



Perspective

Smartphone Technological Advancement Trends: A Scheme for Knowledge Acquisition Towards Societal Development

¹Oguchi Onyeizu Ajaegbu, ²Chigozirim Ajaegbu and ³Oluwaseyi Adewunmi Sodeinde

¹Department of Mass Communication, Babcock University, Nigeria

²Department of Information Technology, Babcock University, Nigeria

³Department of Mass Communication, Babcock University, Nigeria

Abstract

Smart phone technology as a communication gadget has become the thrilling phenomenon of the modern age. However, its usage should be such that should bring about innovative benefits leading to societal development. As Moore predicted that the complexity of integrated circuit will be in constant increase every 18 months, the technology of smart phone is one that will continue to experience growth. It is important that technology of smart phone grows in parallel with knowledge acquisition to enable objective users of the technology. The main objective of the paper was to investigate this prevailing attribute of innovative strategy possessed by these smart phone designers and how well it could mean to a society when adopted towards a steady societal development. To close this gap, this paper examined literature with a view to drawing conclusions that a "strong innovative strategy" is a factor that should not be underestimated by any society gearing towards growth in knowledge acquisition. Also, a concept model was presented as a lead to mend the knowledge gap that could arise in a society as a result of lack of knowledge in the technical uses and benefit this technology could offer to the society.

Key words: Innovative strategy, knowledge acquisition, smart phone, societal development

Citation: Oguchi Onyeizu Ajaegbu, Chigozirim Ajaegbu and Oluwaseyi Adewunmi Sodeinde, 2018. Smartphone technological advancement trends: A scheme for knowledge acquisition towards societal development. *Inform. Technol. J.*, CC: CC-CC.

Corresponding Author: Oguchi Onyeizu Ajaegbu, Department of Mass Communication, Babcock University, Nigeria Tel: +2348060347833

Copyright: © 2018 Oguchi Onyeizu Ajaegbu *et al.* This is an open access article distributed under the terms of the creative commons attribution License, which permits unrestricted use, distribution and reproduction in any medium, provided the original author and source are credited.

Competing Interest: The authors have declared that no competing interest exists.

Data Availability: All relevant data are within the paper and its supporting information files.

INTRODUCTION

Technology permeates every aspect of human lives from learning, doing business, travelling and also communicating. Technology is the use of scientific knowledge for practical purposes or application¹. There have been advancements in technology from the days of telegraph to the era of more advanced technologies like smart phones that have eased the communication process and added more flavour to the way of life². Smart phones are phone devices with advanced features that goes beyond the traditional functions of phones such as making calls and sending text messages but have higher capabilities of playing videos, surfing the web, sending and receiving emails, taking photos and editing them with embellishments, social interactions through chat groups and also enabling business transactions³. The smartphones were initially for business use due to the cost and application, today however, there are countless brands of smartphones and also different uses according to the owner's preference³. Smartphones are now being used to serve as a link between manufacturers of products, advertisers and also potential consumers, in addition, they are mostly used for socialising on different levels³. The smartphone is like a mini computer because it functions like a computer in its mini version and is portable⁴. Knowledge acquisition of technology specifically smartphone is important for proper application to our lives and the society at large. Application of this knowledge could be channelled to societal development and improvements which will bring about a dynamic society constantly experiencing changes and advancements. Past studies have considered smartphone technology either directly or indirectly without a cognitive reasoning of the major factor that has kept the technology moving and also what the effect would be if considered as a pilot towards societal development. The main objective of the paper was to investigate this prevailing attribute of innovative strategy possessed by these smartphone designers and how well it could mean to a society when adopted towards a steady societal development.

