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A CIRCULAR BUSINESS MODEL FOR CLOUD COMPUTING SERVICES PROVIDERS

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ABSTRACT

Aim/Purpose	The main objective of the current study is to develop a business model for service providers of cloud computing which is designed based on circular economy principles and can ensure the sustainable consumption.
Background	Even though the demand for cloud computing technology is increasing day by day in all over the world, the current the linear economy principles are incapable to ensure society development needs. To consider the benefit of the society and the vendors at the same time, the principles of circular economy can address this issue.
Methodology	An extensive literature review on consumption, sustainable consumption, circular economic, business model, and cloud computing were conducted. the proposed model of Osterwalder, Pigneur and Tucci (2005) is admitted designing the circular business model.
Contribution	The proposed model of the study is the contribution of this study where provides the guidelines for the cloud computing service providers to achieve both their economic profits and the society' needs.
Findings	Finding reveals that if the cloud computing service providers design their business model based on the “access” principle of circular economy, they can meet their economic profits and the society' needs at a same time.
Recommendations for Practitioners	It is recommended to the startup and the existing businesses to utilize the proposed model of this study to reach a sustainable development.
Recommendation	It proposes a new circular business model and its linkages with community

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for Researchers	building.
Impact on Society	The proposed model of the study provides guidelines to the cloud computing service providers to design a business model which is able not only to meet their economic profit, but also to meet the society's and customers' benefits.
Future Research	Future researches can build on this research model which proposed in this study to examine the limitations of this model by using empirical researches.
Keywords	Cloud computing, circular economy, circular business model, business model

INTRODUCTION

The scarcity of resources has turned the concept of sustainability to the central attention of economists (Kuhlman & Farrington, 2010). Circular Economy, indeed, cope with environmental concerns and promulgate sustainable development. The former linear economy models mainly consider the financial benefits of the activities and they mainly neglect the harmful effects of such commercial activities on the environment (Korhonen, Nuur, Feldmann, & Birkie, 2018). Consequently, circular economy models are emerged to meet the goals of both economic and environmental benefits at the same time (Andersen, 2007). The linear economy models were resulted from the industrial revolution in the 17th century. Immense innovations in knowledge and technology were developed to open a new chapter in the international economy and global trade where the environmental benefits and the long-term losses on the society were ignored. Prieto-Sandoval, Jaca, and Ormazabal (2017) argue that the circular economy is a paradigm shift which changes the quality of legislation, production and innovation in the society, while consider the societal and environmental needs (Cohen-Rosenthal, 2000; Hofstra and Huisingh, 2014). Therefore, generating a sustainable value proposition which can both send money to the business and is environment friendly, is the new challenge of the today's managers and entrepreneurs (Antikainen & Valkokari, 2016). The circular economy principles not only offer guidelines to having an environment friendly production line and having a sophisticated plan for managing the wastes in the end of lifecycle of the products, but also do contribute to economic growth (Van Weelden, Mugge, & Bakker, 2016). Although the policy makers and the governments such as china and the European Union have developed the policies for implementation of the circular economy, the businesses also accept the approach because circular economy provides them sustainable environmental and economic development simultaneously (Korhonen, et al., 2018). Additionally, the circular economy constitutes the principles of concepts such as Corporate Social Responsibility (Okoye, 2009; Choi and Majumdar, 2014) and sustainable development (Connelly, 2007). This approach is seeking to design dynamic mechanisms for achieving sustainable production and consumption. Circular economy applies approaches, such as the sharing economy, to develop sustainable consumption through sustainable production. (e.g, Naustdalslid, 2017; Tukker, 2015). The sustainable consumption refers to new approaches in consumption of products and services which have the minimal impact on the environment (Lorek, 2016).

