A Model for Youth Empowerment Using Cloud Computing Technology

[1]✉**Akinwunmi, A. O.,**   [2]**Akinboro, S. A. and** [3]**Owoeye, M. O.**

[1]*Bowen University, Iwo, Nigeria*   [2]*Adeleke University, Ede, Nigeria*   [3]*Bowen University, Iwo, Nigeria*
akinwale.akinwunmi@bowen.edu.ng   akinboro2002@yahoo.com   olumide.owoeye@bowen.edu.ng

Abstract

Cloud computing has a lot of opportunities to offer for youth empowerment and can provide a means of living for youths. This study considered the prospects of using cloud computing as a tool for youth empowerment. The social action model and economic empowerment were adopted for the formulation of the conceptual model. The study highlighted some of the opportunities provided by the cloud for empowerment and also presented cloud-based empowerment ideas. A proof of the conceptual model validation by the survey indicated that 92% of the respondents agreed that the cloud-based services give them the opportunities to learn new ideas, explore them, create other new ideas and collaborate with your peers on these ideas while 8% disagreed. Further statistical analysis of the model data from the survey showed that the R-squared value of 1 was realized for a polynomial regression of empowerment determinant as a function of user experience of cloud-based services, this validated the fact that the model can aid youth empowerment. In conclusion, cloud computing can effectively aid the youths to learn, explore, create and collaborate on new skills that can be beneficial to them in various ramifications thereby engaging them for a useful and productive lifestyle that can make the society a better place.

Keywords: Cloud computing, Youth empowerment, Collaboration, Automaton

1.   Introduction

The rate of youth unemployment is disturbing and many of the adolescents have taken to various social indecencies in an attempt to outlive. A typical resultant effect in recent times is the allurement of youth by insurgent groups and criminal minded association via financial aids with the ulterior motive of using them to perpetuate their dastardly acts. Technology such as cloud computing can be harnessed to solve the problem of unemployment by empowering them using the opportunities provided by the technology.

Cloud computing provides a new computing model that allows resources like computing power, storage, and online applications to be shared as 'services' over the internet [1]. It is a technology that majors on sharing data and computations capabilities over a scalable collection of nodes. Typical illustrations of such nodes include computer workstations, data

centres, and cloud services. A collection of such nodes is termed a cloud [2]. It is a type of distributed computing system with the ultimate aim of providing services as a pay as you go platform. Market investigators and innovation merchants alike tend to characterize cloud computing, as a modern sort of utility computing that employs virtual servers that have been made accessible to third parties utilizing the Web. A more tempered look at cloud computing considers it as the conveyance of computational assets from an area other than the one from which one is computing [3].

Cloud computing provides on-demand access to a shared pool of configurable computing assets (e.g., systems, servers, capacity, applications, and administrations) that can be quickly provisioned and discharged with negligible administration exertion or provider's interaction [4]. Cloud computing is key in the next-generation of computing [5]. This computing model is closely related to the past, well-known distributed computing activities like web services and grid computing. It depends on sharing computing assets in place of having neighbourhood servers or individual

gadgets to handle applications. Cloud computing came on top as the next-generation platform with capacity for hosting business and scientific applications [6, 7 and 8]. It provides at the basic model level infrastructure, platform, and software as services that are made available as on-demand and subscription-based services in a pay-as-you-go manner to users and other service offerings have evolved from this basic model.

Youths are highly dynamic and mobile; they are always willing to explore new technologies and be able to derive maximum benefits from such exploration. Cloud computing is quickly becoming the order of the day. The usage of cloud computing technology has become part of everyday living in recent times. When one is updating one's Facebook status, one is on the cloud. When checking one's bank balance on the phone, one is on the cloud again [9]. This computing platform can effectively be harnessed to engage and empower the teeming youths and bring a positive transformation to their lives, families, communities, society, and the entire nation.

Youths can achieve greater skill agility and meaningful collaboration among their interest groups for productive purposes. Cloud computing is also changing how people consume technology. People nowadays are becoming more empowered than ever before to find and use cloud applications, often with limited or no Information Technology (IT) skills. The youths are the driving force of any nation but nowadays a lot of youths are without any job and those who have jobs are not at their best. Hence this work aims at empowering the youths using the divers' opportunities provided by the cloud computing paradigm.

Section two reviewed relevant works and section three focused on the methodology for the work in which the model was conceptualized. Section four discussed the proof of conceptual model and results while section five stipulates the conclusion.

2. Related Works

The related works for this study revolve around cloud computing, youth empowerment, and empowerment theory.

2.1 Cloud Computing

Cloud computing is a form of computing that leveraged on the internet infrastructure. In the past, people do run applications or programs locally using software downloaded on their physical computer or server but now cloud computing makes it possible for them to gain access to the same kinds of applications via the internet and carry out their tasks.

