An Infusion Model for The Adoption of Social Media in Nigerian Tertiary Institution

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Abstract

This study aims to understand the trend of social media adoption among youths especially undergraduates of Nigerian tertiary institutions. This study used a questionnaire for identifying the various social media platforms. Also, the study formulated a polynomial function for estimating the number of students who will adopt the use of social media platforms based on the number of years after the year of social media adoption. The results of the study show that the social media platform adopted by Nigerian undergraduate students include: Facebook, Twitter, Instagram, SnapChat, WhatsApp, LinkedIn, WeChat, ResearchGate, Academia and Line. The results show that the most commonly used platforms are: Facebook, SnapChat, Twitter and Instagram while the earliest adopted platforms include: Facebook in 2007, Twitter in 2009 including Instagram and WhatsApp in 2010. The results showed that the infusion model for the adoption of social media was formulated, using a polynomial function with the best fit of the cumulative frequency distribution of the number of users each year. He study concluded that using the polynomial function of social media infusion, the total number of future adopters of social media can be estimated from the number of years from the year of the adoption of the platform.

Keywords: Social media, Polynomial function, Best fit, Technology adoption, Infusion modeling

Introduction

Over the years, communication technologies have provided a means via which people have been able to transfer information from one point to another using various access media. These media which include audio and video data or multimedia can be transmitted using cable, satellite, fiber optics cable and wireless via radio, infra-red, blue-tooth and Wi-Fi [1]. Information and communication technology (ICT) have in the 21st century constituted a major medium for the processing and dissemination of information. Its influence is so pervasive that virtually all aspects of business (formal and informal, profit and non- profit) which impact on the well-being of the society have been engulfed. Ezeah *et al*. [2], defined social media as modern interactive communication channels through which people connect to one another, share ideas, experiences, pictures, messages and information of common interest. According to Sokoya *et al*. [3], social media became popular because it allows people to communicate using the World Wide Web to form a group, a forum and community where ideas and information can be exchanged without geographic barrier. Apparently, there is a shift from the conventional meaning of communication to a more globalized approach of communication using social media. The revolution in the use of social media has profound implications for economic and social development and has pervaded every aspect of human life [4].

The use of social media is widespread and regarded as an essential tool for the efficient administration of any organization and in the delivery of services to clients. Brown *et al*. [5], states that ICTs are being integrated into procedures, structures, and products throughout businesses, governments, and communities. The use of social media increases the supply of information as ICT plays a key role in information sharing and dissemination. Educational systems around the world are under increasing pressure to use Information and Communication Technology (ICT) to teach students the knowledge and skills needed in the 21st century [4]. Social media is fast becoming a very popular means of both interpersonal and public communication in Nigeria and the world at large. According to Chen and Bryer [6], the traditional way of meeting each other is long gone and now the world meets at social media websites. What distinguishes social media from the conventional means of communication is their interactive nature which allows the audience to participate in it from any part of the world they reside.

Adavbiele [7], noted that as at 2007, the number of Nigerians on all social networking sites was below 40,000, however, in 2009 and 2010, there were 212,000 and 657,360 Facebook users respectively among whom, more than 60% were students. The study further stated that in 2014, there were more than 6,000,000 Nigerian Facebook users. Majority of the internet users are also regular users of social media platforms such as Facebook, Twitter, LinkedIn, and YouTube. In the past decade, these social media platforms have become extremely popular mainly due to the content sharing capability of Web 2.0 technology. According to Internet Live Statistics [8], there are more than 2 billion Facebook users, more than 300 million Twitter users, more than 500 million Google+ users, and more than 400 million LinkedIn users.

Although social media platforms were initially created for the social communication and social interaction, over time academics have realized the advantages of these tools over the traditional communication tools (e.g., university email) in their professional activities, due to certain features such as ease of use and usefulness for collaboration and communication [9], [10]. Academic institutions all over the world are leveraging on social networks which has transformed the landscape of our tertiary educational institutions. Kim *et al.* [11], in their study pointed out that as social media are gaining popularity, and some of them seem to be playing an important role as an information sources, it is crucial to understand what kinds of social media are used as information sources. Students have viewed the use of social media as a beneficial ingredient in modern university education. It has served mainly as a source of information and research materials on-demand rather than as a direct and structured learning option.

University professors are also embracing social media for effective discussions and dealing with their students in matters relating to academics and improving learning benefits through better communication within and outside the classes using platforms such as Google Classrooms and Moodle to mention a few [7]. Social media usage enhances educational access and interaction and it fills the learning gap informally between students and the instructors [12]. Integrating social media for both entertainment and learning is common among students in higher level of education. However, many academicians have a fear that time spent on social media is beyond the required time, this may lead to plagiarism and privacy issues and in most cases contribute minimally to actual student learning outcomes. They often view using social media as superfluous or simply not conducive for better learning outcomes [13].

There is an increasing adoption of social media into various sector of the Nigerian economy but there is no understanding of the degree to which different Social media are adopted among students in Nigerian tertiary institutions. There is a need for the development of an ICT infusion model which can be used for estimating the number of adopters of social media among students of Nigerian tertiary institutions.

Related Works

There has been an increasing number of literature on the area of studying the trend of social media adoption. Also, other studies have focused on the underlying motives and benefits associated with the adoption of social media across the globe. A number of related works to this study are presented in the following paragraphs highlighting their respective contribution to literature.

Arshad and Akram [1], worked on a theoretical insight and empirical evidence of social media adoption by the academic community of developing nations. The study adopted the social constructivist paradigm and the technology acceptance model in proposing a conceptual model for the assessment of social media adoption based on a number of identified predictors. The results of the study showed that data was collected from 661 undergraduate students of universities located in Saudi Arabia and Pakistan for the empirical testing of the model. The results of the study also showed that the main drivers of social media are: collaboration, communication, and resource sharing while mediating variables were identified as ease of use and usefulness. The study concluded that the academic community believes that a collaborative learning environment in a social media platform is helpful in establishing improved communication linkage among peers and colleagues. However, the study is limited to identifying the motivation of social adoption and not on the trend of the adoption of social media.

Al-Azawei [14], developed an integrated model and an empirical study on the adoption of Facebook by Iraqis. The study investigated the influence of social support theory on Facebook adoption and validated the effectiveness of the model for enhancing Facebook adoption. The study adopted a quantitative research approach based on a structural equation model based on partial least squares for the exploratory analysis of complex causal modeling. The results of the study showed that there are four (4) significant predictors of Facebook usage, namely: performance expectancy, peer support, family support, and perceived playfulness. The study concluded that social media organizations should not consider only strategies that apply to just one context, but also to other contexts characterized by different beliefs, perceptions, and cultures. However the study is limited to understanding the factors that influence the adoption of Facebook and not on the pattern of Facebook adoption by users.

