Aspects of mobile phone usage in Papua New Guinea: A socio-economic perspective

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Abstract

The identified aspects of mobile phone usage in healthcare and school systems across PNG are predominantly supportive in nature. However, in income-generating activities mobile phones are deemed to be enablers of business as well as direct revenue earners through sales of call credits and other associated accessories. Quantitative and qualitative data from a survey of 727 mobile phone users across seven provinces were analysed to draw this conclusion. Whilst certain non-utilitarian aspects of mobile phone usage were also noted, mobile phones are largely considered to be beneficial for socio-economic development in PNG. Hence to enable socio-economic development and further growth in the ICT sector, competent policy and regulatory initiatives should ensure equitable access and fair tariffs for citizens.

Keywords: Socio-economic development, mobile phones, healthcare and school systems, income-generating, non-utilitarian use, monopolistic tariffs and rents, competent policy and regulatory intervention, and ICT sector.

Introduction

Prior to 2007, information and communication technology (ICT) services in Papua New Guinea (PNG) were limited to urban centres under the monopoly operator, Telikom (Mitchel, 2008). Consequently, price and choice of the limited ICT services were prohibitive denying the populace access and opportunity to communication conveniences. Retrospectively, past limitations in ICT services may have incurred certain business and opportunity costs (Sowei, 2009).

Commencing mid-2007, Digicel entered the mobile market and expanded communication signal coverage across the country enabling connectivity to many people — the mobile phone penetration rate now stands at approximately 41 per cent (ITU 2014), marking a substantial change in the communications landscape. This paper reports on a survey which investigated the impact of mobile phone usage in healthcare, school systems and income-earning activities enveloped under a working definition of 'socio-economic development' against unprecedented diffusion trends. The paper discusses aspects of mobile phone usage on socio-economic development in PNG using dataset from the survey.

The survey was administered to 727 respondents across seven PNG provinces and was designed to investigate socio-economic indicators

influenced by mobile phone usage. Triangulation of quantitative and qualitative data illuminated perceived and experienced usage of mobile phones for purposes citizens have reason to value. The discussions herein concern aspects of mobile phone usage in healthcare, school systems and income-earning activities. Against the backdrop of an overly expanded Digicel network in PNG a single monopoly maybe on the horizon. Therefore a call to attention maybe considered appropriate for ICT sector policy and regulatory competence to ensure healthy development and that fair tariffs and rents for services are available.

Survey method and sites

Site accessibility challenges due to limitations in transportation across PNG required the use of convenience sampling. Citizens who were willing and able to participate in the research were interviewed. The sampling sites were selected to be representative from geographical and cultural standpoints (Figure 1).
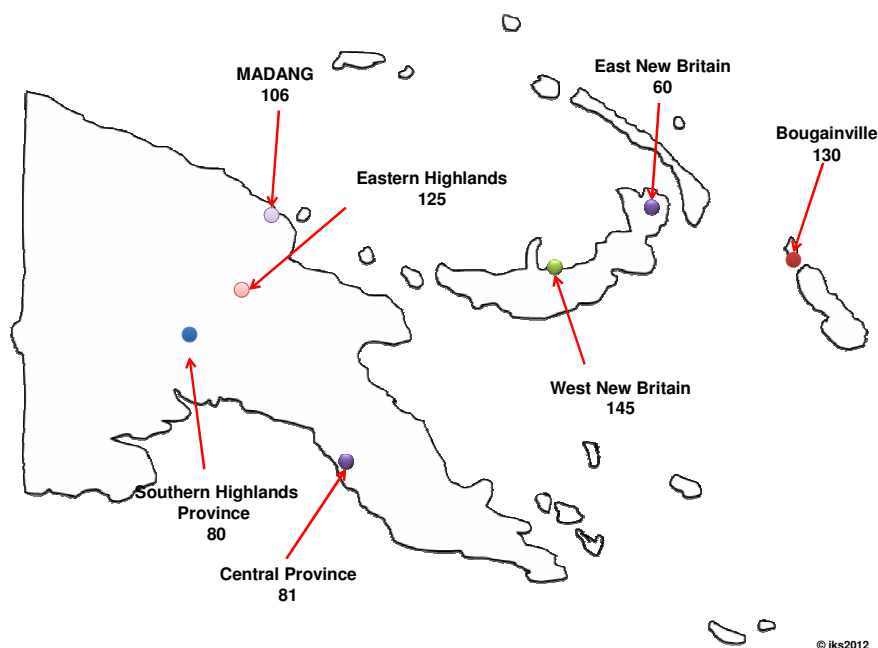

Figure 1: Identifying the data collection sites.