SMARTPHONES: AN OVERVIEW

Smartphone idea can be traced back to the mid⁵-1970s but it all started with IBM Simon Personal Communicator and Nokia 9000 Communicator in the year 1994 and 1996 respectively, with the integration of mobile phone functionality and Personal Digit Assistance (PDA)⁶. They were not officially called smartphone but were capable of sending and receiving email, fax, while Nokia 9000 had in addition web browsing, word processing and spreadsheets⁵. The first break

in smartphone started with Ericsson R380 in 2000 with the follow-up of other releases and Apple launching the biggest concept with full touchscreen⁶ in 2007. Besides the normal features of touchscreen ability, open operating system, mobile network capability and broad application development environment⁷, studies have shown that smartphone with its technical functionality is an integration of sensors⁸. When the smartphones were introduced, it was for doing business³ and as such was not affordable for everyone, now almost everyone has a smartphone, some even have more than one of such phones irrespective of the standard of living. Smart phone technology as a communication gadget has become the thrilling phenomenon of the modern age. However, its usage should be such that should bring about innovative benefit leading to societal development. Knowledge acquisition should be centred on the use of the technology and thus should be the constant reward of access to the smart phone technology. As Moore predicted that the complexity of integrated circuit will be in constant increase every 18 months⁹, the technology of smart phone is one that will continue to experience growth.

To some, having a smartphone is putting them on the same level as those that are highly placed in the society meaning that they did not originally have a substantial reason as to why they should acquire a smartphone and this also led to the misuse of the device. Studies have shown that knowledge is the strength of any functional society and any society that is not complying with this prevailing growth eventually becomes poor in innovative strategy which should also result to crumbling of the society in poverty¹⁰.

It is important that technology of smartphone grows in parallel with acquisition of knowledge. This is because access to this communication gadget should be a platform for every individual to connect the world faster for vital information that should be knowledge rewarding and not for information that should depreciate the level of knowledge acquisition required from a societal community to acquire.

Some researchers have tried to look at technology in its broad nature and asserted some valued understanding thus: the word technology encompasses the theoretical and practical knowledge, skills and artefacts that can be used to develop products and services inclusively the production and delivery systems¹¹. In addition technology has always been linked with society's progress with improvement in the standard of living of the societal community¹¹. On the other hand, knowledge acquisition is a "continuous-time feedback process with its stability depending upon reliable information"¹². Also, people use actionable knowledge acquired to create an implementation world¹². Again, most

information in use today emanates from the internet and as such, the need to investigate first, the level of knowledge acquisition a society has.

It is true that those researchers approached the word technology from different perspectives but with similar objective being knowledge growth tied to each individual opinion. This shows that the strength of any society is in the understanding of the condiments of any technology that is in use. Basically, the technology of communication gadgets is ruling the world presently and will still be there in the next future. It is so important that attention should be paid to a new paradigm of knowledge acquisition in this direction, rather than being technology followers, every societal community should focus more on being objective users thus elevating the societal poverty level to a wealthy and healthy society.

Smart phone in recent studies has been argued that its improvement in technology will eventually become cognitive⁸. But the big question that should be asked is, the technological intelligence in smart phone in parallel growth with societal knowledge acquisition or is it resulting to more knowledge gap in the society? To answer this question, the technological objective of some smartphone designed by major players such as Apple, Nokia and LG need to be considered.

It is well assumed that for any technological communication gadgets been developed there is an underlying aim besides sales. The ability of any society to recognise the underlying technological aim of the technological company for embarking on such development will improve the knowledge acquisition of such society in its day to day activities. It is no doubt that improvements in the technology of smartphones by stakeholders have been seen as a market strategy to be a leader in the sector. This aspect of improvement has blind folded some societies against seeing the main rudiments of the technology in question thereby making the societal community to be only followers of prevailing technology rather than objective users of the technology.

In the Apple company overview of 2015, it was stated that the latest iPhone release coupled with the software is meant to allow a high level of integration with desktop computers¹³. Also, App's LogMeIn Pro was design to allow employees to log in to office-based desktop computers from mobile devices irrespective of their location¹³. Nokia's N95 smartphone was designed with embedded sensing application known as accelerometer⁸. All these and many others are intelligence added to improve and add to societal development.

The great tool that companies like Apple, Samsung, Motorola and so on possess is Innovative Strategy. It is the companies' innovative strategy that has created the world of sophisticated communication gadgets and is still creating more of them till today. Hence, it is very important that every society employs standing innovative strategy that the societal community should benefit from towards improving the societal technological and skill level.

Strategy is defined as "nothing more than a commitment to a set of coherent, mutually reinforcing policies or behaviours aimed at achieving a specific competitive goal"¹⁴. One gap with this definition is that it was tied to only companies without putting into consideration how meaningful an innovative strategy could affect a societal development when applied in line with the technologies in use today.