Turning into a data driven business has become a most demanded trend for the 21th century business. Although the use of data in the businesses has provided lots of advantages and opportunities, it has encountered them challenges as well. One of these challenges is storing the data. Based on the former linier model, the businesses try to buy lots of spaces for data storage. They, normally, buy more space than what they need currently to ensure their possible future needs. Whilst, the approach does meet the society sustainability requirements. Because the linier approach does not consider the sustainable consumption principles. Bonciu (2014) considers circular economy as "a new frame of mind" and Reike, Vermeulen, and Witjes (2017) consider circular economy as a production and consumption model contributing to sustainable development. In addition, circular business models proposed in the literature for value creation and value capturing from reducing, reusing and recycling

(Sihvonen and Ritola, 2015), the reverse supply chain (Schenkel, Caniels, Krikke, & van der Laan, 2015). The current study seeks to design a business model utilizing circular economy principles to ensure both economic benefits and a sustainable consumption. Thence, the main objective of the study is to design a circular business model (a business model based on the circular economy principle) for cloud computing services providers which is able to simultaneously render economic benefits to the service providers and assure a sustainable consumption.

The composition of this article is as of the following; first, an extensive literature of cloud computing, business model, and circular model were precisely studied so as to capture a comprehensive picture of the problem and finding the possible solutions. And then the proposed model of the study is provided based on the reviewed literature.

RESEARCH BACKGROUND

CLOUD COMPUTING

Considering that the use of the internet is prevalent in the late of the last century, many turning points have emerged to facilitate accessibility and consumption of this fast connection and high-speed computing. The services delivering evolution of information technology started from the parallel computing concept toward distributed, then to grid computing and nowadays to cloud computing, which is as the last advancement (Jadeja & Modi, 2012). Generally, the concept of cloud computing refers to the use of shared software and applications by multiple users at the same time (Behrend, Wiebe, London, & Johnson, 2010). The symbol of cloud is adapted to show the worldwide accessibility of computing resources (Lin & Chen, 2012).

According to National Institute of Standards and Technology (NIST), the cloud computing model is enabled on demand and convenient network access to a common pool of configured computing resources including storage facilities, various servers, data networks, services and other applications), which can be provisioned rapidly with minimum interaction of service providers and management efforts. From the aforesaid definition given by NIST here are the main distinguished characteristics of the cloud computing technology: 1) wide network access, 2) self-service on demand, 3) Resource pooling, 4) Measured services, 5) Rapid elasticity (Mell & Grance, 2011). Mell and Grance (2011) argue that wide network access allows the users to reach the needed resources and services from any place at any time. They also explain that self-service on demand enables the users and the customers who are being served by the third-party services provider can ask for more services online without the need to have an interaction with the employees of the service providers and use pay and go method (Mell & Grance, 2011).

According to Hamdaqa and Tahvildari (2012), the feature of resource pooling allows the services provider can offer several resources dynamically to users in cloud computing environment, because the users don't need to know about the place of the computing resources and how it works then. Hamdaqa and Tahvildari (2012) demonstrate different aspects of cloud computing automatically have been reported, optimized, monitored and controlled at various abstract levels for both consumers' and vendors' resources by the characteristic of "measured services". Finally, the characteristic of rapid elasticity refers to concept of scalability. In cloud computing environment the users can ask and request more resources and services as they want at any time lie increasing the storage spaces and processing power etc. A clear example of this characteristic is provided by Amazon through of its most commonly used and popular services as EC2 (Elastic Compute Cloud) (Balduzzi, Zaddach, Balzarotti, Kirda, & Loureiro, 2012).

In the literature, three main levels for providing cloud computing services are provided: software as a service (SaaS), infrastructure as a service (IaaS), and platform as a service (PaaS). Where IaaS is the very basic level in cloud services. Here the customers get the need hardware services virtually, e.g. to get access storage and servers in the cloud. PaaS is the second level of cloud computing that provides access to platforms to allow the customers to develop their own applications (Gangwar, Date &

Ramaswamy, 2015; Giessmann & Stanoevska, 2012). Ultimately, SaaS is the highest level of the services when the user gets the software services from the service provider over the internet (Wu, Garg & Buyya, 2012; Seethamraju, 2015).