Ahmad *et al.* [15], worked on understanding social media adoption and its impact on the performance of SME firms located in the United Arab Emirates. The purpose of this paper is to present a quantitative survey to explore factors that influenced social media adoption by SMEs in the United Arab Emirates (UAE), and its impact on performance. The study used a multi-perspective framework combining technological, organizational and environmental elements affecting SMEs. Survey questionnaires were used to collect data from a random sample of SMEs operating in the UAE. Using partial least squares and structural equation modeling techniques, 144 responses were analyzed. The results of the study showed that social media adoption had no effect on SMEs' performance. The study concluded that managers and decision makers in the SME sector should try to keep pace with research on social media innovations, thereby enabling them to benefit from social commerce as it becomes more ubiquitous. However, the study is limited to understanding the effect of adopting social media on performance and does not consider the underlying pattern that describes how social media is adopted by users.

Idowu *et al.* [16], worked on the development of an ICT infusion model for the adoption of ICT in the Nigerian Transport Sector. Structured questionnaires were used to collect information regarding the use of the ICT devices used in the Nigerian transport sector identified from 100 staffs selected from six (6) different transport companies in southwestern Nigeria. The different ICT devices identified were: smartphones, SMS, e-mails, company website, bulk SMS, ticket reservations, vehicle trackers, POS systems and 2-way radio. The results of the study showed that majority of respondents were married male drivers of Ibo ethnicity within ages of 31 – 40 years which was 57% of the respondents selected. The results of the study also showed that the earliest ICT tools adopted were: SMS, e-mails, bulk SMS, company websites, ticket reservations and vehicle trackers in 2001 while smartphones, POS and 2-way radios were adopted by 2006. The study concluded that, 52% of the respondents are computer compliant it was observed that only a small number of respondents (24% of respondents) were adopters of the identified ICT technologies. However, the study was limited to the development of an infusion model for the adoption of ICT devices in the Nigerian transport sector.

Adavbiele [7], presented the use of ICT for enhancing university education in Nigeria. The study adopted a descriptive survey of five (5) universities. The study examined the gap and challenges facing the use of social media in university education in Nigeria. The sample selected was 120 respondents which composed of university lecturers and students. The results revealed that there is a gap between the university teachers and students and ICT usage in classrooms and many university lecturers and students have to go to commercial cyber cafés in town before they have access to a computer that is internet connected Also, lecturer are faced with challenges such as the unavailability of facilities which prevent the use of social media in the classroom. The study concluded that funding, provision of facilities and technical expertise in Nigeria universities could increase the adoption of social media. However, the study did not consider formulating a mathematical model for estimating the adopters of social media in Nigerian universities.

Materials and Methods

This study adopted an exploratory analysis of social media adoption by making use of structured questionnaire for the purpose of collecting information about the social media platforms that are adopted by students of Nigerian tertiary institutions. Also, the study identified the number of students that used the identified social

media platforms and the number of years for which they have adopted the identified social media platform. Data for this was collected from three (3) tertiary institutions located in the south-western Nigeria, namely: Tai Solarin University of Education (TASUED), Moshood Abiola Polytechnic (MAPOLY) and Olabisi Onabanjo University (OOU) located in Ogun State, Nigeria.

The study population for this study was identified as students of the three (3) tertiary institutions while 60 questionnaires were distributed among the respondents for data collection using a simple random sampling technique. The questionnaire was used to collect information from the respondents of the study, such data included: demographic information such as: gender, age group, religion, academic discipline and ethnic background. Additional information collected included the type of smartphone used, the social media platform used alongside the year which the platform was adopted.

Following the collection of data from the respondents, the data was analyzed using standard descriptive statistics tools: such as frequency distribution tables and bar charts data exploration. The ICT infusion model for social media adoption was formulated based on the cumulative total number of users who adopted each platform over the years using an interval of one (1) year. A polynomial function was used to fit the distribution of the adopters such that the number of adopters of each platform was determined as a function of time (number of years from the year of adoption).

This study used the earliest year identified for the adoption of each social media platform as the initial year (base year, Y_0) or year of adoption. Therefore, given information about the number of years from the year of adoption, *x* then the number of adopters of social media can be estimated from the polynomial fit of the yearly cumulative distribution of adopters. Equation (1) shows how to determine number of years, x from the base year of adoption, Y_0 to the year of interest Y_x. Assuming a social media platform was adopted on a base year, Y_0 = 2001 then the number of terms representing the sequence of adopters per year from 2001 till 2018 is 18 years (since x = 2018-2001+1).

$$x = Y_x - Y_0 + 1 \quad (1)$$

The number of adopters of social media was considered as a sequence of terms representing the total number of adopters N_y per year *y* according to Equation (2). Following this, the cumulative total number of adopters S_y for each year was determined till the present year of interest, Y_x according to equation (3). According to equation (4), each term S_y represents the cumulative total number of social media adopters from the year of adoption Y_0 until the year of interest Y_x.

$$N_t = N_0, N_1, N_2, N_3, N_4, \ldots\ldots\ldots\ldots, N_Y \quad (2)$$

$$S_t = N_0, (N_0 + N_1), (N_0 + N_1 + N_2), \ldots\ldots \left(N_0 + N_1 \ldots\ldots + N_y\right) \quad (3)$$

$$S_t = S_1, S_2, S_3, S_4, \ldots\ldots\ldots\ldots\ldots, S_y \quad (4)$$

where: $S_1 = N_0,\ S_2 = (N_0 + N_1), , \ldots\ldots\ldots\ldots S_y = \left(N_0 + N_1 \ldots\ldots + N_y\right)$

Using the cumulative total number of adopters of social media platforms according to equation(4), the graphical plot of the distribution was required for developing a best fit of the trend using a polynomial function. The polynomial function was formulated as a function of time *x* which defined the number of years after the year of the adoption of the social media platform of interest. The polynomial function adopted for the formulation of the ICT infusion model for social network adoption is expressed in equation (5).

$$S_y(x) = a + bx + cx^2 + \ldots\ldots\ldots + dx^{n-1} + dx^n \quad (5)$$

Therefore, the number of years after the year of adoption *x* was adopted as the independent variable while the number of adopters of social media platforms is the dependent variable. Also, the polynomial function is expressed as degree *n* which is the highest power of the independent variable in the fitted model. The appropriateness of the fitted polynomial function was validated using the coefficient of determination R^2. The coefficient of determination defines the total variations in the estimated number of adopters that are attributed

to the variations in the variable *x*. The value lies between 0 and 1 where better values are defined by values closer to 1.