It was considered appropriate to employ mixed methods enveloping quantitative and qualitative data which were triangulated to identify concurrences, gaps and paradoxes. Mixed methods methodology harnessed the beneficial features of both data strands for increased illumination (Teddlie and Tashakkori, 2011) concerning mobile phone impact in PNG. The following section presents both qualitative and quantitative data blended with relevant discussions on how these findings relate to studies in other parts of the world.

Research findings

The qualitative data consisted of open-ended questions and in-depth interviews which were transcribed and processed through thematic analyses. The overarching themes were categorised into three groupings namely healthcare, education and business activity (Figure 2). The thematic analyses process linked each category with sub-themes which were then triangulated with extracted principle components from the quantitative strand (Migiro and Magangi, 2011). Using the process of corroboration of both strands, improved illumination was reached.
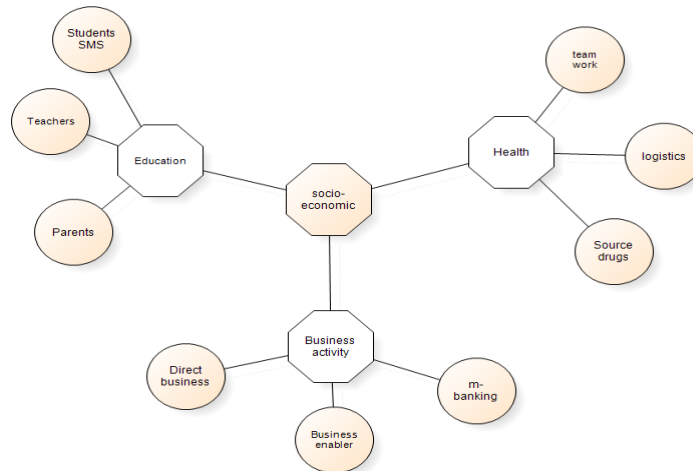
Figure 2: Thematic networks for qualitative data with three overarching themes

Certain sub-themes are quoted verbatim at various sections throughout the paper. This is done to progressively triangulate both strands of data to allow concurrences, gaps and even paradoxes to be identified and explained (Bazeley, 2004). The emergent themes together with the principal component analyses (PCA) components offered evidence to inform the impact of mobile phones on socio-economic development in PNG.

Regarding the quantitative data, statistical regression tests were applied on two separate Likert scales containing attitudes and experiences of those surveyed concerning mobile phones. PCA was used on the dataset to identify simple patterns which represent the whole dataset as has been used in other quantitative data analysis (Beaumont, 2012). The application of PCA conveniently identified primary attitudes towards and uses on mobile phones from the large quantitative sample size. The results are given in Table 1 and Table 2 respectively.

The first Likert scale produced seven PCA components with factor loading score greater than 0.6 for mobile phone usage while five PCA components were extracted from the second scale. Factor loading is a measure of the level of correlation between all variables forming the survey scales used to collect the samples where loading scores less than 0.6 were considered weak attitudes, therefore were not included in the table (Burns & Burns, 2008). The identified PCA components were then juxtaposed with themes from the qualitative strand for improved comprehension.

**Table 1: PCA components of users' perceptions on mobile phone usage**

No	PCA factor	Factor loading	Explanation
PCA 1	Component 1 – mobile phone usage changes English and *Tok pisin.*	0.83	Mobile phone usage changes languages.
PCA 2	Component 2 – use of mobile phones in business within communities.	0.64	Business usage of mobile phones.
PCA 3	Component 3 – mobile phone as a means of entertainment.	0.72	Entertainment medium.
PCA 4	Component 4 – popularity of mobile phones.	0.66	High diffusion of mobile phones across PNG.
PCA 5	Component 5 – mobile phone use in school systems.	0.76	Usage of mobile phones in schools.
PCA 6	Component 6 - adverse impact of mobile phones on societal norms.	0.65	Non-utilitarian usage of mobile phones.
PCA 7	Component 7 – mobile phones offer means of achieving tasks.	0.68	Utility role of mobile phones.