BUSINESS MODEL

The concept of business model, nowadays, has been considered as a competitive advantage source (Mitchell & Bruckner, 2004; Giesen, Berman, Bell, & Blitz, 2007) and according to Chesbrough (2007), innovation in business models provides this competitive advantage without enduring the expenditure on new technologies. The increase in attention to the importance of business model is not limited in practices, it is also counting as a hot topic in the literature of business and economy (Lambert & Montemari, 2017). The term of business model, for the first time, appeared in the article of Bellman, Clark, Malcolm, Craft, and Ricciardi (1957) and then this concept used in both the title and abstract of the article of Jones (1960) where he worked on a research entitled “educators, electrons, and business models: a problem in synthesis”. By emerging the dot com technology in the 1990s the use of this concept was prevalent in the literature of economics and business (Mosleh, Nosratabadi, & Bahrami, 2015). Nonetheless, there is not a single definition of business model (Fielt, 2013; Al-Debei & Avison, 2010; Morris, Schindehutte, & Allen, 2005; Shafer, Smith, & Linder, 2005; Zott, Amit, & Massa, 2011), and different authors provide different definitions (e.g. Ye, Wan & Chen, 2011; Iñiguez de Onzoño and Carmona, 2007; Rasmussen, 2007; Kandampully, 2006; Bouwman, Faber, & Van der Spek, 2005; Magretta, 2002; Chesbrough & Rosenbloom, 2002; Osterwalder & Pigneur, 2002; Amit & Zott, 2001; Timmers, 1998). Whilst a close look at all the definitions reveals that all of them strive to expose a comprehensive picture of value creation and value offering processes. The research on business model is so diverse.

In addition to the authors trying to define business model, there are scholars who have attempted to provide a conceptual framework or model to evaluate, design and innovate the business models (e.g. Li, Zhang, Li, & Ahokangas, 2018; Lambert & Montemari, 2017; Nosratabadi & Drejeris, 2016; D’Souza, Wortmann, Huitema, & Velthuisen, 2015; Weiner & Weisbecker, 2011; and Jupesta, Harayama, & Parayil, 2011). In another stream in the literature of business model research, the authors classify business models (e.g. Kandampully, 2006; Weill & Vitale, 2013; Osterwalder, Pigneur & Tucci, 2005). Some other scholars evaluate the business models of the existence businesses using the former frameworks (e.g. Mosleh & Nosratabadi, 2015; Jupesta et al., 2011). Business model innovation (BMI) is another stream on business model literature which has recently draw the attention of many scholars (e.g. Wirtz & Daiser, 2017; Verhoeven, & Johnson, 2017; França, Broman, Robèrt, Basile, & Trygg, 2017; Saxena, Deodhar, Ruohonen, 2017; Prendeville, O’Connor, Bocken, & Bakker, 2017; Serrat, 2017; Gassmann, Frankenberger, & Sauer, 2017; Foss & Saebi, 2017; Clauss, 2017; Breuer & Lüdeke-Freund, 2017). The current study utilizes the definition provided by Osterwalder et al. (2005) where he defines a business model as “*an abstract conceptual model that represents the business and money earning logic of a company*”. On the other hand, the business model framework provided by Osterwalder et al. (2005) is admitted in the current study to design a circular business model for cloud computing service providers. According to Osterwalder et al. (2005) a business model includes four main pillars and nine building blocks. The pillars and building blocks, and their definitions are exhibited in the Table 1.

Table 1. Nine Business Model Building Blocks

Pillar	Business Model Building Block	Description
Product	Value Proposition	Gives an overall view of a company's bundle of products and services.
Customer Interface	Target Customer	Describes the segments of customers a company wants to offer value to.
	Distribution Channel	Describes the various means of the company to get in touch with its customers.
	Relationship	Explains the kind of the links a company establishes between itself and its different customer segments.
Infrastructure Management	Value Configuration	Describes the arrangement of activities and resources.
	Core Competency	Outlines the competencies necessary to execute the company's business model.
	Partner Network	Portrays the network of cooperative agreements with other companies necessary to efficiently offer and commercialize value.
Financial Aspects	Cost Structure	Sums up the monetary consequences of the means employed in the business model.
	Revenue Model	Describes the way a company makes money through a variety of revenue flows.