According to the World Economic Forum [10], the technology can be more beneficial to establishments, industries, and even the whole economies by speeding up the way companies bring out new products and services. This will enable the development of products and permit professionals around the globe to collaborate more effectively and be exposed to more powerful and cost-saving computer resources. It can also increase the strength of organizations to mine their data for trending information, such as customers' bases changing needs and contenders' moves in the marketplace. It has the potential to provide a level playing ground between big and small establishments, by giving companies of all sizes the same opportunity to information and communication technology (ICT) tools that were previously affordable by the largest companies.

Ultimately, it helps upcoming economies to leapfrog to upper levels of technological development by providing more instant and cost-effective access to new-generation applications, tools, and infrastructure [10]. The five essential characteristics of the technology namely: rapid elasticity, measured service, on-demand self-service, ubiquitous network access, and resource pooling [10] made cloud computing an effective tool that can be harnessed for youth engagement and effectual empowerment.

2.2 Youth empowerment

Youth empowerment according to Kar *et. al.,* [11], is a process whereby youngsters are motivated to take control of their lives. This can be done by addressing their circumstances and taking further action to better their access to resources and change their consciousness through their beliefs, values, and attitudes. Youth empowerment targets to better the quality of their lives. There are many models that youth empowerment programmes use that assist the youths to achieve the desired

empowerment [12, 13 and 14]. Quite a several youngsters' empowerment initiatives are underway across the world. Youth empowerment can only be achieved through involvement and participation in youth empowerment programmes. Many non-profit organizations, government organizations, schools, or private organizations provide youth empowerment programmes [14, 15]. The youth empowerment is different from youth development. Youth development is about developing particular individuals, but empowerment involves bringing about high-level community change which is dependent on the progression of individual capacity [13].

Youth empowerment entails six interrelated aspects namely psychological, community, organizational, economic, social, and cultural [11, 15 and 16]. Psychological empowerment complements an individual's alertness, perception in self-assurance, awareness, and information about challenges and answers and how people can handle challenges that affect their quality of life [11, 15]. This aspect targets to generate self-confidence and accord youth the skills to acquire knowledge [15, 16]. Community empowerment targets improving the community through leadership skill development, enhancing communication, and providing a collection of support systems to rally the community to address their challenges [11, 15].

Organizational empowerment attempts to generate a collection of resources for a community, among which are voluntary organizations, unions, and associations with the purpose to protect, promote and speak for the less powerful [11, 15].Economic empowerment is about teaching entrepreneurial skills, how to master one's assets, and how to ensure steady income [15, 16]. Social empowerment exposes youth to social inclusion and literacy along with aiding young people to get the needed resources to take charge within their communities [15, 16]. The purpose of cultural empowerment is to reproduce cultural practices and re-express rules of culture and norms for young people [15, 16]. Empowering young people using planned programmes can explore these different dimensions of empowerment for effective and result oriented engagement.

2.3 Empowerment Theory
Empowerment theory is all about techniques that allow participation; shared decision making to improve control, and provide opportunities to learn, practice, and upscale skills [15, 17 and 18]. Empowerment theory premise that through the engagement of young people in social activities, purposeful, and community-benefiting activities that the youth define and control, which help them to acquire vital skills, responsibilities, and self-confidence which are required to become more productive and wholesome adults [19, 15]. Hence, the application of empowerment theory in this research is required to realizing the aim of the work.

2.4 Social Action Theory
Social action theory typically focuses on hobbies, interests, and youngsters' abilities. It assists them in developing some level of social awareness and a sense of belonging which enhanced their social interactions within their community [20]. This theory explains how people determine and negotiate between youth individual likes and societal pressure which mostly determine and provide direction for their actions [20]. Furthermore, it comprehends the relationship between the structure and the individual responsible for that behaviour and action. The application of social action theory is required to understand youth strategies and how youth react legitimately to the socio-political structure that oppressed or alienate them [20].

3. Methodology

Applied research was used in this study which typically addresses the practical challenges of the modern society which goes beyond acquiring knowledge for the sake of it but to improve the condition of the youth populace. This approach makes it possible to focus on the analysis and providing solutions to social and real-life problems and in this case youth unemployment.

3.1 Conceptual Model
The social action model which is a theory based on the practice of social work and economic empowerment dimension was adopted in formulating the conceptual model for youth empowerment using the cloud. The social action model is instrumental in socio-political

empowerment for working with disadvantaged groups, oppressed communities, and deprived organizations [21, 22 and 23]. It attempts to reassign socio-political power so that deprived citizens can explore the possibilities and resources available at the society and in response provide significant ways to make a contribution to society as a valued member of the society. The model aids social workers on how to act by using a practical empowerment-based approach, partnership and collaboration, alliances, and improvement and motion proposals [23].

