IOSR Journal of Mobile Computing & Application (IOSR-JMCA)
e-ISSN: 2394-0050, P-ISSN: 2394-0042.Volume 3, Issue 5 (Sep. - Oct. 2016), PP 38-46
www.iosrjournals.org

The Challenges in the Use of Mobile Instant Messaging Systems in Universities

[1]Ratemo Makiya Cyprian, [2]Anselemo Peters Ikoha, [3]Elyjoy Micheni
[1]Maseno University, [2]Kibabii University, [3]The Technical University of Kenya

Abstract: *Mobile Instant Messaging (MIM) encompasses a range of internet-based facilities that enable exchange of real-time messages using mobile phones. The value of MIM has widely been recognized in recent times, instigating an upsurge in its use across the society. The upsurge underscores the potential of MIM in universities due to the strengths the technology presents such as real time messaging, versatility, portability, affordability among others. In spite of manifested value of MIM, institutions are yet to fully embrace the technology. In light of the aforementioned, this paper aimed to determine way forward in MIM use in universities. The study specifically sought to assess the current situation in the use of MIM, identify challenges in the context of existing success models and way forward. Mixed methods research design was used and survey and multiple case designs were used. Both quantitative and qualitative strategies were used. Simple probability sampling method was used to obtain a sample of 655 respondents drawn from four cadres of respondents in Kenyan public universities as follows; ninety three (93) Information and Communication Technology (ICT) administrative staff, ninety six (96) ICT technical staff, ninety eight (98) academic staff and three hundred and sixty eight (368) students. Data was collected by the use of questionnaires and interviews. Validity was ensured through triangulation, peer debriefing and review. Reliability test was done and generated a Cronbach's Alpha value of 0.827. Ethical considerations were taken into account and relevant clearances sought as required. Thematic analysis method was used to analyze qualitative responses whereas descriptive and inferential statistics were used to analyze quantitative responses. Findings revealed a high rate of use of mobile phones and MIM in institutions, underscoring the potential and need for a suitable IS success model with MIM. In particular, MIM penetration rate for academic staff stood at 63%, students at 60% and combined ICT administrative and ICT technical staff at 34%. Findings of the study were considered important for the academia given the MIM-related knowledge generated, and anticipated in the further research recommended herein.*

Keywords: *Information Success Model, Instant Messaging, Mobile Instant Messaging, Success Factor*

I. Introduction

Mobile technology and services are increasingly used in the work context and may benefit the users and companies in several industries. Mobile services for business use include both business-to-employee and business-to-business applications that are used to enhance the mobility and accessibility of employees and the efficiency of business processes (Chen & Nath, 2004; Liang *et al*., 2007). The goal of deploying these services is to achieve business performance impacts, including cost savings, increased productivity and various intangible impacts, such as employee and customer satisfaction, creation and use of knowledge assets and image of a company (Alanen & Autio, 2003; Evans, 2002; Gebauer & Shaw, 2004; Rangone & Renga, 2006; Sheng *et al*., 2005). However, the measurement of these impacts has been difficult as companies do not usually have a comprehensive way to assess the overall impacts of these services (Chen & Nath, 2008). The identification and measurement of intangible and other non-financial performance impacts have repeatedly been reported to be complicated and thus, often neglected (Irani, 2002; Gunasekaran *et al*., 2006). There is usually an underlying assumption that more utilization of a technology means more benefits, but this is often false in practice (Goodhue, 2007). For a technology to positively affect performance, it must be utilized and it must be appropriate for the task (Goodhue, 2007) and more broadly for the mobile and organizational contexts in which it is used.

The value of MIM has widely been recognized in recent times, instigating an upsurge in its use across all segments of society. The upsurge underscores the potential of MIM in universities due to the strengths the technology presents such as real time messaging, versatility, portability, affordability among others. In spite of manifested value of MIM, institutions are yet to fully embrace the technology. In light of the aforementioned, this paper aimed to determine way forward in MIM use in universities. The study specifically sought to assess

the current situation in the use of MIM, identify challenges in the context of existing success models and way forward.

II. Literature Review

Literature was reviewed in line with the objectives of the paper and further detailed in this section as follows.

Mobile Technology and Related Services in Institutions

Using mobile technologies in the work environment is still at the adoption and learning phase in many companies: thus the impacts have been little studied from the performance measurement perspective. The large sum of money spent on information technology (IT) and information system (IS) projects in general and the high degree of uncertainty associated with the adoption of new technology (benefits, risks, and costs) implies that the measurement of IT/IS should assume great importance (Irani *et al*., 2002; Gunasekaran *et al*., 2006). Although the importance of measuring success in the mobile work context has also been acknowledged, many organizations do not have comprehensive ways to measure success, or it may not be a priority at this point (Chen & Nath, 2008). In fact, IT investments in general have often been based on beliefs in the benefits rather than on any sound attempts to measure such benefits (Fitzgerald, 1998). The lack of understanding and measuring the holistic implications of adopting new technology may lead decision-makers to invest in unproductive technology and at the same time to refuse to implement a technology that could be beneficial to their long-term competitiveness (Irani *et al*., 2002; Gunasekaran *et al*., 2006). Seddon *et al*. (2000) report that the main difficulty in evaluating IT projects has been the identification and measurement of benefits, and particularly intangible benefits. In addition, the special characteristics of mobile work necessitate considering many new issues in order to understand the performance impacts of mobile services. Therefore, there seems to be a need to consider new approaches to identifying and measuring the business performance impacts of mobile business services and to have empirical evidence of how the measurement could be conducted in practice.