Table 1 contains seven perceptions or attitudes (PCA 1 to PCA 7) of respondents identified as components through factor analysis. PCA component one (PCA 1) identified mobile phone usage as causing changes to spoken and written English and Tok pisin. This has similarities to other studies which asserted emergence of new written and spoken words through mobile phone usage either via SMS or voice communication (Temple, 2009; Abenisa, 2013).

> When mobile phones were not available I never heard people talking and speaking in English and Tok Pisin. Now everyone is speaking with languages other than our own, especially English and Tok Pisin because they are speaking with people who are from other provinces. They speak more and learn more English words and Tok Pisin. (#1150)

Another study found increasing use of SMS by students paving the way to the emergence of new words being regularly communicated between parties. New words and changed forms of existing words often were abbreviated and even combined with numerical characters. It was found that students use SMS as it saves time, it's fun, it's discreet and convenient, has more space to say more, makes shy people express themselves without having to face the person on the other end (Abenisa, 2013).

The use of SMS was found to be more popular among younger people 16-30 year age groups (Figure 3). This chart was compiled from the number of SMS messages sent by respondents (N=365) the previous day. The chart shows that people older than 36 years tend to send fewer SMS text messages than younger people.
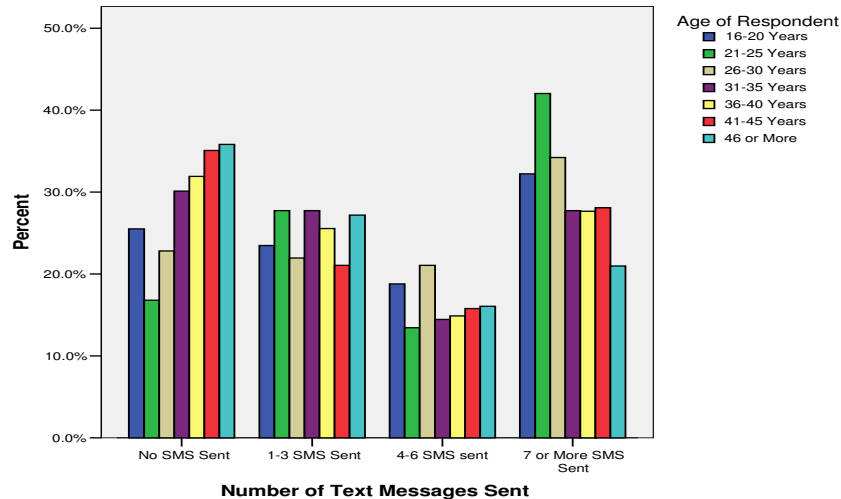
Figure 3: Number of text messages sent according to age groups
(Source: Suwamaru, 2013)

Perceptions on mobile phone use for business are shown as PCA 2 on Table 1 and also as the experience of those surveyed on Table 2 (PCA 1). Its presence on both tables confirms mobile phone use for business purposes by those surveyed. The perceptions and experiences concerning mobile phone use in business activities are similar to findings in India and Philippines (Greengard, 2008).

PCA 3 on Table 1 signals the perception of mobile phones as popular entertainment media. Also the popularity of mobile phones across PNG is uncontested as shown by PCA 4 Table 1. PCA 7 also asserts the utility role of mobile phones as perceived by the respondents.

> Mobile phones brought about many changes….it is the same for the community where communication has changed in a big way….mobile phones are so popular….although we had no other means of modern communications….in the past phones were only in town government and business offices…now the phones are in the villages and it is good development. (#1531)

Comparing the quantitative and qualitative strands together, it can be claimed that mobile phones are as much entertainment objects as technology objects encompassing communications having perceived connotations to development. There are similarities between this finding and other studies (Bell, 2005).

Experiences from developed countries such as Finland, Australia and Japan (Geser, 2005) and developing countries in Africa demonstrate the versatility of mobile phones in all manner of human communications, whether for business, work, family and friends, or recreation and entertainment (Donner, 2005). The versatility of mobile phones as perceived by users in PNG is further attested by the following comment.