As earlier stated, economic empowerment is about teaching entrepreneurial skills, how to master one's assets, and how to ensure steady income *e*conomic. Looking at our nation, a lot of our youths are oppressed due to the unavailability of jobs and some other economic challenges. Hence a conceptual model shown in Figure 1 is derived premised on the social action model guidelines and economic empowerment to empower the youths using opportunities provided by cloud computing.

The conceptual model formulated is a 4-tuple ordered list comprising four elements namely:
  i.   Learn

  ii.   Explore
  iii.   Create
  iv.   Collaborate

The model is defined below in equation (1):
$M= f(L,E,C_1,C_2)$ --------------------------- (1)

The model is a 4-tuple, an ordered list of elements, with four elements
  a. Where L= set of learning activities
  b. E= set of exploring activities
  c. C_1= set of creative activities
  d. C_2= set of collaborative activities, start symbol, or accepting state.

The conceptual model was modelled as an automaton. Automata-based formalisms are used as models for various kinds of systems such as concurrent and distributed systems, real-time systems, embedded software systems, etc. [24]. Cloud computing is a form of the distributed system hence the conceptual model for youth empowerment is modelled as an automaton which has the following components:
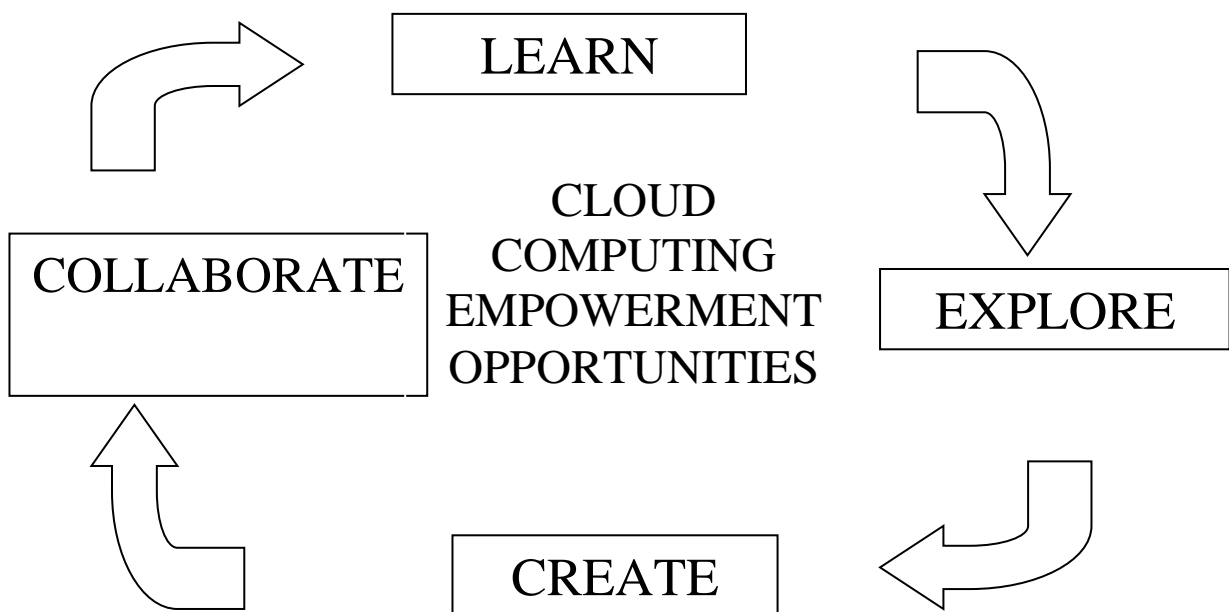 i.   A={a_{C1}, a_L, a_E a_{C2}), the input symbols

Figure 1: Conceptual model for cloud-based youth empowerment (LECC)

ii. S= { s_0, s_1, s_2,s_3}, {L,E, C_1,C_2}, internal states
iii. Y={C_2},"yes"or"Start" or "Accepting" state
iv. C_2, initial state

Next-state function F: $SXA \rightarrow S$

The diagram in Figure 2 shows the automaton for the model. Table 1 showed the next state function for the model. From the automaton in Figure 2, youths can participate in collaborative activities which will make them learn about new ideas. The learning activities carried out lead to exploring activities and the resultant effect of this is that youths will be engaged in creative activities. As a result of creative activities, youths will further collaborate among themselves and the cycle will continue. When the cycle is sustained the youths will be fully engaged and be more productive. The model showed that youths can collaborate and learn about cloud computing opportunities for empowerment, explore cloud computing opportunities for empowerment, create opportunities on the cloud for empowerment and collaborate among themselves on cloud opportunities for empowerment thereby contributing meaningfully to society as valued human beings.