Comparison of Mobile Services and Other Technology-based Services

Mobile services differ from other technology-based services due to the ability to provide service offerings independent of time and location (Heinonen & Pura, 2006). The purpose of using mobile services is to provide value above other methods through ubiquitous access, time, convenience and mobility (Ancar, 2002). Mobile services can be characterized in many ways, for example, based on technology (e.g., WAP, SMS), functionality (messaging, infotainment (information and entertainment), enterprise services, commerce etc.), customer needs or the characteristics of the task (Turel, 2006). Mobile services are usually classified based on the target user into business-oriented and consumer-oriented services (Chen *et al*., 2005), or business-to-consumer (B2C), business-to-business (B2B) and business-to-employees (B2E) services (Leem *et al*., 2004; Rangone & Renga, 2006).

Service refers to a perspective on creating value-in-use as defined and experienced by customers (Edvardsson *et al*., 2005). The performance impacts are also studied from the customer perspective at various levels, therefore, it is important to understand who the customer is. The aim of a mobile business service is to create value for the customer organization (and employees and other stakeholders of the organization) as distinct from creating value for the individual consumer. The role of the customer is twofold and sometimes customer and user may even refer to different roles of the same person – a customer selects the service provider and which of the services offered to buy, whereas a user selects and uses applications and decides how long and how much they are used (Pohjola & Kilkki, 2007). In the business context, the use may also be mandatory and the user is usually not involved in selecting which services to use. There are several players involved in provisioning mobile services to end-users, for example, network and device vendors, network operators, service providers, content providers and third party software developers (Verkasalo, 2009). A service provider deals with the customer relationship and designs service portfolio, pricing and marketing (Pohjola & Kilkki, 2007). The end-users of these services are employees whose employer pays for the services. A useful mobile service can improve the efficiency of work and also improve employee satisfaction.

Evolution of Mobile Instant Messaging Systems

The concept of Instant Messaging started in 1961 when the Compatible Time-Sharing System (CTSS) was developed at Massachusetts Institute of Technology (MIT)'s Computation Center (Messmer, 2010). It

enabled up to thirty users to be logged in and simultaneously exchange messages with each other. Since then, instant messaging technology has improved significantly with the emergence of Zephyr Notification Service, Bulletin Board System (BBS) and Internet Relay Chat (IRC) that was developed at MIT in the 1980s (Chu *et al*, 2008).

The kind of instant messaging we are familiar with today was born in 1996 (Messmer, 2010). ICQ "I Seek You" was the first text-based messenger that conquered the market of online users. ICQ allowed multi-user chats, file transfers, a searchable user directory among others (Chu *et al*, 2008; Mas *et al*, 2010). It also had such features as buddy lists, presence notifications besides sending of instant messages. The ICQ client was very easy to use since it came with graphical user interface as opposed the previous ones that were purely text-based. ICQ was free and explosively became popular, with a user base of over 850,000 within a period of six months since its release (Messmer, 2010).

AOL launched AIM in 1997 and the following year, Yahoo launched Yahoo! Messenger and Pidgin, founded as "Gaim". Microsoft released MSN Messenger in 1999. Apple developed iChat, or iChat AV, for its Mac OS X operating system in 2002 and Mac users could integrate their address books and Apple Mail in a native app compatible with AIM (Chu *et al*, 2008; Mas *et al*, 2010). Skype emerged in 2003 and it could allow Internet users to communicate with others through video, voice and instant messaging.

Meebo began in 2005 as an instant messaging service accessed via web browser (Chung *et al*, 2009). In the same year Google released Google Talk, often referred to as Google Chat or Gchat, available in various web, native and mobile applications. The same year Microsoft renamed their service Windows Live Messenger, adding photo sharing capabilities, social network integration and games (Chung *et al*, 2009). In 2009, the company announced more than 330 million active users every month (Chu *et al*, 2008; Mas *et al*, 2010). In July 2011, Skype announced integration with Facebook, so users could see Facebook friends on Skype and see Facebook Chat through both services.

Myspace developed MySpaceIM in 2006 as an addition to its social platform the first social network to do so (Messmer, 2010). Users could instant message with friends on their desktops, as well as online starting in 2009, through MySpaceIM for Web (Messmer, 2010). Facebook released Facebook Chat in 2008, allowing users to instant message one friend or multiple people through the groups feature while logged into the social network. In 2011, Facebook announced the incorporation of video in Chat (Vatanparast *et al*, 2010). Figure 2.1 displays the growth of users of instant messengers over four years since 2010.

Common Mobile Instant Messaging Platforms in Use Today

Some of the Mobile Instant Messaging applications used across the world today include the Whatsapp, WeChat, Facebook, LINE and Viber among others. Figure 2.2 demonstrates the relationship between Mobile Instant Messaging applications commonly used today.

WhatsApp is the most popular of all which is defined by the vendor as a cross-platform mobile messaging app that allows users to exchange messages without having to pay for them (WhatsApp, 2014). On February 19 2014, Facebook Inc. acquired WhatsApp Inc for $19 billion. WhatsApp has as at January 2015 over 700 million active monthly users (Statistica, 2015). Facebook messenger is another popular instant messenger owned by Facebook Inc. that also owns WhatsApp messenger (Facebook, 2013). WeChat on the other hand is a mobile messaging application released by China's Internet giant Tencent. Viber is another instant messaging voice over Internet protocol application for smart phones (Tencent, 2014). On 14 February 2014, the company was acquired by Rakuten for $900 million. LINE is a Japanese proprietary application for instant messaging on smart phones and personal computers that allows users to make free voice calls and send free messages.