It has been observed, that access to modern communication gadgets like smartphones iPhone, Ipad, laptops is no longer a big challenge even for individuals in the third world countries to possess. But the big question is of what additional knowledge has it contributed in its usage towards the societal development? It is a common thing within developing societies for people to spend a considerable amount of time on social media platforms. Strict observance in smartphone usage shows that, greater percentage of smartphone chatting are friendly chats without any intention of enriching knowledge. Also, this is affecting educational sectors within the developing society where students are trading off knowledge acquisition for friendly chat in classrooms. It should be a normal reasoning to assume the usage of smartphone to increase the level of knowledge acquisition towards societal development rather than resulting to knowledge gap.

KNOWLEDGE GAP THEORY

The knowledge gap theory was propounded by Phillip Tichenor, George Donohue and Clarice Olien in 1970 as was proposed under the knowledge gap hypothesis which explains how the differences in the socioeconomic status of audience members can create knowledge and information gaps in the society. The theory explained that when there is an increase in the media information that was passed into a social system, the segments of the population with higher socioeconomic status, tends to acquire information faster than the lower segments of the population, so this brings about an increase rather than decrease in the already existent information gap^{15,16}.

Smith in his 2009 research work on American citizens realized that there are similarities in both educated and uneducated people and their search for knowledge acquisition in the sense that, when they do not prior information, they do not feel the need to acquire information¹⁷.

Another reason is the issue of selective exposure, acceptance and retention, where some people may find it difficult to learn and even accept new things because it clashes with the already existing knowledge^{16,18}. Technology and the new media which were expected to bridge the gap, have one way or the other widened this gap, with the alarming increase in the release of new information into the society and the easy accessibility of a smart phone device, individuals are bombarded daily with a lot of messages and information which might distract them and increase the possibility of selective retention of a topic at the expense of another¹⁹. Factors such as motivation coupled with other reasons such as individual differences as well as level of education comes into play when individuals choose to search for information and the fact that someone has the accessibility to mobile devices and smart phones does not necessarily mean that the person knows how to use it or use it well¹⁶. The theory also explained how the less informed in the society would not act as responsible citizens in the sense that they lack appropriate and adequate information to make informed decisions which will be detrimental to societal development.

SOCIAL IMPACT OF SMART PHONES

As stated by the Business Insider, mobile subscribers in Nigeria are about 150 million and the numbers of internet users are about 97.2 million¹⁹. It is estimated that by 2019, there would be 23.3 million as compared to the 20.5 million²⁰ in 2018. The impact of advanced communication technologies have significantly influenced the way of doing things and the concept of the global village has been reinforced with the advent of smart phones as people now communicate with others and it seems like they are close geographically. Smart phones allow people to maintain continuous communication without interruption of movements and distances²¹.

They can be used as phonebooks, appointment calendars, internet portals, gaming devices, in addition they are capable of meeting cognitive as well affective needs²². The impact of smart phones can be felt in many areas-education, communication, business/economy, health among others. In the health sector, parents can now easily register the birth of their children and allowing the government to accurately plan

interventions like vaccination schedules²³. In addition, health workers can access health records, schedule appointments and also issue automated text reminders to parents about vaccine clinics.

On the economic side, with the introduction of smartphones and especially in 2008 when the first Apple iPhone was made available, the number of smartphone users have experienced a remarkable increase which is estimated will also contribute to the global economy²⁴ by 2020. In addition, it has eased the burden of doing business as unnecessary expenses can be avoided for example business executives having to travel long distances to seal a deal now such deals can be discussed using virtual presence.

Students use the smartphones to expand their learning experience⁴. Smartphones and tablets have become part of students' daily lives and are used as assistive tools in education²⁵. The importance of technological advancements in expanding students' horizon especially as it affects academics was expounded citing results of a past study, it was discovered that majority of students and teachers in that institution use smart phones not just as a form of communication but also to find information related to their learning activities while also accessing social networking sites related with the necessary knowledge⁴.