Activities such as application development, blockchain-based transaction, starting a business, acquiring a skill, business proposal writing, preparing for job interview, data analytics, website development and so many other activities are some of the activities that youth can collaborate and learn about on the cloud. They can create ideas on them and further collaborate with their peers using the cloud. Bringing the real life perspective into the model for example, youths with flair for ICT (Information and Communication technology) can collaborate and learn about hosting platforms/activities or Github platform available on the cloud, then explore the various hosting services or Github resources for proper understanding of the capabilities that they have, this will lead to creating ideas about how to provide hosting service as a business or software development. They can further collaborate with their peers effectively on these ideas using the cloud services with a view to actualize them thereby getting engaged and become more productive. This will motivate them for further learning to become master of the ideas.

Harnessing the numerous opportunities offered by cloud computing and using economic empowerment strategy, youths can learn, explore, create and collaborate on various entrepreneurial skills that cloud computing offers and take ownership of these skills for income generation.
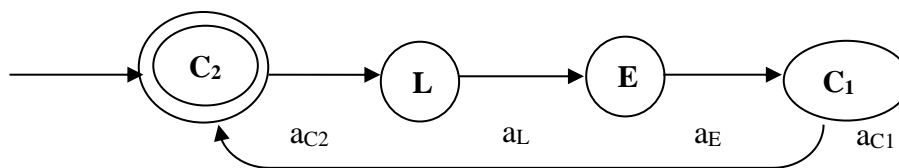

Figure 2: Model automaton

Table 1: Next state function

F	a_{C1}	a_L	a_E	a_{C2}
C_1	C_2	C_1	C_1	C_1
L	L	E	L	L
E	E	E	C_1	E
C_2	C_2	C_2	C_2	L

3.2 Cloud Computing Opportunities for aiding empowerment

According to Ajaero [25] and Onlinemba [26], like most innovations that offer enormous solutions for businesses and individuals, cloud computing has made available great potentials for entrepreneurs with a flair for computers and ICT generally. An appropriate interest in ICT and a good knowledge of cloud computing can make youth to be empowered to start life-changing ventures. To empower the youth via cloud computing the following are some of the opportunities that are readily available for motivating the youths for empowerment and engagement:

i. Start-up capital-expenditure is free
Cloud computing can effectively cut out the dear cost of acquiring hardware and other associated IT tools. It is possible to go by a pay as you go mode and enjoy a subscription-based model which is supportive of business cash flow. Furthermore, the environment for setting-up and efficient management is friendly. Taking the first step to adopting cloud solutions has not been an easy task. Youths can avail themselves of this golden opportunity provided by the cloud computing to start worthwhile endeavours using IT tools for creating online businesses with different streams of income and be engaged in creating products and services that vast communities of internet users can subscribe to hence becoming fully empowered.

ii. Scalability
Cloud computing supports the youths in scaling up or down their operations' needs quickly to adjust to the prevailing condition, allowing flexibility as the need changes. Instead of procuring and installing costly IT tools, the cloud service providers offer a solution to this need. With the cloud-based solutions, it is possible for the youth to fully focus on running the core of the business.

iii. Increased collaboration
In a cloud environment, collaboration permits youths to communicate and share ideas effectively than in traditional settings. When working on a project from separate locations, they employ cloud facilities to avail the team members access to the same set of files. There are cloud solutions that support the sharing of their contents within the team. Team members can access, edit, and share documents ubiquitously with a high level of efficiency.

Many applications in the cloud provide workflow and document sharing capabilities making it possible to have updates in real-time and support transparent visibility while collaborating.

iv. Work ubiquitously
Cloud computing can allow youths to be more flexible in their work schedules. For instance, they can access their data from anywhere and anytime and can work remotely provided there is a connection to the Internet. Some provisions support offline access to data while working at the outstation, by connecting to the virtual office seamlessly. Typically, several cloud-based mobile applications work effectively irrespective of mobile devices available. All these make it possible to access data and applications for working efficiently. Youths are dynamic and mobile always on the move, this mode of operation will lead to good engagement and a productive lifestyle allowing them to live a balanced life.

v. Competitiveness
Cloud offers youth the opportunity to compete favourably in their endeavour and make a notable impact. Migrating to the cloud scaled up them to explore an enterprise-class of technology. This will avail upcoming enterprises to act quickly than large, established contenders. With the pay-as-you-go model of service provisions supported by cloud-based business applications, smaller businesses can compete favourably with the larger ones and upset the market environment for the tremendous benefits of customers.