> Before the arrival of mobile phones, people always have problems in communicating with relatives or friends who are far away from them. But after the introduction of mobile phones, everything changed for better, it is positive change and development. …it's good now. For instance now you don't have to waste money on transport to travel to town, just to visit the post office or use the public phone to contact relatives and friends, or love ones. With the new mobile phones, just call from where you are. (#1140)

This respondent reminisces about the 'pre-mobile-phone' era challenges encountered there and then concerning maintaining contact between people. While appreciating the changes, this respondent also appreciates the presence of mobile phones as a sign of positive development. The comment further asserts that mobile phones save time and money as people can now establish contact for all manner of purposes without the need to travel. There are similarities between this assertion and the findings of another study which concluded that mobile phones enabled a multiplicity of connectivity in 'rural areas that used to be isolated extending boundaries and changing the experience of time and space' (Tenhunen, 2008, p. 515).

Alleged non-utilitarian usage of mobile phones in PNG was identified as PCA 6 component as shown on Table 1. In particular, this component refers to certain uses of mobile phones deemed incongruent with societal norms. The following response exemplifies typical perceived adverse impacts of mobile phones on cultural norms.

> The mobile phone has changed the life in the community in some good and bad ways. One example is young ones getting married at a very young age or young girls getting pregnant without proper arranged marriages just on mobile phones. This is contrary to culture of my community. Otherwise mobile phones have really helped the community to contact relatives living in distant places to give information of what issues taking place at home. (#1172)

When one parses this response, the dualistic nature of mobile phone usage is clearly apparent. In acknowledging certain adverse consequences brought about by mobile phone usage, this respondent is generally appreciative of mobile phones and the associated services. Here it may be argued that outcomes of mobile phone usage are reflections of the intentions of user. In essence, if mobile phones are used for useful purposes, good outcomes can be expected whilst bad intentions may also lead to bad outcomes. This assertion shows similarities with findings of another study which concluded that

outcomes of any technology are only as good as the intentions of the user (Toyama, 2011).

Table 2: PCA component for user's experience on mobile phone usage

No:	PC factor	Factor loading	Explanation
PCA 1	Business use of mobile phones.	0.74	Experiences in using mobile phones for business related activities.
PCA 2	Internet portal.	0.78	Experiences of using mobile phones to access the internet.
PCA 3	Instantaneous contact.	0.74	Mobile phones offer means of transcending temporal and geographic boundaries.
PCA 4	Contact with healthcare and school system workers.	0.72	Making contact with and between healthcare and school officials.
PCA 5	Sending and exchanging call credits.	0.77	Sending and exchanging call credits between circles of known users.

Table 2 differs from Table 1 in that it shows experiences of respondents concerning mobile phones with five PCA components that were obtained through the appropriate regression test. As noted previously, PCA 1 from Table 2 shows usage of mobile phones for business related activities and is further emphasized by the following theme.

> I use the mobile to get information on goods and services. I wanted to find the price of one product from different suppliers, I used the mobile phone. From this, I made the decision where to buy from based on good price. I also communicated with people I know to find out certain cocoa buyers rates. This way we decided who to sell our cocoa to but other considerations come into the picture such as transport and distance to the buyer. (#1343)

With improvement in provision of diversified ICT services in many developing countries, including PNG, mobile phones have been harnessed for business related activities. The PNG experience is similar to experiences in Bangladesh and many parts of sub-Saharan Africa (Rashid and Elder, 2009).

> Mobile phone also brought good income earning for us. Many people in our community sell call-credits. The call-credits of top-ups worth K1 can be re-sold for K1.20 with 20 toea as the profit. The flex cards worth K3.50, is re-sold for K4.00 and 50 toea is the profit. In that way we make money in our community. (#1040)

Figure 4: Roadside mobile phone and accessory sellers are kept busy even on hot sunny days – Madang 2014

The response and Figure 4 clearly indicate that mobile phones are both direct income earners as well as enablers of business. Firstly, citizens use mobile phones to acquire information on goods and services enabling them to make business decisions. On the other hand, the selling of mobile phone accessories by those surveyed directly earned them an income.

