of business practices
- Document and analyze the internal processes
- Revise or eliminate inefficient processes

Mapping Applications & Workloads

- Analyze each workload f0r applicability to cloud
- Determine the security profile for each workload
- Decide what deployment model is best

Phase 3 – Mapping of Applications and Workloads

Users should map applications and workloads to associated cloud services. Each workload should be reviewed based on its applicability to cloud computing and its location environment. Next, a detailed review of the overall architecture of the workloads that make up an application is necessary. Finally, users need to determine the security profile of each workload – for example, can it reside off-premises and does it need to be encrypted? After users analyze the workload, decisions need to be made regarding what cloud computing deployment model is best for the organization's applications and workloads. Should the workload run in a public cloud, an on-premises private cloud, or both?

COMMON USES OF CLOUD COMPUTING TECHNOLOGY IN SMBs

Cloud-Based Tools Used by SMBs

Cloud-based services has also made possible a wide array of time-saving tools and applications for small businesses that make performing business tasks a lot easier for them. For example, tasks such as sending invoices, managing sales tax payments, marketing, and sales are faster and more efficient using cloud services. Top business applications currently offered in CCT are uses (Martinez, 2018; Aland, 2017; Bailey, 2017):

- Office tools
- Web/E-Commerce, email
- Financial and accounting (record keeping)
- Help desk and IT support and security
- Sales automation software
- Operations and HR services
- Project and product management
- Backup and recovery
- Collaboration and communication solutions
- Marketing and Customer Relationship Management (CRM)

Popular Cloud Tools and Services Available to SMBs

Past few years have seen a huge growth in low cost and free cloud based technology for social interaction, publishing, collaborating, editing, content creation, computing, etc. These platforms are cloud-based, simple, and could get SMBs started with minimum efforts. Companies like Microsoft (Microsoft Azure), Google (Google Cloud), and Amazon (Amazon Web Services) are providing cloud services for SMBs. Many SMBs are using Microsoft products including Office 365, office Web Apps and Business productivity online suite for more many years. Similarly, many SMBs are using Google Apps (email, calendar, and documents) for communication and collaboration. Amazon cloud is being used for creation of flexible IT infrastructure in these institutions.

The following section lists tools that provide reduced costs and increased efficiencies for SMBs. They might not be the best in their respective classes, but they are best suited for the small markets (Martinez, 2018; Aland, 2017; Bailey, 2017; Wood, 2017; Schenker, 2016; Evans, 2015; Nazar, 2013 ;).

1. **Managing General Business Projects** - Software-as-a-Service (SaaS) enables SMBs to access many services at a low cost. More specifically, SMBs are using the power of CCT for managing various activates including, accounting, payroll, Henman Resources, Customer Relationship Management (CRM), document management, help desk, and backup storage. Software accounting tools such as Intuit QuickBooks Online Plus and FreshBooks Provide inexpensive accounting package with a comprehensive set of features for SMBs. SuperPayrool and Intuit QuickBooks allow users create and manage employee payment records and payroll. Ascensio System OnlyOffice provides users with business document management, file sharing, online editing, project management, and calendar integration. NutShell CRM a Customer Relationship Management software specially designed for small businesses. The software automates sales processes, simplifies contact management, and provides reports and analytics. Finally, IDrive Provides 1 TB of online backup storage. The tool features an easy setup, unlimited access, continuous backup, disk image backup, folder syncing, and more.

2. **Collaborations and Communications** – According to a 2017 study by Salesforce, collaboration increased productivity within a business by more than 40 percent (Salesforce, 2017). Software services in this category make teamwork easy, more fun, and inexpensive. They are easy to set up and provide collaboration tools such as shared desktops, white boarding, and in-app private chat. One can easily create chat rooms for employees, create email templates that help send

emails quickly, and run and manage robust and easily-automated email campaigns. Teamwork software such as <u>Asana</u> makes teamwork easy and fun. Free version is available and supports up to 15 members. E-mail Marketing tools such as <u>MailChimp</u> and <u>Send Blaster</u> can be used for sending promotions, announcements of new features or services, and discounted coupons to customers. SMBs can take advantage of email analytics feature provided by these tools to evaluate the effectiveness of their online promotions. Video conferencing and online marketing software such as <u>ClickMeeting, Zoom, Go-to-Meeting</u>, and <u>Microsoft Teams</u> provide SMBs with inexpensive collaboration tools including shared desktops, white boarding and in-app private chat. <u>Skype</u> allows professionals to collaborate through screen sharing, file sharing, instant messages, and video/audio conferencing. <u>Slack</u> and RocketChat allow users create chat rooms with small groups, and conduct one-on-one private chats. Surveys and campaign monitoring software such as <u>SurveyGizmo</u> and GetFeedback offer tools for listening, publishing, and third-party integration. They Help SMBs build, style, test, share surveys, and examine the results. They also help solicit feedback from people who are using mobile devices.