Results and Discussion

The questionnaire used for this study was distributed among the three (3) tertiary institutions selected for this study, for which a total of 60 questionnaires were distributed following which 58 questionnaires were retuned completely filled by respondents. The selected respondents provided the necessary information required for this study as presented in the questionnaires with the data extracted and stored in a spreadsheet file. Table 1 shows a description of the number of respondents selected from each tertiary institution respectively. The result in Table 1 shows that majority of the students were from MAPOLY owing for a proportion of 63.8% of the respondents followed by students of OOU with a proportion of 20.7% and least were students selected from TASUED owing for a proportion of 15.5%.

Table 1: Number of Respondents Selected

Institutions	Frequency	Percentage (%)
TASUED	9	**15.52**
OOU	12	**20.69**
MAPOLY	37	**63.79**
Total	**58**	**100.00**

Table 2 shows the distribution of the gender of the respondents selected for this study and shows that and equal proportion of male and female students were selected for the study such that majority of the male and female students were selected from MAPOLY owing for a proportion of 32.8% and 31.0% respectively. The results of the distribution of the age group of the respondents is shown in Table 3. The results showed that majority of the students selected were between 18 and 25 years of age owing for a proportion of 81% followed by students whom were between 25 and 35 years with a proportion of 13.8%.

Table 2: Distribution of Gender of Respondents

Gender	TASUED		OOU		MAPOLY		Total	
	Freq	Percentage (%)	Freq	Percentage (%)	Freq	Percentage (%)	Freq	Percentage (%)
Male	6	**10.34**	4	**6.90**	19	**32.76**	29	50.00
Female	3	**5.17**	8	**13.79**	18	**31.03**	29	50.00
Total	**9**	**15.52**	**12**	**20.69**	**37**	**63.79**	**58**	**100.00**

Table 3: Distribution of the Age Group of the Respondents

Age Group	TASUED		OOU		MAPOLY		Total	
	Freq	Percentage (%)	Freq	Percentage (%)	Freq	Percentage (%)	Freq	Percentage (%)
Below 18	0	**0.00**	1	**1.72**	1	**1.72**	2	3.45
18 and 25	8	**13.79**	7	**12.07**	32	**55.17**	47	81.03
25 and 35	1	**1.72**	3	**5.17**	4	**6.90**	8	13.79
Above 35	0	**0.00**	1	**1.72**	0	**0.00**	1	1.72
Total	**9**	**15.52**	**12**	**20.69**	**37**	**63.79**	**58**	**100.00**

The results of the distribution of the religion of the students showed that majority of the students were Christians owing for a proportion of 46.6% as presented in Table 4. The results of the distribution of the discipline of the

students showed that majority were selected from sciences owing for proportion of 31.0% followed by those selected from administration with a proportion of 20.7% and those selected from Arts/Humanities owing for a proportion of 17.2% as shown in Table 5.

Table 4: Distribution of the Religion of the Respondents

Religion	TASUED		OOU		MAPOLY		Total	
	Freq	Percentage (%)	Freq	Percentage (%)	Freq	Percentage (%)	Freq	Percentage (%)
Christian	4	**6.90**	5	**8.62**	18	**31.03**	27	46.55
Islam	5	**8.62**	7	**12.07**	19	**32.76**	31	53.45
Total	**9**	**15.52**	**12**	**20.69**	**37**	**63.79**	**58**	**100.00**

Table 5: Distribution of the Discipline of Respondents

Discipline	TASUED		OOU		MAPOLY		Total	
	Freq	Percentage (%)	Freq	Percentage (%)	Freq	Percentage (%)	Freq	Percentage (%)
Administration	2	**3.45**	2	**3.45**	8	**13.79**	12	20.69
Arts/Humanities	3	**5.17**	1	**1.72**	6	**10.34**	10	17.24
Education	0	**0.00**	1	**1.72**	1	**1.72**	2	3.45
Engineering	1	**1.72**	2	**3.45**	0	**0.00**	3	5.17
Law	0	**0.00**	1	**1.72**	0	**0.00**	1	1.72
Medical Sciences	0	**0.00**	1	**1.72**	3	**5.17**	4	6.90
Sciences	2	**3.45**	3	**5.17**	13	**22.41**	18	31.03
Social Sciences	1	**1.72**	1	**1.72**	6	**10.34**	8	13.79
Total	**9**	**15.52**	**12**	**20.69**	**37**	**63.79**	**58**	**100.00**

The results of the distribution of the ethnicity of the students showed that majority were Yoruba with a proportion of 86.2% as shown in Table 6. The results of the distribution of smartphone used also showed that majority of the students used Android OS smartphones owing for a proportion of 72.4% followed by students who used iOS smartphones with a proportion of 15.5% as shown in Table 7.

Table 6: Distribution of the Ethnicity of Respondents

Ethnicity	TASUED		OOU		MAPOLY		Total	
	Freq	Percentage (%)	Freq	Percentage (%)	Freq	Percentage (%)	Freq	Percentage (%)
Yoruba	8	**13.79**	8	**13.79**	34	**58.62**	50	86.21
Hausa	0	**0.00**	3	**5.17**	0	**0.00**	3	5.17
Ibo	1	**1.72**	1	**1.72**	3	**5.17**	5	8.62
Total	**9**	**15.52**	**12**	**20.69**	**37**	**63.79**	**58**	**100.00**

Table 7: Distribution of the Smartphone OS used by Respondents

Smartphone OS	TASUED		OOU		MAPOLY		Total	
	Freq	Percentage (%)	Freq	Percentage (%)	Freq	Percentage (%)	Freq	Percentage (%)
Android OS	7	**12.07**	4	**6.90**	31	**53.45**	42	72.41
BB-OS	1	**1.72**	2	**3.45**	0	**0.00**	3	5.17
iOS	1	**1.72**	4	**6.90**	4	**6.90**	9	15.52
Windows OS	0	**0.00**	2	**3.45**	2	**3.45**	4	6.90
Total	**9**	**15.52**	**12**	**20.69**	**37**	**63.79**	**58**	**100.00**

Results of the duration of use of social media

Following the results collected from 58 respondents belonging to the 3 academic tertiary institutions selected regarding the duration of use of identified Social media; information relevant to the year of infusion of social media platform considered for this study was analyzed using tables and charts for presentation. Table 8 shows the distribution of the number of respondents who started using each Social media platform between the years 2007 till 2018 (a period of 12 years). The number of users for each Social media used was recorded over the period of 12 years including years 2007 and 2018. The initial number and total number of users of each Social media platform used in all locations were also considered from the period of infusion till 2018.