3.3 Some Cloud-Based Youth Empowerment Ideas

The following are some but not limited to cloud-based ideas for youth empowerment:

i. Web hosting service
Youths can learn how to assist business enterprises and individuals host their web content securely thereby setting their own web hosting company and application of cloud computing. They can become web hosting reseller agents also.

ii. Online blogging

Cloud computing is a new computing model and most people are just getting to understand its workings, youths can leverage on this to generate income through setting up a blogging outfit that focuses on the discussion of different trending topics from different professions.

iii. File hosting service

Youth with additional IT skills can generate income from putting up resources to help interested individuals in keeping their vital documents and files within the cloud environment. Setting up a cloud storage solution like Dropbox, Box, Next cloud, iCloud, Google Drive, OneDrive, SugarSync, and Evernote for people to hold their files and charge them for services rendered.

iv. Cloud Computing Technologist

Youths with IT knowledge can liaise between cloud solutions providers and companies that need the solutions. Working as a cloud-computing technologist, they could guide the company's technical team on how to deploy such cloud-based solutions with the focus of providing user-friendly solutions for the company's potential customers.

v. Cloud Computing Consultancy

Many individuals and business owners are getting to know the potentials of cloud computing as against the traditional standalone solutions. Youths can leverage this to create value for money by consulting for individuals and business owners on cloud solutions.

vi. Apps Development

With the abundance of tools available on the cloud, youths can be empowered to becoming apps developers, and with the ready-made market available on the internet, youths can easily turn their ideas into multi-million-dollar income streams.

vii. Digital/Internet Marketer

Cloud provided applications that can support Internet-based marketing which is a trending form of online marketing and advertising that uses the Internet superhighway for delivering to potential consumers promotional messages about products and services. Youth with bright business ideas can harness the opportunity to become Internet marketers of legitimate products and services. They can make use of email, search engine, and social media platforms for marketing. Youths can even become product brand ambassadors and make a living out of it.

viii. Freelance Reporter

Social media platforms have a feature for online video streaming hence youths with interest in videography can be engaged effectively and generate income from the video coverage activities. Youths with interest in journalism can further pursue adequate training in communication studies.

ix. Cloud-Based Photography Service

Cloud computing also supports dynamic photography that opens up diverse opportunities. Youth with interest in photography can use cloud-based software to edit, organise, store, and share photos that can be useful for legitimate purposes at a fee.

x. Cloud-Based Physician Admin Software

The healthcare industry has a lot to benefit from cloud computing technologies. Doctors need to record their clinical findings and recommended treatment accurately because these are critical to patient's management. In the modern setting, IT solutions can aid them to accomplish this efficiently reducing substantially the use of paper. Youth with requisite skills can take up the challenge and provide a cloud-based solution for accomplishing this. This effort will help health personnel in the timely access and retrieval of patients' records for effective case management.

x. Tour Guide

A cloud-based tour guide of the virtual tour of the tourist centres can be highly beneficial to tourists who may not be familiar with the terrain of the centres. This will give adequate graphic information to the centre to prepare an intending tourist for the tour. With the advent of the cloud-based navigation system, youths with interest in tourism can use virtual tours to serve as a guide for tourist.

4. Results and Discussion

To validate the conceptual model, an online cloud-based survey manager; Google form was used as the research instrument to carryout questionnaire-based survey among the youth populace with a focus on their level of awareness about cloud computing with its offerings and how they have benefited from the use of the various

cloud-based services. The respondents were people with divers' discipline backgrounds ranging from social, arts, science, law, and technology. The respondents were undergraduates' students and graduates. An offline questionnaire was also used to complement the Google form administered. The demographic coverages are Africa, Europe, and the USA. From the combined online Google forms and the offline questionnaire, there were 217 respondents.

4.1 Results

There were 217 respondents and the age range was classified as 15 – 25 (71%), 26-35 (21%), and 36 and above (8%) (See figure 3). The gender of the respondents was as follows: male respondents form 67% and female respondents were 33% of the 217 respondents (See figure 4). The analysis of their responses on the survey questions are discussed in section 4.2

Age Range of Respondents
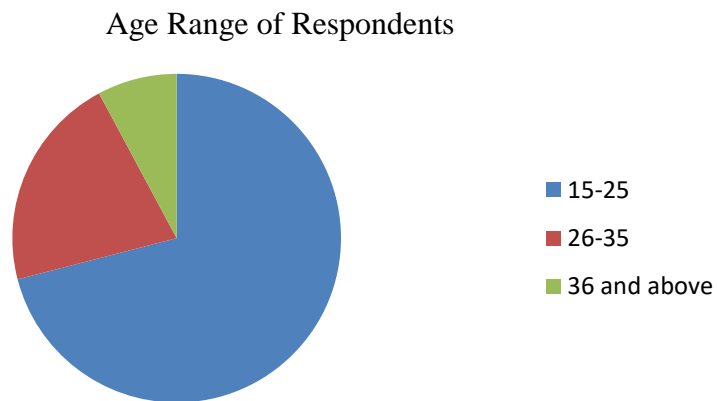
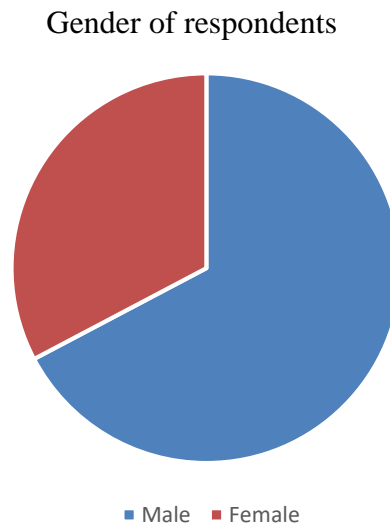Figure 3: Age range of respondents