On the other hand, it is Onciu suggested that defining the line between technology use and overuse is becoming problematic as the young generation do not actually have knowledge of the world without the omnipresent digital technology²⁵. Furthermore, smartphone usage addiction can affect social skills as people use smartphones at parties and social events to avoid socialising with others and also ignore people nearby²⁶. Psychologists have warned of the addiction that could arise as a result of smart phone usage²⁷. Without the smartphones, some people could experience withdrawal symptoms associated with substance abuse such as anxiety, insomnia and depression and this could in turn lead to academic relapse of such students²⁷.

In addition to studies that have highlighted the negative use of smart phones, this study however explained three ways that smart phones can be valuable in the workplace such as promoting autonomy, strengthening relationships and also improving knowledge sharing. The study concluded by proposing a model that is a combination of two factors together to form a new factor. It proposed that autonomy and relationship could lead to self-satisfaction, autonomy and knowledge-sharing could lead to self-development and relationship and knowledge-sharing could lead to teamwork. These together promote job satisfaction and could lead to work efficiency²⁸.

A study was conducted to look at the implications of internet enabled phones on academic concentration of students in tertiary institutions on the basis that when students have their mobile phones during classes, they could be a tendency of browsing the internet or responding to received messages²⁷. Igbinedion University students were studied to determine how they use mobile phones to get academic information and what interests them most on the internet. The study concluded that the students use mobile phones to search for academic information and following is that they use it for social networking and chatting²⁹.

A survey analysis was conducted on students (undergraduates and postgraduates) to determine how often they use smart phones for learning purposes³⁰. The result of the analysis indicated students were using smart phones in several ways to support learning. The researcher's data suggested that although smart device ownership has increased, the ways through which students are using them appears to be lessening over the course of the year. The study concluded by further indicating that more students are beginning to own smart phones while a small percentage of them use it for learning in the university³⁰.

Another study sort to find out the impact of smart phone on the society in areas of health, education, human psychology, business and social life. The authors explained that smart phones do have an impact on the society in the sense that it enables one to be connected, it leads to addiction, it gives an edge in business and education, applications due to new technology, utilization of time and also negative impacts such as disrespectful behaviour, privacy issues and distractions due to addiction³. The importance of smart phones and other technologies is accepted, but also raises concerns of the potential overuse²⁵. Some of the effects of this overuse range from having an impact on academic performance to affecting physical and emotional wellbeing²⁵.

SMART PHONE TECHNOLOGY: A TOOL FOR EDUCATIONAL LEARNING

Education is considered one of the prerequisite for development in every society. This brings about the orientation and reorientation of individuals from a state of ignorance to knowledge acquisition needed for critical thinking and informed decision making towards development.

Education is needed for academic and skill acquisition empowerment necessary to achieve individual, economic and societal development³¹. The introduction of smartphone technologies have however, altered the way people learn.

These technologies provide the opportunities for continuous learning and interaction among students and lecturers who are able to discuss and share knowledge on the move³². Reading materials are easily shared and referred to, aiding continuous knowledge acquisition and providing student support. The availability of such platforms sometimes lead to lack of commitment of students to formal lectures because they are assured of gathering same knowledge as that shared at lecture rooms on their mobile devices³¹. However, it is asserted that technologies break the barrier of boring and brain-tasking subjects, making knowledge acquisition interesting, increasing mental capacity and providing more productive usage of devices among the audience³¹.

Smart phone technologies bring about exposure to and learning of modern technological skills. The use of smart phone technology exposes users to recent technological skills, developing positive and receptive attitude to technology. Users according to their preferences are able to customise information to meet knowledge acquisition needs and practice safe use of data and technology for individual and national growth³¹.

Through smart phones, users are able to download applications and access social media platforms through which they learn and enjoy professional support^{31,33}. These sites allowed users to broaden their knowledge in their field of specialisation through various discussions, learning and sharing of information among various professional groups around the world³¹. This also allows students to engage in ethical discussions that would question the on-going situations in the society bringing about a shift in the status quo.