Statistics onCurrent Mobile Instant Messaging Platforms

Figure 1 demonstrate the trends in instant messaging with respect to user base, and number of messages exchanged respectively. Figure 2 on the other hand shows that the number of active WhatsApp users worldwide increases significantly over time since April 2013. This suggests that the number will grow even in the days to come.

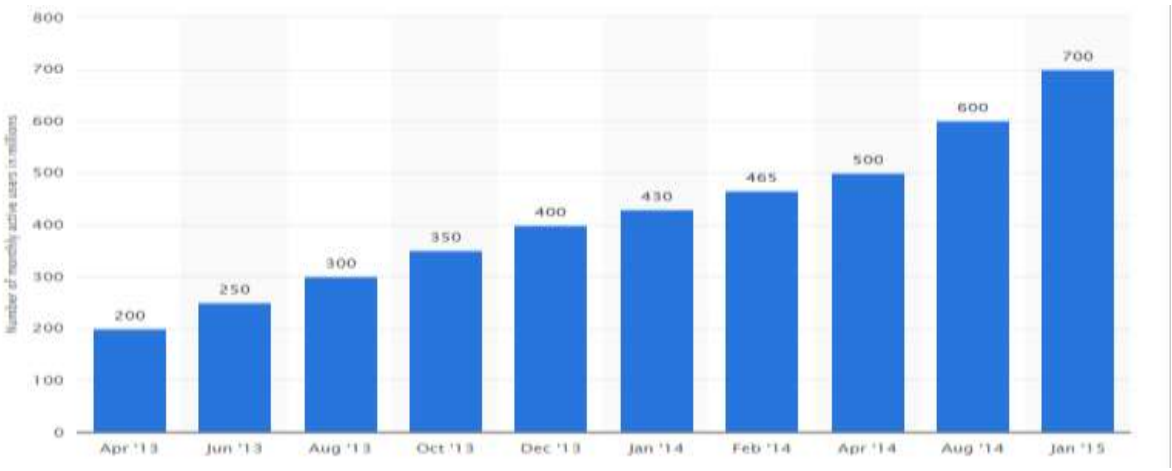

Figure 1 Monthly active WhatsApp users worldwide 2013-2015 (Statistica, 2015)

Figure 2 indicates that daily mobile message volume of WhatsApp messenger has constantly increased over time since October 2011. Going by the trend depicted in the Figure 2.4, this scenario will continue and the daily volume will increase. Daily mobile message volume is a good indicator of how messages using a mobile phone compares with other available alternatives (Statistica, 2015).

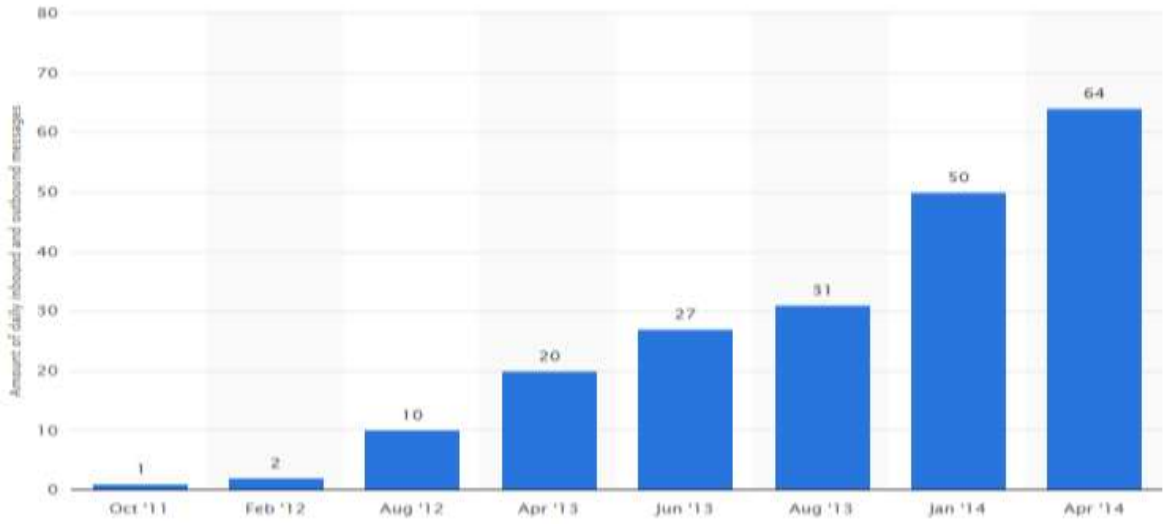

Figure 2 Daily mobile message volume of WhatsApp messenger (Statistica, 2015)

Figure 3 indicates that Instant messaging is three times more popular than all the others put together; underscoring the value of Mobile Instant Messaging. This fact places IM apps as having great potential compared to the possible alternatives.