Table 8: Number of Users of Social media for the Period of 2007 till 2018

Social Networks	y07	y08	y09	y10	y11	y12	y13	y14	y15	y16	y17	y18	Users	%	Non-Users	%
Facebook	1	5	2	0	16	13	7	6	4	2	1	0	**57**	**98.28**	**1**	**1.72**
Twitter	0	0	3	5	7	10	12	8	4	1	2	1	**53**	**91.38**	**5**	**8.62**
Instagram	0	0	0	1	3	6	3	17	19	3	1	2	**55**	**94.83**	**3**	**5.17**
Snapchat	0	0	0	0	0	1	3	4	10	13	8	1	**40**	**68.97**	**18**	**31.03**
WhatsApp	0	0	0	8	10	16	10	3	3	5	2	0	**57**	**98.28**	**1**	**1.72**
LinkedIn	0	0	0	0	1	3	1	2	2	1	1	0	**11**	**18.97**	**47**	**81.03**
WeChat	0	0	0	0	0	2	5	2	0	0	0	0	**9**	**15.52**	**49**	**84.48**
ResearchGate	0	0	0	0	0	3	1	2	0	0	0	2	**8**	**13.79**	**50**	**86.21**
Academia	0	0	0	0	0	0	1	5	0	1	1	0	**8**	**13.79**	**50**	**86.21**
Line	0	0	0	0	0	3	0	0	1	0	0	4	**8**	**13.79**	**50**	**86.21**

From the results, 57 (98.2%) students have been using Facebook since the year 2007 with 1 initial user, 53 (98.2%) students have been using Twitter since the year 2009 with 3 initial users, 55 (94.8%) students have been using Instagram since the year 2010 with 1 initial user, 40 (69.0%) students have been using SnapChat since the year 2012 with 1 initial user, 57 (98.3%) students have been using WhatsApp since the year 2010 with 8 initial users, 11 (19.0%) students have been using LinkedIn since the year 2011 with 1 initial user, 9 (15.5%) students have been using WeChat since the year 2012 with 2 initial users, 8 (13.8%) students have been using ResearchGate since the year 2012 with 3 initial users; , 8 (13.8%) students have been using Academia since the year 2013 with 1 initial user while 8 (13.8%) students have been using Line since the year 2012 with 3 initial users.

From the results of this study, it was discovered that the most commonly used Social media among Nigerian students in tertiary institutions starting from the earliest were Facebook adopted in 2007 with 1 user, Twitter adopted in 2009 with 3 users, Instagram and WhatsApp both adopted in 2010 with 1 and 8 users respectively. The results also revealed that the most common social network among users was Facebook and LinkedIn both used by 98.3% of respondents, Instagram used by 94.8% of respondents and Twitter used by 91.4% of respondents.

Results of formulation of ICT infusion model for social media platforms

Following the presentation of the results for the number users of each Social media platform used by selected students, the infusion model for Social media adopted among the students of Nigerian tertiary institutions using the data collected for this study was considered. In order to formulate the ICT infusion model, the sum of users at each consecutive year, n from the base year of infusion (the year the Social media platform was first used in location by a user) for all Social media used till 2018 was considered. Table 9 shows the base year considered for each Social media platform while Figure 1 shows a graphical plot of the cumulative total sum of adopters per of year for each Social media used in Nigerian tertiary institutions.

Table 9: Year of Infusion (Base year, y_0) Social media used by Students

Social media	Year of Infusion	Initial Users	Present Users	%
Facebook	2007	1	57	98.28
Twitter	2009	3	53	91.38
Instagram	2010	1	55	94.83
SnapChat	2012	1	40	68.97
WhatsApp	2010	8	57	98.28
LinkedIn	2011	1	11	18.97
WeChat	2012	2	9	15.52
ResearchGate	2012	3	8	13.79
Academia	2013	1	8	13.79
Line	2012	3	8	13.79