CONCEPT MODEL

This study hereby proposes a model that guides the use of smartphone technology innovative strategy on knowledge acquisition for societal development (Fig. 1). From the model, it is seen that there is a need to improve the usage of smartphone technology with the aim of improving knowledge acquisition which should tailor towards societal development. However, innovative strategy being the strong hold of technological growth should be considered in every society as it has been shown here as the major reason, informing the

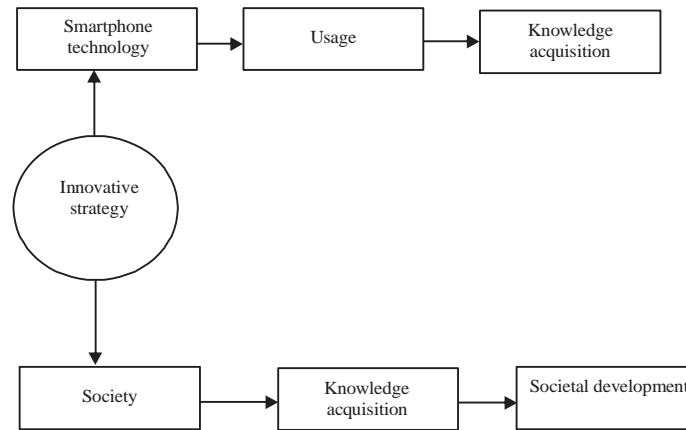


Fig. 1: Smart phone technology innovative strategy on knowledge acquisition for societal development

steady growth in smartphone technology. Hence, an integration of such idea in any society should as well result to growth in the society.

CONCLUSION

The study has looked at the need to adopt the elements informing the steady growth in smart phone technology into any society for steady growth. Also, a major factor identified as innovative strategy should be such that societies should embrace for its development. This has been demonstrated in the model presented in this paper as a direction worth considering in any society aspiring for positive impact for its individuals, thus opening more opportunities to the societal community.

SIGNIFICANCE STATEMENT

This study discovers the diverse use of smart phone technology and how its specific use for knowledge acquisition can be beneficial for societal development. As smartphone manufacturers introduce flagships and improve on previous technology, the user experience changes, improved access to vital information globally and knowledge acquisition influences individuals in all works of life and in various sectors of the society, bringing about an all-round development. This study has helped the researcher to uncover the critical areas of innovative technology, closing the knowledge gap in the society, the social impact of smart phones and the use of technology for educational learning that many researchers were not able to explore. Thus, a new model on smart phone technology innovative strategy and knowledge acquisition for societal development may be arrived at.

REFERENCES

1. Wood, D., 2003. What is technology? Definition and types. <https://study.com/academy/lesson/what-is-technology-definition-types.html>
2. Klein, E., 2012. Technology is changing how we live, but it needs to change how we work. <https://www.vox.com/a/new-economy-future/technology-productivity>
3. Sarwar, M. and T.R. Soomro, 2013. Impact of Smartphone's on society. *Eur. J. Scient. Res.*, 98: 216-226.
4. Rambitan, V.M., 2015. The effect of smartphone on students' critical thinking skill in relation to the concept of biodiversity. *Am. J. Edu. Res.*, 3: 243-249.
5. Martin, T., 2014. The evolution of the smartphone. <https://pocketnow.com/the-evolution-of-the-smartphone>
6. Tech Savvy Session, 2016. Introduction to smartphones Part 2. Telstra Corporation Limited. <https://www.telstra.com.au/content/dam/tcom/seniors/pdf/beginners-intro-smart-phones.pdf>
7. Miyashita, Y., 2012. Evolution of mobile handsets and the impact of smartphones. InfoCom Research, Inc. https://www.icr.co.jp/docs/Evolution_of_Mobile_Handsets_and_the_Impact_of_Smartphones.pdf
8. Campbell, A. and T. Choudhury, 2012. From smart to cognitive phones. *IEEE Pervas. Comput.*, 11: 7-11.
9. Anonymous, 2012. Moore's law. <https://www.kth.se/social/upload/507d1d3af276540519000002/Moore's%20law.pdf>
10. Braunerhjelm, P., 2010. Entrepreneurship, innovation and economic growth past experiences, current knowledge and policy implications. Working Paper 02. Swedish Entrepreneurship. https://entreprenorskapsforum.se/wp-content/uploads/2013/03/WP_02.pdf
11. Dolinsek, S. and P. Strukelj, 2012. Technology, wealth and modern management of technology. *Manag. Global Trans.: Int. Res. J.*, 10: 29-49.