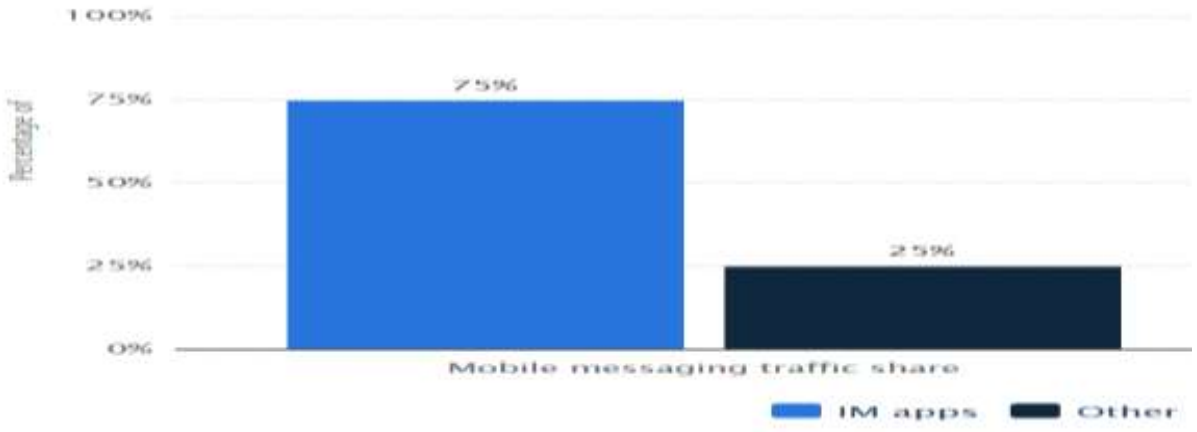

Figure 3 Instant messaging app share of mobile messaging traffic (Statistica, 2015)

III. Research Methodology

Mixed methods design was employed in the study with both quantitative and qualitative methods being used. The study was carried out amongst ICT administrative staff, ICT technical staff, academic staff of ICT-related courses and students pursuing ICT related programs in the Kenyan public universities selected for the study. Simple probability sampling method was used to obtain the sample, drawn from four cadres of respondents as follows; ninety six (96) ICT technical staff, ninety three (93) ICT administrative staff, ninety eight (98) academic staff and three hundred and sixty eight (368) students. Primary data was collected through the use of questionnaires and interviews. The data collection instruments were pre-tested and revised through a pilot study to guarantee their validity and reliability. Validity was achieved through triangulation, peer debriefing and review, prolonged engagement with respondents and data audits. Reliability was ensured through a reliability test that generated a Cronbach's Alpha value of 0.827, higher than the recommended minimum of 0.8 in reliability tests. Ethical considerations were taken into account and correct procedures were followed in the study. Requisite clearance was sought from National Council for Science, Technology and Innovation. Further clearance was sought from relevant departments of government at county level and the institutions under study. Thematic analysis method was used to analyze qualitative responses. Quantitative data was analyzed using descriptive and inferential statistics.

IV. Research Findings

Mobile Phone Penetration amongst Targeted Stakeholders in Universities

Data generated from respondents in this context focused on whether the respondents have a basic mobile phone, a smart phone that can support Mobile Instant Messaging or has no phone at all. Access to mobile phone technology is paramount in the access to Mobile Instant Messaging facility by the targeted respondents. The responses generated were presented suitably as hereunder to facilitate inference;

Mobile Phone Penetration amongst Students of ICT-Related Courses

Penetration of the mobile phone was found to be high at 93%, with those with a basic phone taking 15% and those with an internet-ready phone with internet capability to support Mobile Instant Messaging being 78%. The students with a basic phone were however not left out in accessing an internet-ready phone since the study found out that students shared time and could access services of a smart phone through the use of their friends who possessed smart phones. This scenario significantly raises the percentage of students who have access to smart phone services above the percentage of those who actually own smart phones.

Mobile phone penetration amongstICT Academic staff

Penetration of the mobile phone amongst academic staff of ICT related courses was found to be high at 99%, with those with a basic phone taking 8% and those with an internet-ready phone with internet capability to

support Mobile Instant Messaging being 91%. Generally, the penetration rate of basic phone and smart phone was higher at 99% compared to 91% in the student category. Basic phone was higher amongst academic staff of ICT related courses at 15% compared to 9% amongst the staff. The higher penetration rate of mobile phone and smart phone amongst academic staff category as compared to student's category is as a result of the difference in socio-economic status of the two categories of respondents. Just like in the case of the students category, academic staff with a basic phone are however not left out in accessing an internet-ready phone since they could access services of a smart phone through the use of their friends who possessed smart phones also had access to the web-based services of a smart phones through via computers accessible in the offices, computer laboratories and cyber cafes. The study therefore revealed that 99% of academic staff of ICT related courses have access to web-based smart phone services albeit not regularly regardless of whether or not they owned a smart phone.

Mobile Phone Penetration amongst ICT Administrative and Technical Staff

Penetration of the mobile phone amongst administrative and ICT technical staff was found to be high at 89%, with those with a basic phone taking 22% and those with an internet-ready phone with internet capability to support Mobile Instant Messaging being 67%. 11% of the respondents were not connected at all. Just like in the case of the students' category, administrative and ICT technical staff with a basic phone are not left out in accessing services of a smart phone since they could access the services through their friend's smart phones and also could access the web-based services through via computers accessible in the offices, computer laboratories and cyber cafes'. The study therefore revealed that 99% of academic staff of ICT related courses have access to web-based smart phone services albeit not regularly regardless of whether or not they owned a smart phone.

Comparison of Level of Mobile Penetration across the Different Categories

The data for university ICT technical and administrative staff was presented as shown in Figure 4.