Gender of respondents

Figure 4: Gender of respondents

4.2 Discussion

Considering the level of awareness about cloud computing among the respondents, 92% of the respondent have heard about cloud computing before, while 8% have not heard about it. When it comes to testing the users' experience of the cloud computing services compared with the traditional offline services 47% adjudged it to be Good, 40% adjudged it to be better, 11% adjudged to the best, 2% adjudged to be poor, 0% adjudged to be worse and 0% also adjudged to be worst (See Figure 5).

In terms of preference for the cloud-based services to traditional offline services; 67%

responders prefer it, 9% did not prefer it and 24 % were not sure of their preference (see Figure 6).

Furthermore, 92% of the respondents agreed that the cloud-based services gave them the opportunities to learn new ideas, explore them, create other new ideas and collaborate with your peers on these ideas and 8% did not agree (See figure 7).

The survey further found out if respondents can confidently say that they were empowered from their users' experience of cloud-based services; 63% agreed that they were empowered, 9% stated they were not while 28% of the respondent were not sure (See Figure 8).
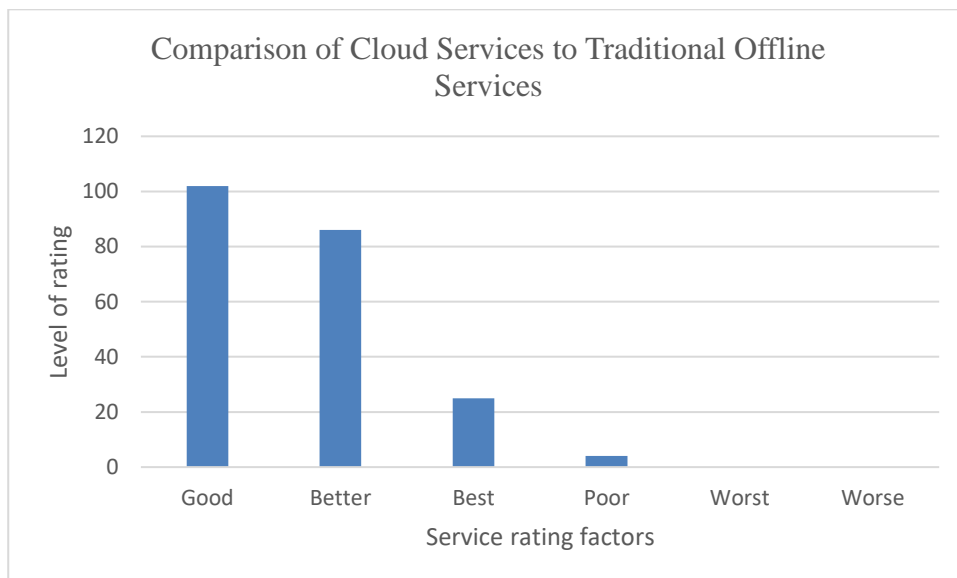