Source: Osterwalder et al. (2005)

CIRCULAR ECONOMY

Circular economy is considered as a solution for the many environmental problems made by linear economic model in which "Take-Make-Waste" is an implication (Korhonen, et al., 2018). Instead, circular economy models make long the lifecycle and the value of the material, if possible, in order to preserve the resources (Antikainen & Valkokari, 2016). Circular economy generates a restorative and regenerative system (Charonis, 2012) in which cooperation and interaction among all the actors provide opportunities for both existing and new businesses (Antikainen & Valkokari, 2016). In this system, addition to forward supply chain, there is a reverse supply chain in which the recovered product re-enters into the forward chain (Wells & Seitz, 2005). Ghisellini, Cialani, and Ulgiati (2016) believe that circular economy is originated from general systems theory and industrial ecology where, according to general systems theory, organizations and their environments have a strong cause and effect relationship as interaction between them has made a system which is not understandable by studying each of them individually (Von Bertalanffy, 1968; László, 1972). In addition, Industrial ecology draws the attentions from open to closed cycles of resources to minimize the wasteful industrial processes (Andersen, 2007).

The main principles of circular economy are: reduction, reuse and recycle (Zhijun & Nailing, 2007; Su, Heshmati, Geng, Yu, 2013; Lett, 2014), access, and performance (Mathieu, 2001, Antikainen & Valkokari, 2016). Where the reduction refers to minimizing energy, raw materials and waste (Zhijun & Nailing, 2007; Su et al., 2013). Resource efficiency is the key in the reduction principle. Resource efficiency, at the same time, consider resource reduction and improvement of economic and social benefits (Ness, 2008). Whilst, the reuse principle points out the approaches have been resulted in reusing the products or parts of them in the same purpose they are created for (EU, 2008). This principle also implies using less resources, energy, and labor (Castellani, Sala, & Mirabella, 2015) which evokes the eco-efficiency term (Figge, Young, Barkemeyer, 2014). The recycle principle is associated with reprocessing operations in which new products have been produced from the wastes (EU, 2008). Recycling decreases the environmental impact through reducing the use of raw material and the waste concurrently by re-entering the wastes to the producing cycle (Birat, 2015). The access and performance are two circular economy principles which are resulted from servitization (Antikainen & Valkokari, 2016). Due to the significant potential service industry in using circular economy

models, these two principles of circular economy have emerged. According to the access principle, the end-users can access to the functionality of products, based on their requirements, without owning the product or the asset (Mathieu, 2001). Mathieu (2001) also argues that circular economy has changed the relationship between consumers and products/services. Concept of product as a service is one of the consequences of circular economy, in which the concept of ownership is fading as pay per use and pay for accessibility are substituted. Ultimately, performance is the last principle of circular economy. “Performance” refers to the result-based activities striving to provide the promised performance level of the product (Antikainen & Valkokari, 2016).

Circular economy is not only associated with one step of a product life cycle, but also it has remedies for all the cycle from production to consumption and end-of life (Gillespie, 2017). Production step, in lifecycle of a product, refers to processes producing a product. In this stage, the necessity actions to transform a linear production process to a circular one, are focused on reducing use of energy and raw material and they are also concentrated on the operations by which the product can be reused, and the waste are minimized (Gillespie, 2017). Therefore, to design such business model which is related to the production step of the product, the circular economy principles of reduction and reuse should be considered in the business model designing process. Circular economy also has principles during the consumption stage of a product. In other word, consumption is related to how a product is used. Gillespie (2017) believe that to design a circular business model for consumption of a product, the principles “access” and “performance” must be considered. Because in this stage of a product life style, it should be assured that the designed business model is able to offer a circular consumption (a consumption which is based on the circular economy principles rather than the liner approach). Circular economy, of course, has considered principles for stage of so called end-of life. End-of life stage of a product describes how a product will be managed at end-of-life. Gillespie (2017) explains the strategies of circular economy for this stage of a product lifecycle are reuse and recycle. It signifies that to design a circular business model for a product which is in this stage of lifecycle, either the operations by which the reuse of the product are supported, or the operations reprocess the waste to produce new products must be centered. Table 2 shows the circular economy principles related different lifecycle of a product.