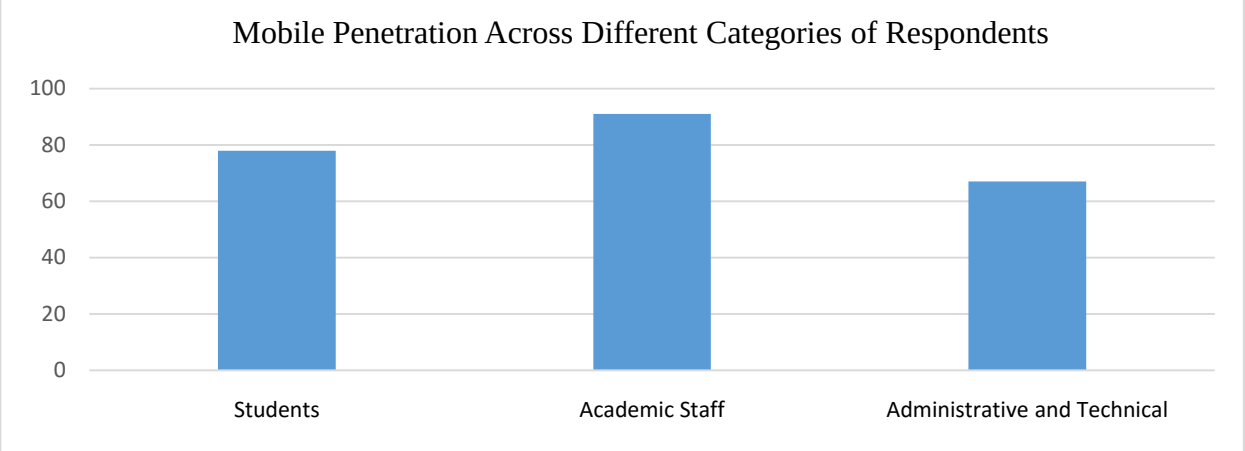

Figure 4 Mobile penetration across different categories of respondents

Different groups differed in terms of the level of use of the mobile phone as highlighted in Figure 4.4. Mobile phone penetration is highest amongst academic staff at 91%, followed by students pursuing ICT-related courses at 78% and lastly administrative and ICT technical staff at 67%. Social-economic status of the respondents played a role in determining the difference in the penetration rate of academic staff and the other staff, but the penetration rate for students was higher than that of administrative and ICT technical staff because of the level of reliance on technology given their age.

Penetration Level of MIM-Ready Mobile Devices in Universities

Mobile Instant Messaging is not possible with just any phone. It is possible with internet-ready mobile phones, with the right mobile application deployment environment, MIM application and right configuration. Data regarding penetration of MIM-supportive mobile devices was analyzed as detailed in Figure 2.

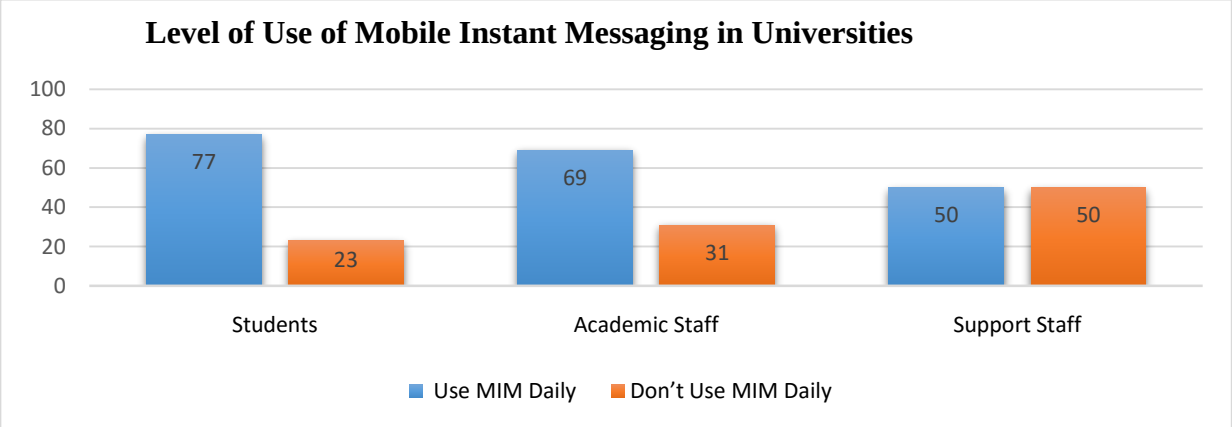

Figure 5 Level of Use of Mobile Instant Messaging Services in universities

Data that was generated by this study indicate that various categories of respondents have different levels of use of Mobile Instant Messaging technology. 77% of students pursuing ICT-related courses use Mobile Instant Messaging technology which is high underscoring the potential of the technology amongst that category of respondents. 69% of academic staff of ICT related courses use the technology in regard to their daily activities which further emphasizes the usefulness of the technology currently. 50% of administrative and ICT technical staff were found to use the technology. The percentage was low compared to the other categories because of the nature of activities that this category of respondents is involved in. Unlike students and academic staff of ICT related courses, the interaction between this category and the others is limited, and is still largely guided by existing formal systems that have not yet opened up to enterprise Mobile Instant Messaging. It was revealed that a higher percentage of respondents would use the technology in each category if use of the technology is streamlined.