Mobile phones are also becoming indispensable Internet access devices and so form a convenient means of making instantaneous contact traversing temporal and geographic boundaries as shown by PCA 2 and PCA 3. Such findings concur with other studies where mobile phones were found to be a convenient portal to the internet (Zain, 2003). The current study found that in the absence of other ICT services in PNG, mobile phones provide the predominant means through which internet access is enjoyed. This could be that Digicel will become a popular internet service provider (ISP).

Also for students, mobile phones enable internet access for purposes of information search and knowledge building as attested by the following respondent.

> Students always want mobile phones….it is part of their school utensils….important for knowledge building….useful features include calculator functions, alarm and clock, music, calendar and diary and an internet portal. (# 1137)

The foregoing response alludes to mobile phones as a utility device for those well intentioned students. If used purposefully as stated above, Internet access for knowledge building may have beneficial outcomes. From this response, the other revealing aspects are study planning and time keeping purposes which mobile phones are perceived to conveniently support. This compares with a study in Korea which found that 7 out of 10 students brought their phones to class. However, to discourage students from using

their phones, a teacher penalized students by demanding that they sing a song in front of the class if their phone rang during class (Kim, 2008).

While there exist adverse perceptions of mobile phones (PCA 6 Table one), survey respondents identified an array of positive uses of mobile phones in the education and healthcare systems. Students used short message service (SMS) to coordinate group work and to contact teachers and parents. Teachers used mobile phones to arrange substitutes when incumbents were unable to take classes and to contact headquarters.

PCA 5 component from Table 2 embodies sending and exchanging call-credits between circles of known mobile phone users. Although not explicit, while this component relates to exchanging of call-credits, it also alludes to the use of SMS. In some cases surveyed users claimed that exchanging call credits was a form of business because the call-credits were resold at the receiving end. Interestingly, this finding mirrors the discourse with regard to the strength of weak ties within social networks that are used by friends and relatives to help one another regarding possible opportunities (Granovetter, 2005).

Healthcare and school systems

PCA 4 component from Table 2 identified that mobile phones enable instantaneous contact between school and healthcare workers such as for coordination of job purposes or delegation of duties and responsibilities. This PCA component is adequately supplemented by the following response expressly identifying other aspects of mobile phones in healthcare systems.

> The mobile phone has made easy access to medical supplies so when the supply runs out we call the headquarters and request for new supply. It is through the mobile phones we request the supply to be delivered. The mobile phone also helps in emergency accident and for the women in labor to be brought to the health. For me I also use the mobile phone to undertake malaria parasite density count using the calculator option on the phone. I take pictures of injuries and Bluetooth them to colleagues. (#030)

This response manifests other uses of mobile phones in healthcare within PNG. The search for locations where medical drugs are available and organizing logistics for sourcing and delivery is important in PNG. This is true against the persistent transportation challenges which can impede smooth flow of goods and services. In seriously challenged locations, mobile phones form the only means to alert or organize transportation to ferry the sick to healthcare facilities which maybe several kilometres away along dilapidated roads, bridges including crossing rivers or patches of seas.

Outside Goroka, Eastern Highlands Province, a healthcare worker captured images of injuries on a mobile phone for distribution among colleagues through Bluetooth for their assessment before dispensing medication on patients. Phones were also used to disseminate healthcare tips via SMS and

to source medical drugs from provincial centres. These exemplify that mobile phones are used in supportive roles for school and healthcare systems in PNG (Erbs, 2012).

> It sets the alarm for me….and I can keep to my schedules using the clock features…mobile phone helped with the calculation of malaria incidence counts and taking photos of slides and sharing them with colleagues through Bluetooth for analysis and comment. (#1007)

This response asserts that mobile phones efficiently support mundane but necessary chores like keeping up with time and being on schedule. Taking photos of slides and sharing them with colleagues through Bluetooth are examples of harnessing easy to use versatile features for practical purposes. Similar experiences are documented in African developing countries demonstrating the versatility of mobile phones in communications, business, work, family and friends, or recreation and entertainment (Donner, 2005).

The following response alludes to the use of mobile phones to plan and announce healthcare visitations by medical officials. PNG villages are sparsely located and many kilometres from government service centres. Often mobile phones offer the only link to these villages to pass important messages as narrated by this respondent.