Figure 5: Comparison between cloud services and traditional offline services
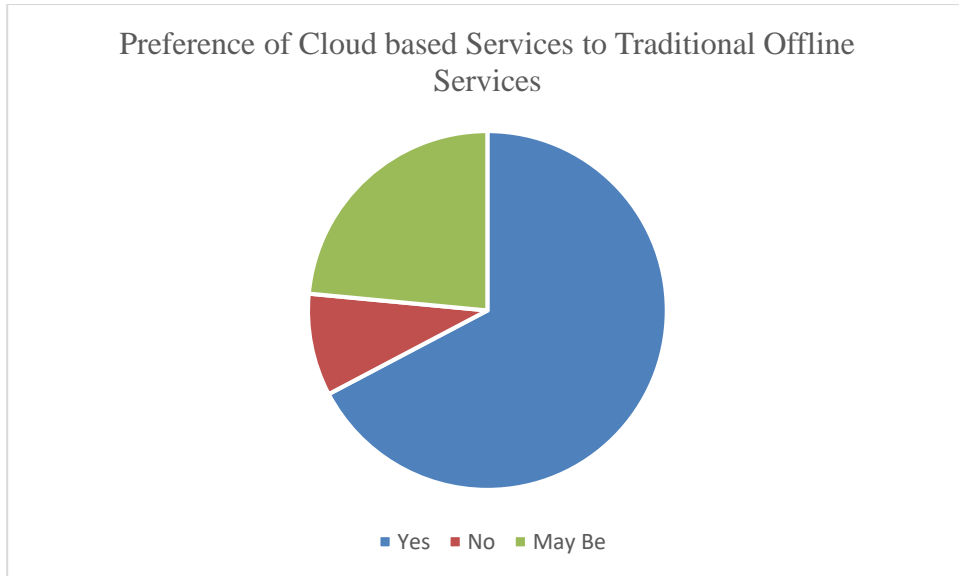
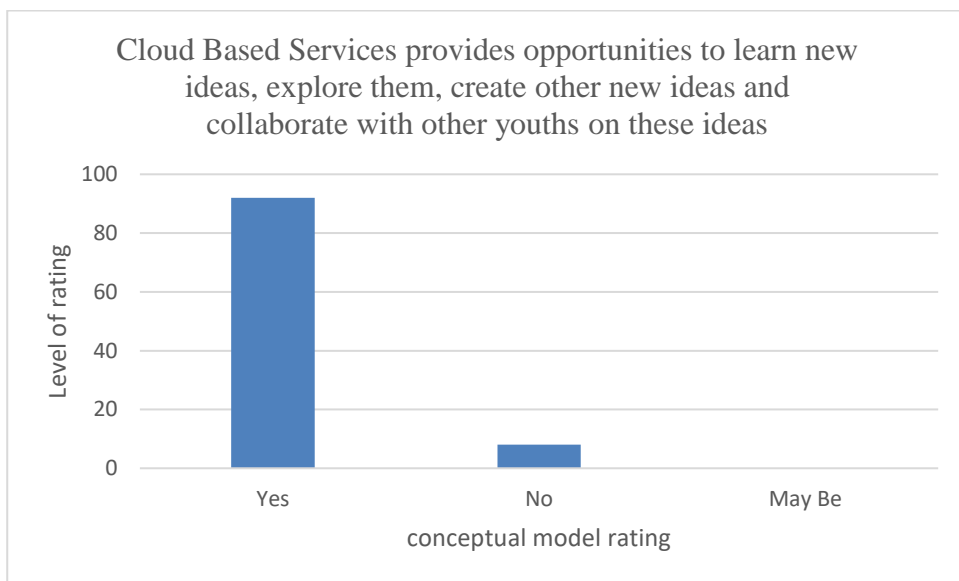Figure 6: Preference for cloud services against traditional offline services

Figure 7: Rating of the model

Further statistical analysis of the model data from the survey showed that the R-squared value of 1 was realized for a polynomial regression of empowerment determinant as a function of user experience of cloud-based services (see Figure 9), this is validating the fact that the model can aid youth empowerment. Regression analysis is a form of predictive modelling technique that investigates the relationship between a dependent and independent variable, hence the R^2 (R-squared) value of the respondents' response curves showed evidence of good fitness of the conceptual model.
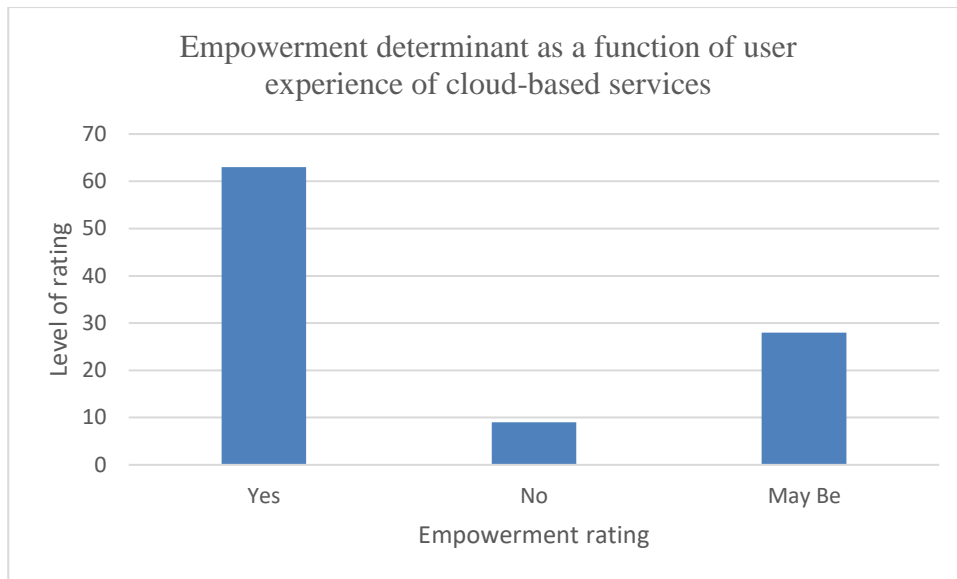
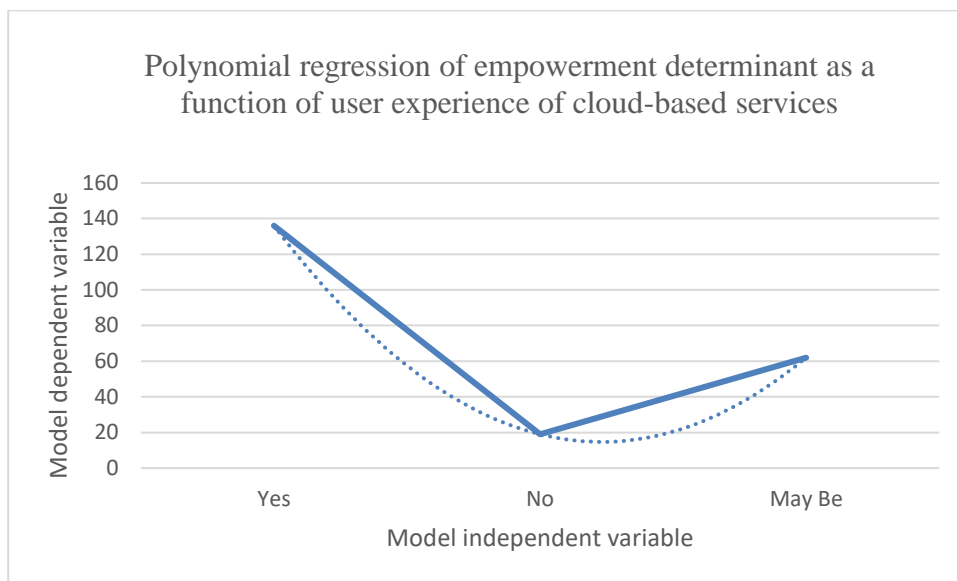Figure 8: Cloud empowerment rating based on users' experience