Ownership of MIM-ready Phone and Actual Use of MIM

Data analysis showed that various categories of respondents manifested different levels of possession of MIM-ready phones. This could be associated with the difference in age, level of education, social status, and economic status among others. Table 4.16 shows how the different categories of respondents compared with respect to use of MIM.

Data analysis showed that ownership of MIM-ready device and actual use of the devices to get MIM services differed. The level of penetration of MIM-ready mobile devices amongst respondents was generated as shown in Figure 6, showing the relationships between the highlighted aspects.

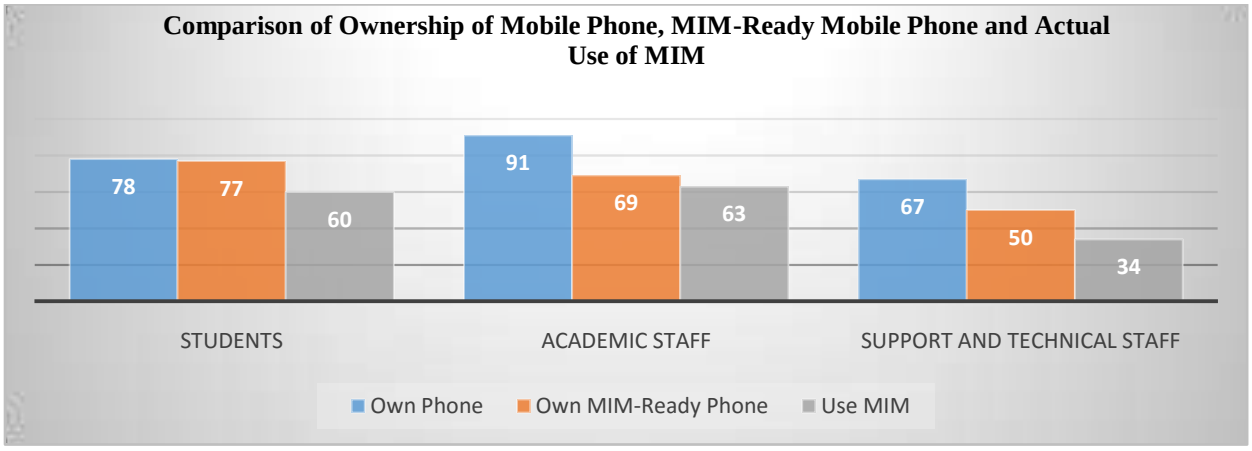

Figure 6 Comparison of ownership of mobile phone and actual use of MIM

Ownership of MIM-Ready phone, and the use of the MIM services were found to differ across the different categories of respondents. Whereas 99% of students with MIM-Ready phones actually used MIM

services, the rest of the categories of respondents manifested a larger difference in the two aspects. Only 76% of the academic staff of ICT related courses and 75% of administrative and ICT technical staff with MIM-Ready phones actually used MIM services.

Factors that influence the adoption of the user's preferred MIM

Respondents largely learned about the MIM they use through a friend with 65% of them saying so. Social media was second source of information about MIM that the respondents are subscribed to standing at 17%. Mainstream media accounted for 10% and the rest 8%.

Benefits of Mobile Instant Messaging in universities

Respondents cited a variety of strengths that MIM possessed over the other alternatives including; versatility of the technology, affordability and little time required to deploy information across devices. Versatility of Mobile Instant Messaging technology was described to include the diversity of information formats that the technology supports. The formats include audio, text, video, contacts and other various formats for documents that can be exchanged as attachments. This versatility of Mobile Instant Messaging lacks in other technologies such as SMS, MMS among others.

Impediments in the use of Mobile Instant Messaging in universities

Data collected about impediments in the use of Mobile Instant Messaging was presented in form of a pie-chart shown in the Figure 4.11;