Table 2. A product’s lifecycle with the associated circular economy principles

	Production	Consumption	End-of life
Reduction	*		
Reuse	*		*
Access		*	
Performance		*	
Recycle			*

Source: own construction

CIRCULAR BUSINESS MODEL

The concept of circular economy is tied to the concept of business model. The reason behind is to transfer from the linear economy and to affect the principles of circular economy generating new business models is the only solution (Boons, Montalvo, Quist, & Wagner, 2013). Designing such business model, which enables the businesses to shift from a linear thinking to the circular one, is the challenge of decision makers nowadays (Gillespie, 2017). It is not going to be a normal business model innovation in which the designers are looking for economic profits through finding a new value proposition or a new revenue model. Considering the other stockholders’ benefits is a must in switching from a linear economy to a circular economy. Mentink (2014), likewise, argues that to design a circular business model the paradigms of circular economy must be considered (e.g. longevity,

renewability, reuse, repair, upgrade, refurbishment, capacity sharing, and dematerialization). In other words, a circular business model should be able to clearly explain the processes of value creation, delivering, and capturing within closed material loops (Mentink, 2014). Collaboration is one of the concepts which has also implied in the circular business model - collaboration, communication, and coordination with the actors/stakeholders within the material loops (Antikainen & Valkokari, 2016). The position of the product in its lifecycle (i.e. production, consumption, and end-of life) determines the principles should be considered in designing a circular business model. In addition, the object of the study is to design a circular business model for cloud computing service providers. Since the service providers does not produce the service and this service is not in its end-of life stage, the best circular economy principle should be considered in designing a circular business model is the “access” principle. Because its goal is to design a business model ensuring the use of the service is sustainable (Bocken, Bom, & Lemstra, 2017).

As it is mentioned in business model section, to design a circular business model, the business model framework proposed by Osterwalder et al. (2005) is used. Hence, the “access business model” (a circular business model which is designed based on the access principle of circular economy) will be analyzed based on the building blocks of this business model. According to Gillespie (2017) the value propositions of an access business model are convenience of on-demand availability, flexibility and greater range of choices, lower cost (turns fixed to variable costs). And the model includes pay-as-you-go, rental, and leasing. Gillespie (2017) argues this model unlocks new segments of customers and the relationship between the service providers and the customers will be a direct and long-time relationship through the technology platforms such as mobile and/or web applications. The key activities required for such business model are service provision activities such as asset management, customer service, etc. and reverse logistic to return the products at end of use cycle (Gillespie, 2017). Technology providers normally are the key partner of these businesses and they impose the main cost of this business model because they provide the asset management platforms. Of course, maintaining and insuring the asset are other important costs of an access business model (Gillespie, 2017). Gillespie (2017) also explains that the revenue model of an access business model is that of a service, potentially with add-on consumables.

CIRCULAR BUSINESS MODEL AND COMMUNITY DEVELOPMENT

Sustainable development and a harmonious society are of expected results of circular business model (Zhiyun & Nailong, 2007; Ness, 2008; Mathews & Tan, 2011; Europesworld, 2014; Lett, 2014; Naustdalslid, 2014). To develop a sustainable model the interests of a wide range of stakeholders such as environment and society should be considered (Bocken, Short, Rana, & Evans, 2014). Sustainability brings a competitive advantage to the organizations (Lüdeke-Freund, 2009). Centering the customer value is an approach can be led to the sustainable development of the company and the society at the same time (Lüdeke-Freund, 2010). A circular business model is a sustainable business model which coverages sharing knowledge, multiple value creation (Jonker, 2012). On the other hand, Bocken et al. (2014) believe that the following archetypes speed up sustainability of a circular business model: 1) maximizing the efficiency of material and energy, 2) value creation from the wastes, 3) replacing with renewables and natural processes, 4) delivering functionality rather than ownership, 5) adopting a stewardship role, 6) encouraging sufficiency, 7) re-purposing the business for society/environment, and 8) developing scaleup solutions. Of course, concurrent development of all aspects of sustainability is impossible and it makes difficulties in designing and prioritizing sustainable goals and it may also create a conflict of interest in designing the sustainable processes (Rudnicka, 2016). Rudnicka (2016) also suggests that to avoid the complexity and conflict of interest the businesses develop only one aspect of sustainability. On the other hand, cloud computing provides benefits to the public societies in which it is implemented, since it is based on sharing values and reducing the cost generally. also cloud computing can be considered as an opportunity for green computing which consequently reduces the carbon emission and energy consumption which is important for the users of cloud application (Miettinen & Nurminen, 2010). Cloud computing has ben-