Figure 9: Polynomial regression of the empowerment model

5. Conclusion

Cloud computing as a technology has a lot of prospects for engaging the youths and getting them empowered to bring a total transformation to their lives. This technology if effectively harnessed can aid the youths to learn, explore, create, and collaborate on new skills that can be beneficial to them in various ramifications thereby engaging them for a useful and productive lifestyle. Youth restiveness and social vices will be greatly reduced and the larger society will be better for it. The youths can effectively compete for opportunities and create opportunities/services/products and collaborate on opportunities via the cloud computing paradigm globally.

The scalability of the technology makes it affordable and cost-effective such that youths do not need huge capital investment to kick start their innovative business. Therefore, the model gives room for a more practical approach in youth

empowerment that will encourage novelty and perfection in product or service development leading to world-class innovation. It will also support mentoring of youths and create networking opportunities and exchange of ideas leading to better business skills with improved output and productivity. It will open opportunities to modern tools and improve the level of competency thereby leading to outputs that meet international standards. Hence, cloud computing is an effective tool for youth empowerment. Making our youth entrepreneurs and fully engaging them for maximum benefit in the society turning our society a better place.

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Authors' Biographies

Dr. Akinwale O. Akinwunmi (principal and corresponding author) a Senior Lecturer at the Computer Science programme of Bowen University, Iwo, Osun State. Nigeria, holds a B.Sc. Computer Engineering, M.Sc. and PhD in Computer Science from Obafemi Awolowo University Ile-Ife. His research interest among others includes Networking and Communication, Hardware, Distributed Systems, Mobile Computing, Modeling and Simulation. He is a member of the following professional bodies: Nigeria Computer Society, International Association of Engineers, Association for Computing Machinery (ACM) and also a professional fellow, Institute of Corporate Administration of Nigeria.

Dr. Solomon A. Akinboro an Associate Professor from Adeleke University, Ede, Osun state, Nigeria, holds a B. Tech degree in Computer Engineering from Ladoke Akintola University of Technology, Ogbomosho, M.Sc. and PhD in Computer science from Obafemi Awolowo University Ile-Ife. Research interests include Computer network, Computer Security, Mobile Computing and Machine Learning. Member of the following professional bodies: Nigeria Computer Society, Nigeria Society of Engineers and Council for the Regulation of Engineering in Nigeria.

Dr. Michael Olumide Owoeye a Senior Lecturer at the Sociology programme of Bowen University, Iwo, Osun State. Nigeria, holds a B.Sc. M.Sc. and Ph.D. in Demography and Social Statistics from Obafemi Awolowo University Ile-Ife, M.sc in Sociology from University of Lagos, Akoka Lagos. His research interest among others include Sustainable Development, Population Growth and Information Technology, Youth Empowerment, Gender Studies, Reproductive Health and Behaviour, Social Demography and Social Research. He is a member of the following professional bodies: Nigeria Institute of Management (NIM) Population Association of Nigeria (PAN), Union for African Population Studies (UAPS), International Union of the Scientific Study of Population (IUSSP) and Nigerian Anthropological and Sociological Association (NASA).