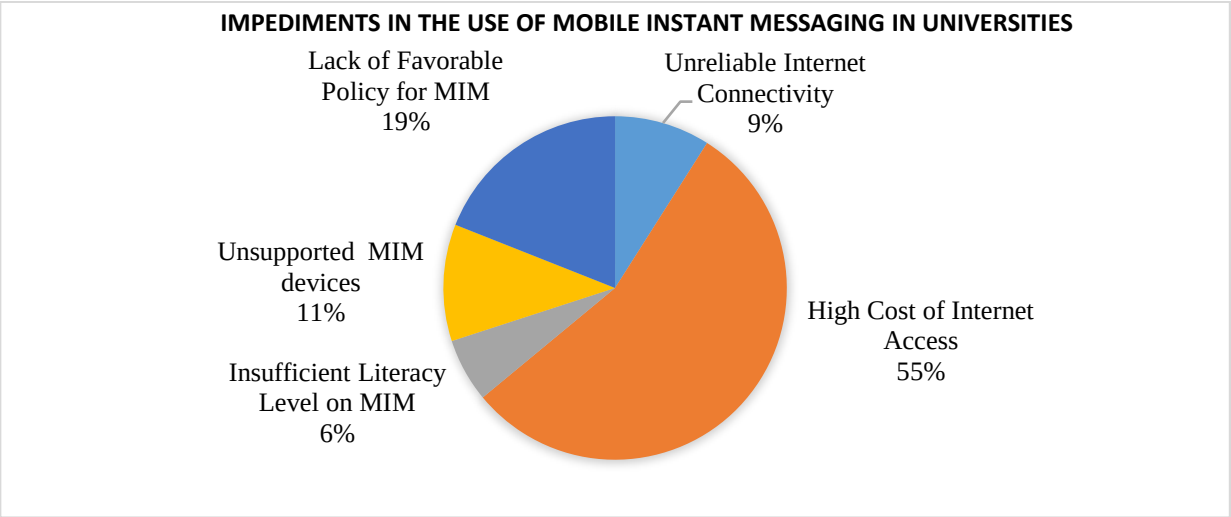

Figure 7 Impediments in the use of Mobile Instant Messaging in universities

Research findings revealed that the limitations that respondents face include the following; unreliable internet connectivity, sufficient ICT literacy level, availability of ready-to-use device among others. The cost of internet access rated highest taking 55% of the total percentage. 19% of the respondents cited lack of favorable policy for MIM, 11% cited lack of right mobile devices that support MIM services. 9% of the population cited unreliable internet connectivity as 6% cited insufficient literacy level among respondents.

Challenges of Mobile Phones which Support Mobile Instant Messaging

Even though only aspects affecting MIM services are considered here, most of them apply to mobile services in general. The limitations of mobile phones that support MIM include the following as presented in Figure 4.12.

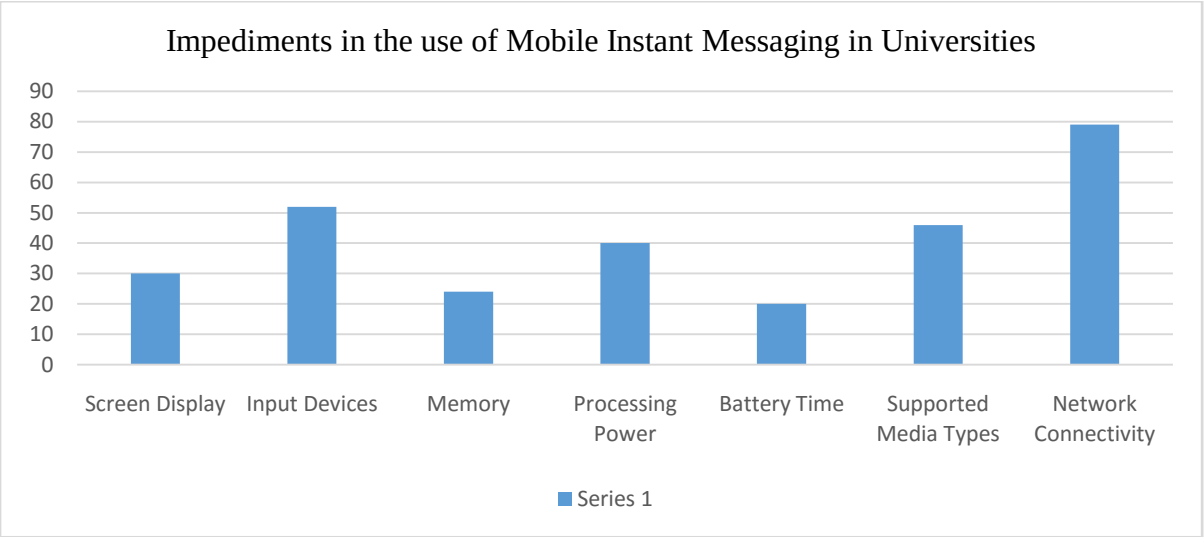

Figure 8 Impediments in the use of Mobile Instant Messaging in universities

Screen Display: Screen display is a limitation since in making mobile phones to be portable, screen displays must be somewhat small to be appropriate for the devices. With the small display size, special emphasis must be put on user interface design for mobile applications.

Input Devices: Another limitation is with respect to input devices. Constraints of portable devices make a number of input devices impossible to use (for example keyboards and mice) with mobile devices. Mobile devices come with limited keyboards, navigator buttons, touch screens or pointing devices.

Memory: Memory in mobile devices is also somewhat limited. Because of these memory limitations, some mobile devices are unable to receive large amounts of data.

Processing Power: Processing Power: Mobile devices are also limited with respect to their processing power. The various data formats in mobile devices require high processing power to encode and decode for network transmission, causing a challenge.

Battery life: Battery life/durability is another limitation. Since all mobile devices are powered by rechargeable batteries, this poses a challenge. Given the sophistication of mobile devices, there is high need for power thus powering such devices for long periods of time becomes a challenge.

Media Types: All mobile devices do not support all media types. This poses a challenge as parties engaging in a communication have to find out the mutually supported formats.

Network Connectivity and Coverage: Bandwidth is a factor that must be considered in mobile services. Besides the reduced bandwidth, bandwidth variations are more frequent in wireless networks. Network coverage is an aspect that applies to wireless networks and not in wireline networks. Network coverage is lost when the mobile device is outside of coverage area posing a challenge to availability of mobile services.

V. Conclusion and Recommendations

In conclusion, the study found that mobile phone penetration across all cadres of respondents is high and consequently gives promise to services that are supported by the mobile phone. One such technology supported by the mobile phone, as revealed in the previous chapter, is mobile instant messengers. Research findings further indicate that this technology holds a lot of potential given the features that respondents in the area under study find useful. A suitable success model was found to be a way forward to guide all stake-holders in adoption, implementation and use of mobile instant messaging systems.

This study recommends further research in the context of e-learning and m-learning platforms. The current study focused on face-to-face mode of study as opposed to the alternative emergent modes of study. The recommended study will hopefully impact positively on the utilization of the strengths presented by the technology as discovered herein so as to improve learning and administrative processes in the context e-learning and m-learning.