12. Pentzaropoulos, G.C., 2016. New technologies, the infoworld and the need for actionable knowledge. *Elect. J. Philos.*, 22: 51-61.
13. Anonymous, 2007. Information and communication technology in small business. Chapter 7. Why it is important. https://www.wiley.com/legacy/Australia/PageProofs/BUS_MAN/1_2/KC_VCE_BusMgmt_U1%262_3E_c07__WEB.pdf
14. Pisano, G.P., 2015. You need an innovation strategy. *Harvard Bus. Rev.*, 93: 44-54.
15. Chen, X., 2013. The influence of social media on knowledge gaps about science and technology among Chinese audiences. Graduate Thesis, Iowa State University, Iowa.
16. Littlejohn, S.W. and K.A. Foss, 2009. *Encyclopaedia of Communication Theory*. SAGE Publications, USA.
17. Baran, S.J. and D.K. Davis, 2009. *Mass Communication Theory, Foundations, Ferment and Future*. 5th Edn., Wadsworth Cengage Learning, USA.
18. Anaeto, S.G., O. Onabajo and J.B. Osifeso, 2012. *Models and Theories of Communication*. African Renaissance Books Incorporated, Senegal.
19. Smith, J. and K. Tran, 2017. Smartphone adoption on the upswing in Nigeria. *Business Insider*, April 28, 2017. <https://www.businessinsider.com/smartphone-adoption-on-the-upswing-in-nigeria-2017-4?IR=T>
20. Statista, 2018. Number of smartphone users in Nigeria from 2014 to 2019 (in millions). <https://www.statista.com/statistics/467187/forecast-of-smartphone-users-in-nigeria/>
21. Miakotko, L., 2017. The impact of smartphones and mobile devices on human health and life. <http://www.nyu.edu/classes/kefer/waoe/miakotkol.pdf>
22. Wilmer, H.H., L.E. Sherman and J.M. Chein, 2017. Smartphones and cognition: A review of research exploring the links between mobile technology habits and cognitive functioning. *Front. Psychol.*, Vol. 8. 10.3389/fpsyg.2017.00605
23. Berkley, S., 2013. How cell phones are transforming health care in Africa. <https://www.technologyreview.com/s/519041/how-cell-phones-are-transforming-health-care-in-africa/>
24. The University of Scranton, 2018. How the smartphone has impacted economic development. <https://elearning.scranton.edu/resource/business-leadership/how-the-smartphone-has-impacted-economic-development>
25. Onciu, S., 2015. Disruptive innovation and students' performance-mobile device use and overuse. <http://www.mobishop.eu/blog/interesting/mobile-device-use-and-overuse/>
26. Bozeman, M., 2011. Smartphone obsession the latest addiction. *Bozeman Daily Chronicle*, July 27, 2011. <https://www.bozemandailychronicle.com/>
27. Ezemenaka, E., 2013. The usage and impact of internet enabled phones on academic concentration among students of tertiary institutions: A study at the University of Ibadan, Nigeria. *Int. J. Edu. Devel. Infor. Commun. Technol.*, Vol. 9.
28. Pitichat, T., 2013. Smartphones in the workplace: Changing organizational behavior, transforming the future. LUX: J. Trans. Writing Res. Claremont Graduate Univ., Vol. 3. 10.5642/lux.201303.13.
29. Mamudu, P.A. and A.O. Oyewo, 2015. Use of mobile phones for academic purposes by law students of Igbinedion university, Okada Nigeria. *Int. J. Library Sci.*, 4: 65-72.
30. Woodcock, B., M. Armstrong, A. Nortcliffe and A. Middleton, 2012. Smart-device potential for student learning. *Proceedings of the International Conference on Computer Supported Education*, April 16-18, 2012, Porto, Portugal, pp: 410-415.
31. Sanusi, B.O., O. Adelabu and J.K. Okunade, 2014. Adapting social media for formal learning in Nigeria: Challenges and prospects. *Arabian J. Bus. Manage. Rev.*, 3: 22-30.
32. Cifuentes, O.E. and N.H. Lents, 2011. Increasing student-teacher interactions at an urban commuter campus through instant messaging and online office hours. *Electron. J. Sci. Educ.*, 14: 1-13.
33. Bansal, T. and D. Joshi, 2014. A study of students' experiences of mobile learning. *Global J. Hum. Soc. Sci.*, 14: 26-33.