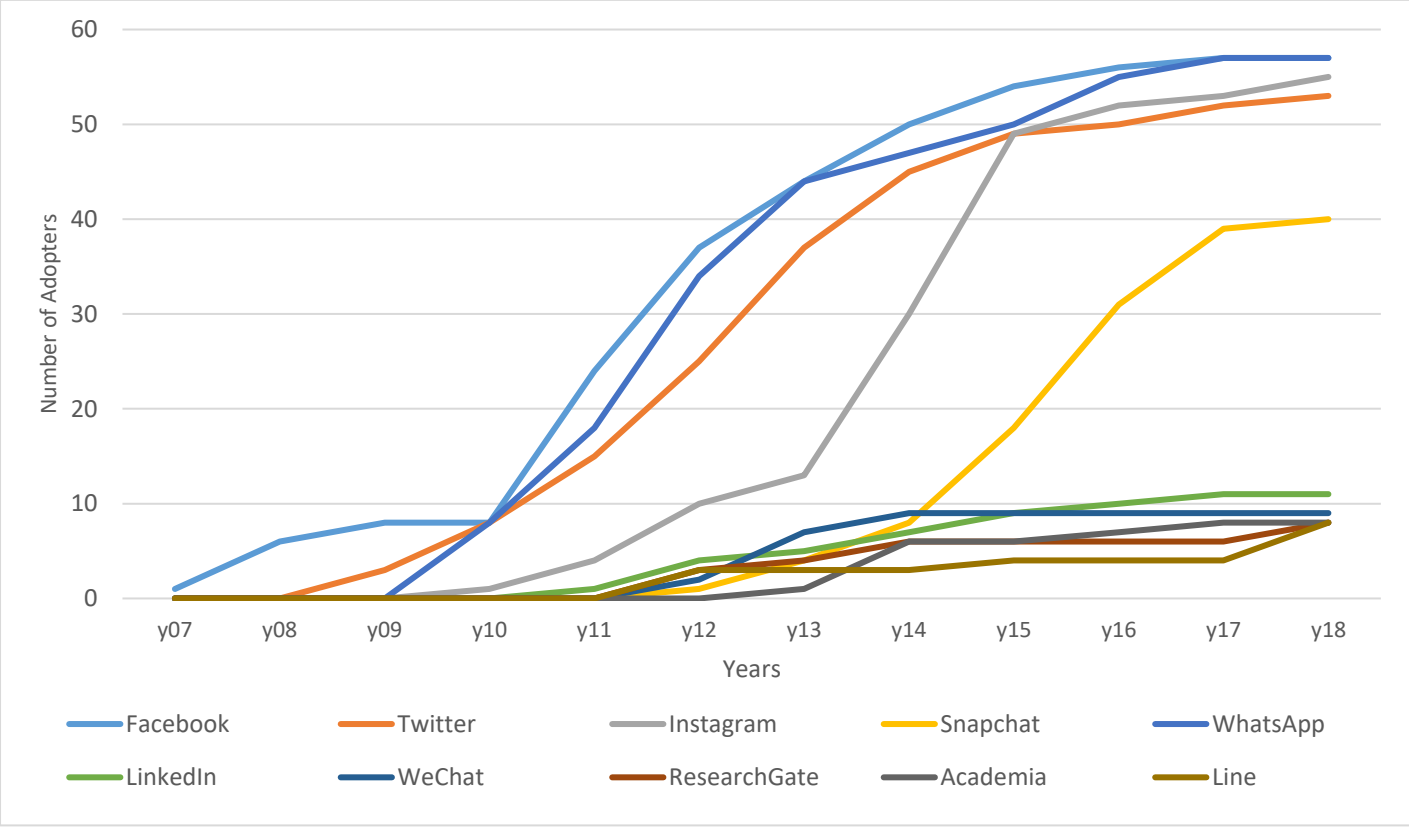

Figure 1: Graphical Plot of Social media platform users between 2007 till 2018

The plot of the cumulative total number of social media adopters for each social media platform identified in this study was used to generate a polynomial fit. The polynomial fit with the best R2 values was considered for the formulation of the ICT infusion model of social media among students of Nigerian tertiary institutions. The results of the infusion model that was formulated for each social media platform considered in this study is presented in the following paragraphs.

a. Infusion model for the use of Facebook

According to Table 9, the year of infusion of Facebook is 2007 with 1 user. Figure 2 shows the graphical plot of the total number of users of Facebook for each subsequent year considered from the year of infusion; hence, the period between 2007 till 2018 is 12 years. Each point along the horizontal axis represents the number of

years between the base year and the year of interest, e.g. the number of users in 2014 is identified by the point 8 along the horizontal axis which corresponds to 50 users since 2007. Using the auto-generated trend line functionality of the Excel Data Analysis Tool-pack, the infusion model for Facebook use taking the base year as 2007 is estimated using a polynomial of degree, z = 5 and R^2 = 0.9896 stated as follows:

$$S(x) = 0.0052x^5 - 0.1524x^4 + 1.4395x^3 - 4.4984x^2 + 7.2926x - 2.1364 \quad (7)$$

Therefore, in order to determine the total number of users of Facebook x years from 2007; equation (7) can be used to estimate the number of users since 2007 that have been using Facebook in tertiary institutions located in Nigeria.

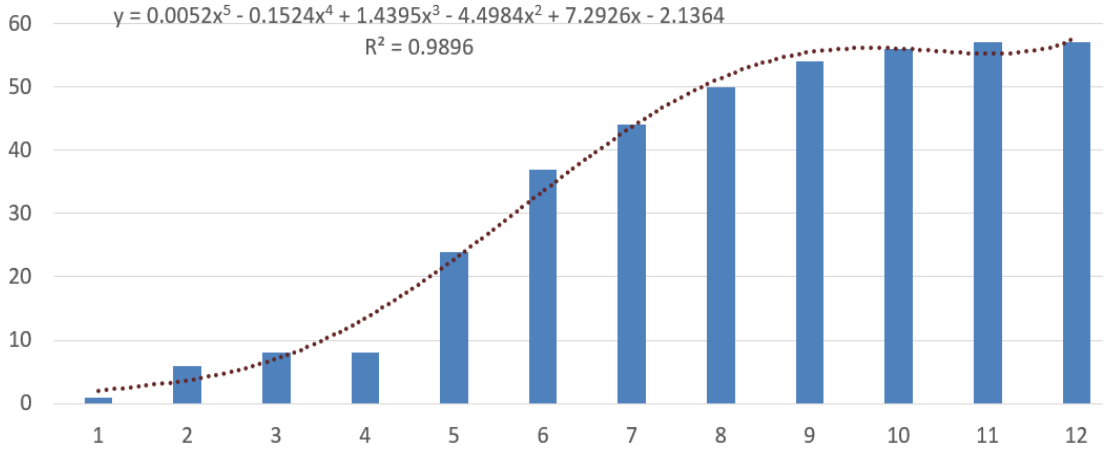

Figure 2: Infusion Model of Facebook Users

b. Infusion model for the use of Twitter

According to Table 9, the year of infusion of Twitter is 2009 with 3 users. Figure 3 shows the graphical plot of the total number of users of Twitter for each subsequent year considered from the year of infusion; hence, the period between 2009 till 2018 is 10 years. Each point along the horizontal axis represents the number of years between the base year and the year of interest, e.g. the number of users in 2014 is identified by the point 6 along the horizontal axis which corresponds to 45 users since 2009. Using the auto-generated trend line functionality of the Excel Data Analysis Tool-pack, the infusion model for Twitter use taking the base year as 2009 is estimated using a polynomial of degree, z = 5 and R^2 = 0.9986 stated as follows:

$$S(x) = 0.0001x^6 - 0.004x^5 + 0.07x^4 - 0.66x^3 + 3.64x^2 + 9.11x + 8.59 \quad (8)$$