This study recommends conducting a research that is aimed at the delivering a solution that monitors key performance indicators of the success factors of Mobile Instant Messaging according to the IS success model developed herein. This solution tracks the key performance indicators and automatically gestures the aspects of success that need intervention by certain relevant persons.

VI. References

[1]. Alanen, J., Autio, E. (2003) "Mobile business services: a strategic perspective", In Mennecke, B. E. and Strader, T. J. (eds.), Mobile Commerce: Technology, Theory and Applications, Idea Group Publishing, pp. 162–184.

[2]. Barnes, S. (2003) "Enterprise mobility: concepts and examples", International Journal of Mobile Communications, Vol. 1, No. 4, pp. 341–359.

[3]. Chen, L, Nath, R. (2004) "A framework for mobile business applications", International Journal of Mobile Communications, Vol. 2, No. 4, pp. 368–381.

[4]. Chen, L., Nath, R. (2008) "A socio-technical perspective of mobile work", Information Knowledge Systems Management, Vol. 7, No. 1/2, pp. 41-60.

[5]. Heinonen, K.,Pura, M. (2006) "Classifying Mobile Services", Helsinki Mobility Roundtable, Helsinki School of Economics, June 1-2, 2006.

[6]. Hindocha N."Threats to Instant Messaging", Technical report, Symantec Security Response, October 2002. Available at: http://www.symantec.com/avcenter/ reference/threats.to.instant.messaging.pdf [re

[7]. Liang, T., Wei, C. P. (2004) "Introduction to the special issue: mobile commerce applications", International Journal of Electronic Commerce, Vol. 8, No. 3, pp. 7-17.

[8]. Liang, T., Huang, C. W., Yeh, Y-H. and Lin, B. (2007) "Adoption of mobile technology in business: a fit-viability model", Industrial Management & Data Systems, Vol. 107, No. 8, pp. 1154–1169.

[9]. Maggie Shiels, "A Chat with the Man Behind Mobiles". http://news.bbc.co.uk/2/hi/uk_news/2963619.stm (Accessed April 9th, 2009)

[10]. Mitsuoka M., Watanabe S., Kakuta J., and Okuyama S. Instant Messaging with Mo- bile Phones to Support Awareness. In Symposiumon Applications and the Internet, pages223–230,January 2001.

[11]. Nicholls P. "Short Message Service Longon Possibilities". Available at: http://www. klixxx.com/archive/smssolution.shtml [referred to30.8.2004].

[12]. Parvianen R., Parnes P. "Mobile Instant Messaging", In 10th International Conference on Telecommunications, pages 425–430, 2003.

[13]. Pohjola, O. P. and Kilkki, K. (2007) "Value-based methodology to analyze communication services", Netnomics, Vol. 8, No. 1-2, pp. 135-151.

[14]. Pun, K.F., White, A.S. (2005) "A performance measurement paradigm for integrating strategy formulation: A review of systems and frameworks", International Journal of Management Reviews, Vol. 7, No. 1, pp. 49–71.

[15]. Quintana A., Ramsinghani J., and Walls T. Peer-to-Peer Computing: The Search for Viable Business Models. Technical report, Kellogg Tech Ventures, 2001. Avail- able at: http://www.ranjaygulati.com/new/research/PEER-TO.pdf[referred to 30.8.2004].

[16]. Rangone, A., Renga, F. (2006) "B2e mobile internet: an exploratory study of Italian applications", Business Process Management Journal, Vol. 12, No. 3, pp. 330-343.

[17]. Riege, A.M. (2003) "Validity and reliability tests in case study research: a literature review with "hands-on" applications for each research phase", International Journal of Qualitative Market Research, Vol. 6, No. 2, pp. 75-86.

[18]. Sheng, H., Nah, F., and Siau, K. (2005) "Strategic implications of mobile technology: A case study using Value-Focused Thinking", The Journal of Strategic Information Systems, Vol. 14, No. 3, pp. 1402-1408.

[19]. Sorensen, K. et al (2008) "Exploring enterprise mobility: lessons from the field", Turel, O. (2006) "Contextual effects on the usability dimensions of mobile value-added services: a conceptual framework", International Journal of Mobile Communications, Vol. 4, No. 3, pp. 309-332.

[20]. Verkasalo, H. (2009) "Handset-Based Analysis of Mobile Service Usage", Doctoral dissertation, Department of Electronics, Communications and Automation, Helsinki University of Technology.

[21]. Vuolle, M. & Käpylä, J. (2010) "Theoretical Evaluation Models Used in Mobile Work Context," the Proceedings of the Ninth International Conference on Mobile Business / Ninth Global Mobility Roundtable, Athens, Greece, June 13-15 2010, pp. 425-431.
[22]. Information Knowledge Systems Management, Vol. 7, No, 1/2, pp. 243-271.
[23]. Vogiazou Y. "Wireless Presence and Instant Messaging". Technical report, Knowledge Media Institute, November 2002.
[24]. Yuan, Y., Archer, N., Connelly, C. E., and Zheng, W. (2010) "Identifying ideal fit between mobile work and mobile work support", Information & Management, Vol. 47, No. 3, pp. 125-137.
[25]. Zheng, W., Yuan, Y. (2007) "Identifying the differences between stationary office support and mobile work support: a conceptual framework", International Journal of Mobile Communications, Vol. 5, No. 1, pp. 107-122.