effitted from the advanced technologies such as virtualization and sleep scheduling to reduce energy consumption, a study by Baliga, Ayre, Hinton, and Tucker (2011) showed that generally cloud computing consume less energy than the conventional computing technology. With the advancement in information technology and the networks over the last decades there is a trend to consider the computing to be delivered as a utility in addition to the traditional utilities (water, gas, electricity and telephony) and the computing utility will meet the daily needs of the communities (Buyya, Yeo, Venugopal, Broberg, & Brandic, 2009). In addition, a study by Gerard & Marinos (2009) suggested that where the cloud computing being based on the digital ecosystem, it can be used as a socio – technical conceptualization to achieve the sustainable distributed computing by using the networked personal computers and make a virtual data center to finally build a collective community cloud.

THE PROPOSED MODEL OF THE STUDY

A CIRCULAR BUSINESS MODEL FOR CLOUD COMPUTING SERVICE PROVIDERS

Cloud computing is considered as an important element of the fourth industrial revolution. It is expected the use of this concept become more popular in all over the world at the upcoming years. As it is discussed above, to ensure a sustainable consumption, Gillespie (2017) recommends using access business model. And an access business model is defined as a business model which is designed based on the circular economy principles and is able to ensure the sustainable consumption. Accordingly, the current study utilizes the access business model principles to develop a circular business model for cloud computing service providers (see Figure 1).

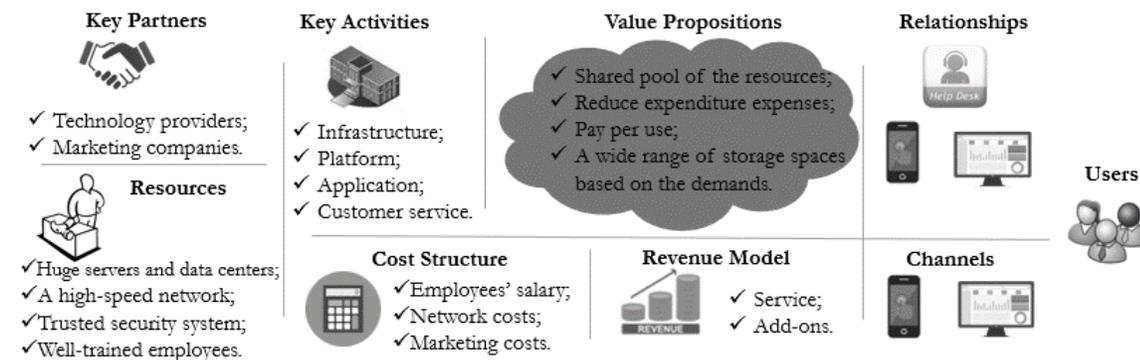


Figure 1. Cloud computing service provider's business model based on the circular economy principles

Source: own construction

According to the access business model principles mentioned in the circular business model section, the value propositions of a cloud computing service provider based on the principles of circular economy are shared pool of the resources, reduce expenditure expenses, pay per use and a wide range of storage spaces based on the demands need. Since the access business model opens new segments of customers and provide a direct and long-time relationship between the service providers and the users (Gillespie, 2017), new small and medium firm, large corporations and public organizations, who have not already owned lots of storage spaces for data, constitute the customer segments of cloud computing service providers using access model. On the other hand, both Mobile and web application of the service providers, as well as their help desk service, connect them with the users. Of course, the services are delivered via these channels too. The next building block of the business model is “key activities”. The key activities are required to run an access business model, according to

Gillespie (2017), are asset management, customer service, and reverse logistic. Thus, the cloud computing service providers should firstly manage three services levels: 1) infrastructure service level, 2) platform services level, and 3) application service level. In addition, a sophisticated customer service is needed for the success of this business model. According to Gillespie (2017) technology providers are the key partner. Due to the fact that the most important factor in success of cloud computing service provider is a high speed and reliable network connection, technology providers are the main partners of this business. Besides, the marketing companies can be the second partner of the service providers, because using a very recent technology is needed intensive sophisticated marketing activities. And subsequently, huge servers and data centers, a high-speed network, trusted security system, and well-trained employees are key resources required for having a circular business model. Financial aspect is the last pillar of a business model. To analyse this business model pillar, cost structure and revenue model should be discussed (Osterwalder et al., 2005). Employees' salary, network costs and marketing costs are the main costs cloud computing service providers have been confronted with. And finally, the revenue model is that of a service, potentially with add-on consumables (Gillespie, 2017).