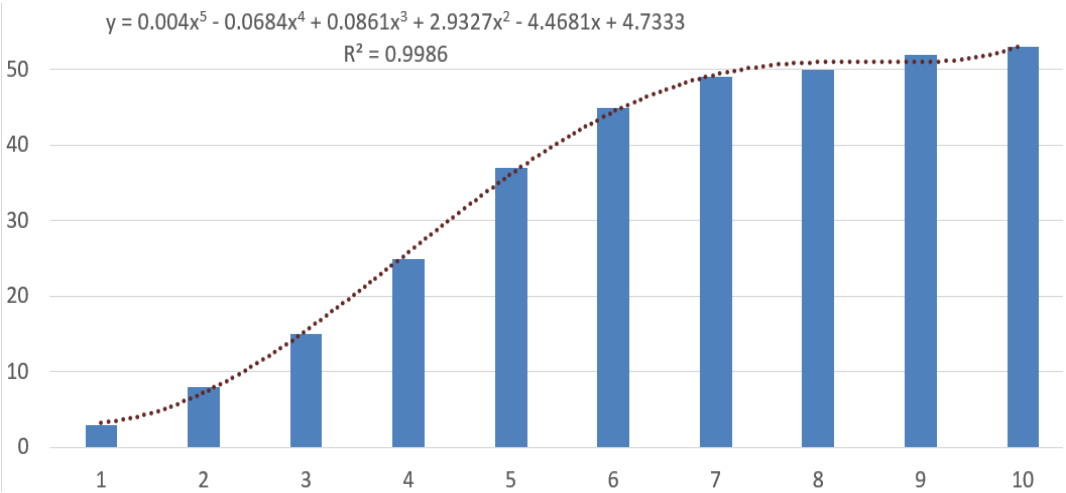

Figure 3: Infusion Model of Twitter Users

Therefore, in order to determine the total number of users of Twitter *x* years from 2009; equation (8) can be used to estimate the number of users since 2009 that have been using Twitter among students of tertiary institutions located in Nigeria.

c. Infusion model for the use of Instagram

According to Table 9, the year of infusion of Instagram is 2010 with 1 user. Figure 4 shows the graphical plot of the total number of users of Instagram for each subsequent year considered from the year of infusion; hence, the period between 2010 till 2017 is 8 years. Each point along the horizontal axis represents the number of years between the base year and the year of interest, e.g. the number of users in 2014 is identified by the point 5 along the horizontal axis which corresponds to 30 users since 2010. Using the auto-generated trend line functionality of the Excel Data Analysis Tool-pack, the infusion model for Instagram use taking the base year as 2010 is estimated using a polynomial of degree, z = 5 and R^2 = 0.9924 stated as follows:

$$S(x) = 0.0542x^5 - 1.3533x^4 + 12.026x^3 - 45.318x^2 + 75.498x - 40.25 \quad (9)$$

Therefore, in order to determine the total number of users of Instagram *x* years from 2010; equation (9) can be used to estimate the number of users since 2010 that have been using Instagram among students of tertiary institutions located in Nigeria.

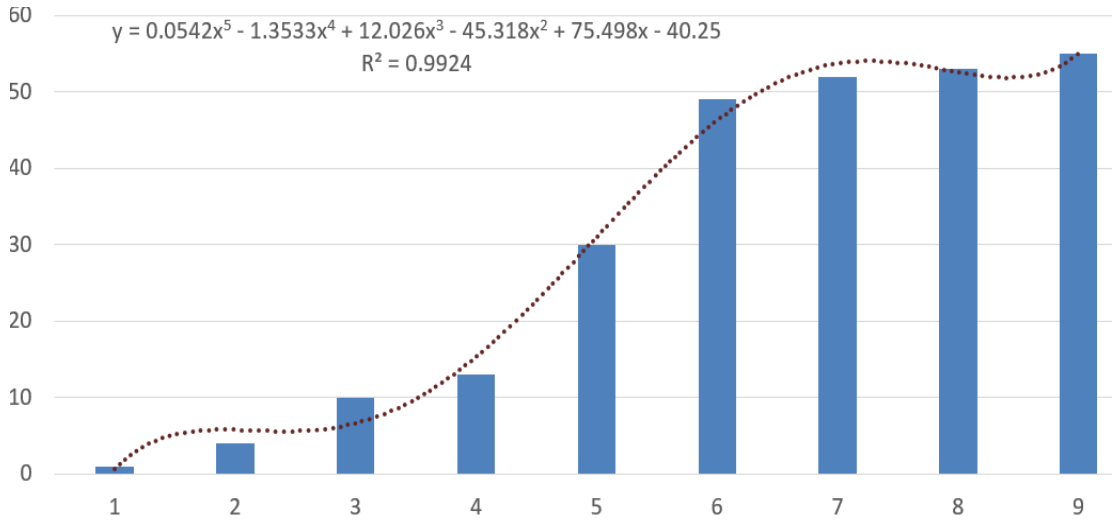

Figure 4: Infusion Model of Instagram Users

d. Infusion model for the use of SnapChat

According to Table 9, the year of infusion of SnapChat is 2012 with 1 user. Figure 5 shows the graphical plot of the total number of users of SnapChat for each subsequent year considered from the year of infusion; hence, the period between 2012 till 2018 is 7 years. Each point along the horizontal axis represents the number of years between the base year and the year of interest, e.g. the number of users in 2014 is identified by the point 3 along the horizontal axis which corresponds to 8 users since 2012. Using the auto-generated trend line functionality of the Excel Data Analysis Tool-pack, the infusion model for SnapChat use taking the base year as 2012 is estimated using a polynomial of degree, z = 5 and R^2 = 1.0 stated as follows:

$$S(x) = 0.0583x^5 - 1.2841x^4 + 10.004x^3 - 32.792x^2 + 48.862x - 23.857 \quad (10)$$

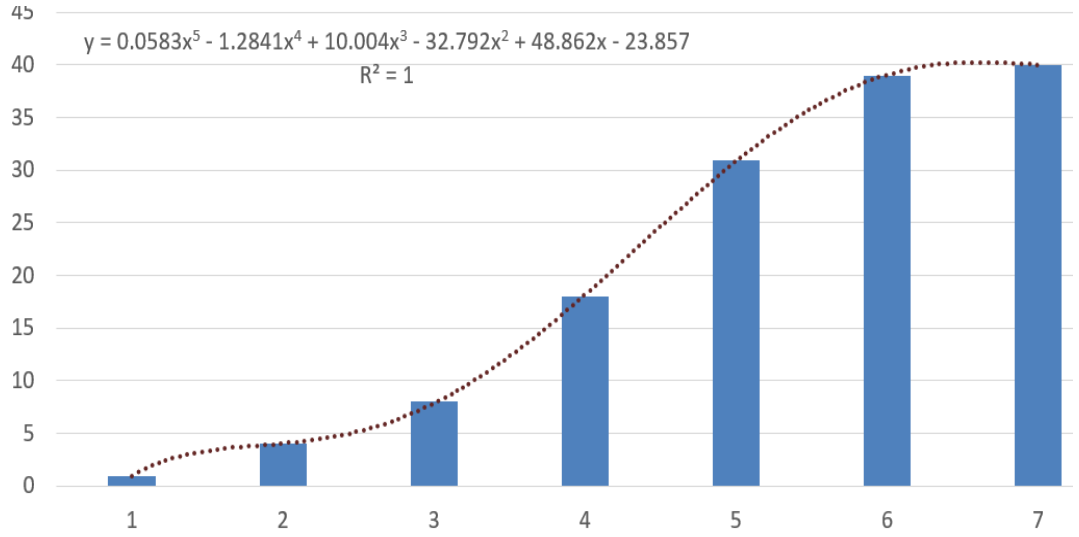

Figure 5: Infusion Model of SnapChat Users

Therefore, in order to determine the total number of users of SnapChat *x* years from 2012; equation (10) can be used to estimate the number of users since 2012 that have been using SnapChat among students of tertiary institutions located in Nigeria.