3. **Social Media Marketing and Commerce Tools–** <u>Google Analytics</u> and <u>Sprout Social</u> are among the most popular social media analytics tools available for SMBs. They provide easy tracking and report for website traffic. SMBs can use these tools to sift and sort website visitors with dozens of dimensions. <u>AdWords</u> is Google's pay-per-click (PPC) advertising system and is one of the most measurable and flexible of online advertising. It is transparent, providing tons of metrics that allows any SMBs to track ROI for their online marketing strategy. <u>Shopify E-Commerce</u> is an online shopping cart that can be used for web-based storefront. The platform provides many templates and tools to make online business easier to oversee. It is easy to use and requires little technical expertise to set up. Finally, <u>Microsoft Power BI</u> is a free Business Intelligence tool that lets one drag, drop, customize, and analyze data, up to 1 GB. There is a monthly charge if you decide to increase your data tenfold.

SUMMARY AND CONCLUSION

Cloud provides the foundation for a cost-effective and successful IT transformation. Cloud computing emerges as a brand new and powerful computing model that ever more companies are willing to adopt in order to improve collaboration. Advantages such as increased IT infrastructure flexibility, computational power, the opportunity to use an existing infrastructure on a pay-per-use basis, better information visibility, and disaster recovery make cloud technology a viable choice for many companies. CCT provides extraordinary opportunities for firms, especially SMBs, to innovate and develop their electronic business. Moving forward with cloud computing, either in a private, dedicated or colo environment will bring SMBs many benefits that directly impact productivity and security.

As discussed in this paper, cloud-hosted servers are providing a significant savings for SMBs. By utilizing platform as a service (PaaS) and software as a service (SaaS) structures, SMBs can gain benefits and improve productivity and security. CCT enables IT infrastructure of SMBs to evolve quickly and allows companies to save time and focus on new opportunities. Small businesses now have the ability to access the same types of high quality enterprise IT services utilized by larger organizations at a cost and scale that is affordable for businesses of smaller size. Software companies are building tools that are specially designed for SMBs or can be configured to support more modest needs. As discussed in this paper, SMBs can use numerous SaaS-based applications and services available for managing business projects, accounting and finance, document storage and sharing, social media marketing, collaboration and communication, and CRM at affordable cost.

Building an information technology infrastructure can be complex and expensive for new businesses. Limited resources, lack of expertise, and time constraints often limit how much SMBs can accomplish. This paper used the three phases of cloud adoption strategy and proposed a conceptual framework for implementation of CCT in small businesses. Additionally, this study concluded that cloud computing introduces both challenges and new possibilities to many aspects of internet architecture, protocols,

services, and applications. This technology will affect many people in the organization and has a significant impact on IT investment and costs. CCT improves the delivery of traditional applications - reducing the cost structure of IT and allowing SMBs to focus resources on core business activities and innovation. Additionally, this paper used the three phases of cloud adoption strategy and proposed a conceptual framework for implementation of CCT in small businesses.

REFERENCES

Aland, M. (2017). Free small business software: 35 tools for simplifying your business. *FitSmallBusiness*. June 2. Online: https://fitsmallbusiness.com/free-small-business-software/

Attaran, M. (2007). Collaborative computing: a new management strategy for increasing productivity and building a better business. *Business Strategy Series*, 8(6), 387-393.

Bailey, D. (2017). 30 online small business tools to use in 2017. January 17. Online: https://blumint.co/30-online-small-business-tools-use-2017.

Bask, I. (2015). Why cloud technology is the smart move right from start up. *Entrepreneur*. April, 2. Online: https://www.entrepreneur.com/article/241914

Evans, M. K. (2015). 15 Essential software, apps and tools for small businesses. *Capital Solutions Bankcorp*. April, 28. Online: http://capitalsolutionsbancorp.com/15-essential-software-apps-and-tools-for-small-businesses/

Feltham, T. S., Feltham, G., & Barnett, J. J. (2005). The dependence of family businesses on a single decision-maker. *Journal of small business management*, 43(1), 1-15.

Folinas, D., Manijas, I., & Graham, D. (2013). *E-logistics and E-supply chain management*. IGI Global, ISBN: 9781466639140.

Gartner Report, (2017). Gartner says worldwide public cloud services market to grow 18 percent in 2017. February 2. Online: https://www.gartner.com/newsroom/id/3616417

Gonzalez, N., Miers, C., Redígolo, F., Carvalho, T., Simplicio, M., Näslundy, M., & Pourzandiy, M. (2012). A quantitative analysis of current security concerns and solutions for cloud computing. *Escola Politécnica at the University of São Paulo (EPUSP)*, São Paulo, Brazil.

Hackett, S. (2016). The transformative impact of the cloud. *451 Research*. Online: https://cdn.govexec.com/media/451_report.pdf

Hosseinian-Far, S., Ramachandran, M., & Slack, C.L. (2018). Emerging trends in cloud computing, big data, fog computing, IoT and smart living. January 18. Chapter from book Technology for Smart Futures (pp.29-40).