THE CASE OF AMAZON CLOUD SERVICES

Amazon is a market leader and one of the most famous cloud computing service providers. A study by (Khajeh-Hosseini, Greenwood & Sommerville, 2010) showed that the companies in the oil and gas industry that has migrated of an IT system to Amazon cloud services could reduce the cost of the system infrastructure by 37%, and using amazon cloud services reduced the support calls for system by 21% (Amazon Web Services, Inc., 2018)

In 2009, Amazon launched spot instances which allow selling the spare capacity of their data centers and they offer a dynamic pricing model which is based on bids by users and the price is not fixed, it is changed dynamically as the supply and demand changed. Amazon web of services (AWS) is the name of cloud computing application provided by amazon. they mentioned that the running of the application in the cloud will benefit the environment. In addition, Amazon has set a target to run their cloud services and data centers by 100% renewable energy and they could exceed their goal of 40% usage of renewable energy in 2016 (Amazon Web Services, Inc., 2018). Amazon is committed to circular economy principles as they believe that large scale cloud services providers can increase the utilization of the servers and other IT infrastructure by 50% comparing with traditional in-house computing. Besides, the traditional computing is 29% less efficiency in using the electricity comparing with large-scale cloud computing. Thus, by adopting cloud computing and amazon web services and through the less energy consumption and less carbon-intense power mix the total carbon emission can be reduced by 88% (Amazon Web Services, Inc., 2018).

CONCLUSION

The cloud computing technology, as one of the most demanded service, is remarkably increasing all around the world. Nonetheless, the current models of service providers are only able to satisfy the economic goals. Whilst considering the society benefits, rather than economic benefits is one of the strategies of the todays' organizations for the society development. Since, the linear economy principles are incapable of meeting the sustainability requirements, the circular economy principles are provided to presents alternatives, which are able to meet both economic benefits and environmental benefits at the same time (Ness, 2008). Sustainable consumption is a concept is the circular economy principles ensuring the society needs are met. Therefore, sustainable consumption of cloud computing services thrilled the current study to develop a business model which is designed based on circular economy principles for cloud computing service providers enabling the users to have a sustainable consumption.

Finding reveals that an "access business model" is the remedy. An access business model is a business model designed based on circular economy, which is able to ensure a sustainable consumption

and meet the economic benefits simultaneously. It is worth mentioning that to design such business model, the proposed model of Osterwalder et al. (2005) is adopted in this study. According to this model, a business model comprises nine building blocks of value proposition, customers segments, customer relationship, distribution channel, key activities, key resources, partners network, cost structure, and revenue model. According to the literature, the value proposition of the circular business model of the service providers of cloud computing includes shared pool of the resources, reduce expenditure expenses, pay per use and a wide range of storage spaces based on the demands need. The customers segments of this business model will be the businesses are using cloud computing service which don't own this service. Both Mobile and web application of the service providers, as well as their help desk service, can connect the service providers with the users. Service delivering also takes place via these channels. The key activities are required to run an access business model are asset management, customer service, and reverse logistic. The technology providers and the marketing companies are the main partners of this business. The huge servers and data centers, a high-speed network, trusted security system, and well-trained employees are key resources required for having a circular business model. Employee salaries, network costs and marketing costs are the main costs cloud computing service providers have been confronted with. And finally, the revenue model is that of a service, potentially with add-on consumables. The proposed model of the current study, can be a base for any start-up who want to invest in this technology or current businesses which are interested to turn to this kind of technology along with circularity concepts of the economy and shared resources. Future researches can build on this research model which proposed in this study to examine the limitations of this model by using empirical researches.

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