e. Infusion model for the use of WhatsApp

According to Table 9, the year of infusion of WhatsApp is 2010 with 8 users. Figure 6 shows the graphical plot of the total number of users of WhatsApp for each subsequent year considered from the year of infusion; hence, the period between 2010 till 2018 is 9 years. Each point along the horizontal axis represents the number of years between the base year and the year of interest, e.g. the number of users in 2014 is identified by the point 5 along the horizontal axis which corresponds to 47 users since 2010. Using the auto-generated trend line functionality of the Excel Data Analysis Tool-pack, the infusion model for WhatsApp use taking the base year as 2010 is estimated using a polynomial of degree, z = 5 and R^2 = 0.9978 stated as follows:

$$S(x) = -0.0304x^5 + 0.7752x^4 - 7.1936x^3 + 28.475x^2 - 34.942x + 20.75 \quad (11)$$

Therefore, in order to determine the total number of users of WhatsApp *x* years from 2010; equation (11) can be used to estimate the number of users since 2010 that have been using WhatsApp among students of tertiary institutions located in Nigeria.

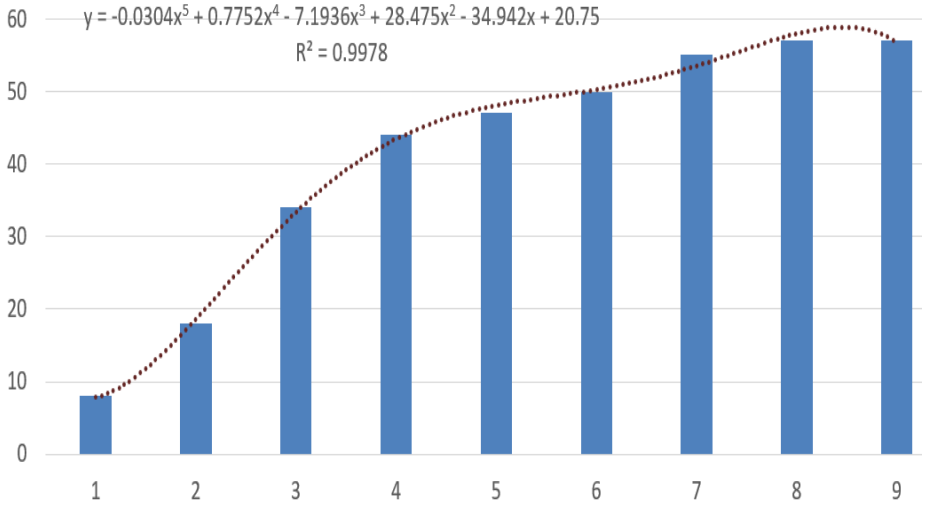

Figure 6: Infusion Model of WhatsApp Users

f. Infusion model for the use of LinkedIn

According to Table 9, the year of infusion of LinkedIn is 2011 with 1 user. Figure 7 shows the graphical plot of the total number of users of LinkedIn for each subsequent year considered from the year of infusion; hence, the period between 2011 till 2018 is 8 years. Each point along the horizontal axis represents the number of years between the base year and the year of interest, e.g. the number of users in 2014 is identified by the point 4 along the horizontal axis which corresponds to 7 users since 2011. Using the auto-generated trend line functionality of the Excel Data Analysis Tool-pack, the infusion model for LinkedIn use taking the base year as 2011 is estimated using a polynomial of degree, z = 5 and R^2 = 0.9974 stated as follows:

$$S(x) = -0.0077x^5 - 0.1844x^4 + 1.6253x^3 - 6.551x^2 + 13.632x - 7.5 \quad (12)$$

Therefore, in order to determine the total number of users of LinkedIn x years from 2011; equation (12) can be used to estimate the number of users since 2011 that have been using LinkedIn among students of tertiary institutions located in Nigeria.

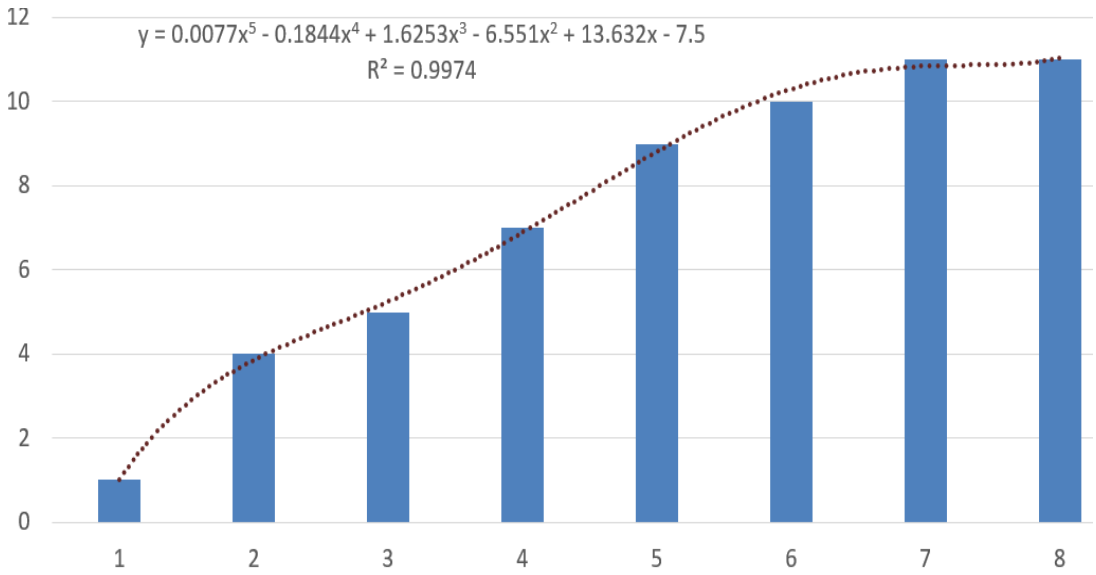

Figure 7: Infusion Model of LinkedIn Users

g. Infusion model for the use of WeChat

According to Table 9, the year of infusion of WeChat is 2012 with 3 users. Figure 8 shows the graphical plot of the total number of users of WeChat for each subsequent year considered from the year of infusion; hence, the period between 2012 till 2018 is 7 years. Each point along the horizontal axis represents the number of years between the base year and the year of interest, e.g. the number of users in 2014 is identified by the point 3 along the horizontal axis which corresponds to 3 users since 2012. Using the auto-generated trend line functionality of the Excel Data Analysis Tool-pack, the infusion model for WeChat use taking the base year as 2012 is estimated using a polynomial of degree, z = 5 and R^2 = 0.9993 and stated as follows:

$$S(x) = -0.0042x^5 + 0.0568x^4 - 0.0549x^3 - 2.2917x^2 + 11.574x - 7.2857 \quad (13)$$