Information Technology & Systems. (2017) Cloud computing. Online: https://www.mbaskool.com/business-concepts/it-and-systems/7250-cloud-computing.html

International Data Corporation (IDC) (2018). Worldwide public cloud services spending forecast to reach $160 billion this year, according to IDC. January 18. Online: https://www.idc.com/getdoc.jsp?containerId=prUS43511618

King, S., Hicks, T., & Reeves, J. (2014). Small business success in the cloud, *Emergent Research and kingking Inc.* Online: file:///D:/Downloads/futureofsmbforslidesharev2-140807111046-phpapp02.pdf

Lavoie, A. (2015). 4 reasons small businesses should migrate to the cloud. *Entrepreneur*. May 5. Online: https://www.entrepreneur.com/article/245784

Lin, A. & Chen, N-C. (2012). Cloud computing as an innovation: perception, attitude, and adoption. *International Journal of Information Management, Retrieved* From: http://dx.doi.org/10.1016/j.ijinfomgt.2012.04.001

Marston, S., Li, Z., Bandyopadhyay, S., Zhang, J., & Ghalsasi, A. (2011). Cloud computing —the business perspective. Decision Support Systems, 51(1), 176-189.

Martinez, J. (2018). 20 Free tools your small business should be using today.
  PC Magazine. January 18. Online: https://www.pcmag.com/article/344148/10-free-tools-your-small-business-will-love

Matsumoto, R. (2012). SaaS does not necessarily equal cloud. Retrieved from:
  http://www.rickmatsumoto.com/saas-does-not-necessarily-equal-cloud/

Mazzarol, T. (2003). A model of small business HR growth management. *International Journal of Entrepreneurial Behavior & Research, 9*(1), 27-49.

Mell, P., & Grance, T. (2011). The NIST definition of cloud computing. *Special Publication 800-145.*
  Retrieved from: http://nvlpubs.nist.gov/nistpubs/Legacy/SP/nistspecialpublication800-145.pdf

Nazar, J. (2013). 30 terrific tools for small businesses. *Entrepreneurs*, May 28. Online:
  https://www.forbes.com/sites/jasonnazar/2013/05/28/30-terrific-tools-for-small-businesses/#6ed3fcf75b57

Pillai, M. (2011). Advantages of running your business on the cloud. June 20th. Online:
  http://runapptivo.apptivo.com/advantages-of-running-your-business-on-the-cloud-2738.html

Promokap. (2017). Cloud computing." *Promoting Capacity & Sustainability.* Online:
  http://www.promokap.com/enterprise-cloud.aspx

RightScale (2018). Cloud computing trends: 2018 state of the cloud survey.
  Retrieved from: https://www.rightscale.com/blog/cloud-industry-insights/cloud-computing-trends-2018-state-cloud-survey#96-percent

RightScale (2017). State of the cloud report (2017)." Retrieved from:
  https://www.rightscale.com/blog/cloud-industry-insights/cloud-computing-trends-2017-state-cloud-survey#cloud-workloads

Salesforce. (2017). 10 advantages of cloud computing for small businesses. July. Online:
  https://www.salesforce.com/au/blog/2017/06/10-advantages-of-cloud-computing-for-small-businesses.html

Schenker, M. (2016). 25+ best small business software tools and online apps
  December 2. Online: https://business.tutsplus.com/articles/best-small-business-software-tools-and-online-apps--cms-27784

Schramm, T., Nogueira, S., & Jones, D. (2011). Cloud computing and supply chain: a natural fit for the future. Retrieved from: http://www.aberdeen.com/aberdeen-library/7470/RA-software-service-cloud.aspx

Secure ITnet. (2017). All the SMB cloud computing statistics you need in one blog! Online:
  http://www.secure-itnet.com/2017/02/06/all-the-smb-cloud-computing-statistics-you-need-in-one-blog/

Shacklett, M. (2010). Is supply chain management emerging from the clouds? the short answer is 'yes,' and now's the time to take a more serious look. *World Trade*, 23(4), 34-37.

Smith, D. (2016). Cloud computing deployments should begin with service definition. *Gartner Report*,
  Retrieved from: https://www.gartner.com/doc/reprints?id=1-3G2H8FE&ct=160826&st=sb

Winkler, V. (2012). Cloud computing: virtual cloud security concerns. *Technet Magazine*, Microsoft.
  December. Online: https://technet.microsoft.com/en-us/library/hh641415.aspx.

Winkler, V. (2011). *Securing the cloud: cloud computer security techniques and tactics.* Waltham, MA USA: Elsevier. p. 59. ISBN 978-1-59749-592-9.

Wood, M. (2017). 50 free tools to help grow your small business. *Fundera Ledger*. November 8. Online:
  https://www.fundera.com/blog/50-free-tools-to-help-grow-your-small-business