Therefore, in order to determine the total number of users of WeChat z years from 2012; equation (13) can be used to estimate the number of users since 2012 that have been using WeChat among students of tertiary institutions located in Nigeria.

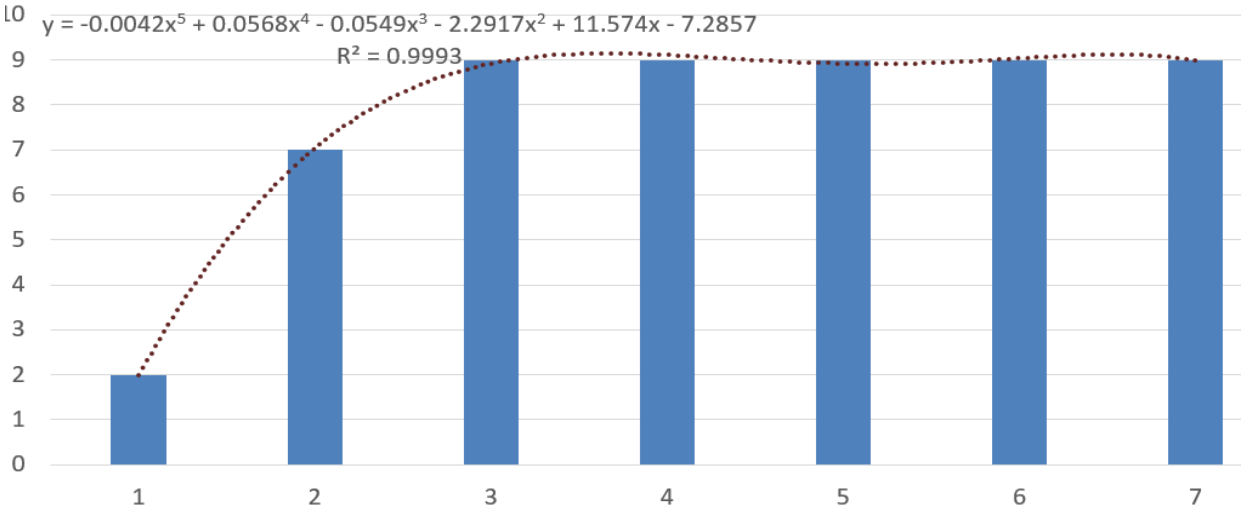

Figure 8: Infusion Model of WeChat Users

The results of the study revealed that majority of the respondents selected for the study were students of MAPOLY among with a majority of students within the age group of 18 and 25. The study also revealed that social network adopters were majorly students of science followed by administration students both owing for a proportion of 50% the students selected. The results of the study revealed that majority of the students selected adopted the use of Android OS-based smartphones with a proportion of about 72% of selected students.

The results of the availability and usability of Social media among tertiary institution students showed that majority suggested that Facebook, Twitter, Instagram, SnapChat, LinkedIn, Line and ResearchGate were previously in use by at least 55% of the respondents. Also, the results showed that among the social media identified, the respondents suggested that WeChat, Academia, LinkedIn, ResearchGate and LinkedIn were never in use as suggested by at least 24% of the respondents.

The results of the frequency of use of social media pointed out that a majority of the students selected suggested that among the most frequently used social media were Facebook, SnapChat, Twitter and Instagram comprising of at least 60% of the students. The results of also show that at least 60% of the students also suggested that ResearchGate, Line, Academia, WeChat and LinkedIn were only used whenever there were alerts. The results further revealed that majority of the students adopted social media platforms that shared media such as pictures, texts, audio and video with friends than they used social media that consisted of academic or entrepreneurial friends or connections.

From the results of this study, it was discovered that the most commonly used Social media among Nigerian students in tertiary institutions starting from the earliest were Facebook adopted in 2007 with 1 user, Twitter adopted in 2009 with 3 users, Instagram and WhatsApp both adopted in 2010 with 1 and 8 users respectively. The results also revealed that the most common social network among users was Facebook and LinkedIn both used by 98.3% of respondents, Instagram used by 94.8% of respondents and Twitter used by 91.4% of respondents.

Conclusions

Following the analysis of the information collected from 58 students selected from three (3) tertiary institutions, a number of conclusions were drawn from the results of the analysis performed. The study concluded that science, administration and arts students were the majority adopters of social media of which majority of the sampled students had smartphones using Android Operating System (OS).

The study concluded that about 55% of students agreed that social networks such as Facebook, Twitter, Instagram, SnapChat, LinkedIn, Line and ResearchGate were presently in use while about 24% suggested that WeChat, Academia, LinkedIn, ResearchGate and LinkedIn were never in use. The study concluded that majority of the students adopted social media platforms that shared media such as pictures, texts, audio and video with friends than they used social media that consisted of academic or entrepreneurial friends or connections. This

was because at least 60% of students suggested that the most frequently used social media were Facebook, SnapChat, Twitter and Instagram.

The study concluded that the earliest commonly used the most commonly used Social media among Nigerian students in tertiary institutions starting from the earliest were Facebook adopted in 2007 with 1 user, Twitter adopted in 2009 with 3 users, Instagram and WhatsApp both adopted in 2010 with 1 and 8 users respectively. The results also revealed that the most common social network among users was Facebook and LinkedIn both used by 98.3% of respondents, Instagram used by 94.8% of respondents and Twitter used by 91.4% of respondents. The study also showed that using the polynomial ICT infusion model of a certain degree m in terms of n – the number of years after ICT infusion; the number of users adopting a social media can be estimated.

Conflicts of Interest

This study does not possess any conflict of interest however the results of this study does not reflect the overall state of social media adoption across tertiary institutions across Nigeria as a country.

Funding Statement

Not Applicable

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