> In many rural areas, healthcare workers announced their scheduled visitations to the villages through these instruments to ensure greater attendance… Also we occasionally receive health tips through mobile phone SMS. (#1534)

The practice of using SMS messages by healthcare officials and agencies is not uncommon in PNG and recounted by this respondent. Mobile phones are regularly used to make important healthcare visitation announcements for rural villages. This exemplifies the advantages of mobile phones in reaching villages which are usually separated by rivers and challenging terrain. Here, mobile phones are used advantageously to reach people across geographically and temporal boundaries. While a mobile phone is not a total substitute for roads and transportation (Kyem and LeMaire, 2006), it is an important means to garner support or effort at a distance. The mobile phone use to support healthcare has been documented in other developing countries in sub-Saharan Africa. In Botswana patients who own mobile phones can be sent SMS text messages reminding them to take medication at a certain times (ITU, 2009). And in Uganda, SMS is used to strengthen prevention-of-disease programs complementing the limited healthcare delivery system (Danis, et al., 2010). Other efforts where mobile phones support healthcare in developing countries include education and awareness, remote data collection, remote monitoring, communication and epidemic outbreak tracking, and diagnostic and treatment support (United Nations Foundation, 2012).

Market activity

Previously, lack of availability and timely access to relevant information contributed to missed income-earning opportunities for people (Sowei 2009). Now local farmers use mobile phones to coordinate delivery and sale of local fresh produce in markets. For example, in highland areas, farmers use mobile phones to coordinate potato production and transportation to attractive markets in the coastal cities of Lae and Port Moresby (Figure 5). Farmers are able to identify prices and demand conditions at major towns, and to finalise logistic decisions and supply quantum to those centres.

Figure 5: Supplying urban markets from the Highlands (Photo: jks 2014)

West New Britain Province hosts large oil palm plantations employing hundreds of labourers from all over PNG. Extended families from the oil palm blocks venture into poultry and piggery projects, while others grow garden food for personal consumption and sale. Mobile phones are often used by both buyers and sellers from the oil palm plantation communities, or from nearby Kimbe town. Oil palm fruit harvest and sale to New Britain Palm Oil Company occurs every fortnight, providing income to communities who then engage in trading of local produce. One hundred and forty-five respondents claimed that mobile phones enable negotiations between producers and consumers in and around these oil palm blocks.

On Bougainville Island, the main cash crops are cocoa and copra, for which prices fluctuate in response to external supply and demand conditions. Producers rely on market information accessed via mobile phones to decide on which upstream buyer to sell their wet and dry beans. Upstream buyers too use mobile phones to attract producers by disseminating information on prices and incentives such as free nursery and packing bags among accessories they offer. This exemplifies bi-directional use of mobile phones by downstream and upstream cocoa and copra traders using up-to-date

information, ensuring better deals. Research on the use of mobile phones in cash crop practices in sub-Saharan Africa and rural Bangladesh shows similar activity (Cohen, 2001; Donner and Escobari, 2010).

Another useful example of market activity and mobile phones comes from the village of Gaire, along the Magi Highway in Central province, with eighty-one survey respondents. Some Gaire villagers work in Port Moresby but the majority engages in fishing, gardening and other activities including operating roadside markets. This survey found that fishermen used mobile phones in finalizing logistics, maintaining contact with the village while at sea and informing potential buyers of the sizes, types and price of fish caught. While some fish are sold at roadside markets, many are sold to pre-booked customers in Port Moresby who pay better prices, as the fish are brought to their doorsteps fresh. Squid and lobster seasons bring extra business to these fishermen where they supply fresh catch to supermarkets in Port Moresby. Mobile phones are used to negotiate prices with supermarkets often resulting in better deals for the villagers as they can deal with those buyers offering better prices. This is similar to how fishermen in Kerala, India, access market and price information reducing the bargaining power of middlemen, which reduced costs (Palackkal, et al., 2011).

Reducing business costs

Access to services and markets through mobile phones has also reduced basic business costs. Survey participants in Bougainville and in the highlands reminisced about the 'pre-mobile-phone' days where they incurred high transport costs to towns wanting to use public payphones which were regularly out-of-service. Many spent time and money but returned to their villages without making any phone call. Some foregone calls were to distant relatives in other provinces but many were supposedly to government offices to check up on school selection results, while others were business related such as checking up on awards of local contracts. With mobile phones, access to an array of services in PNG is now being experienced. A Bougainville businessman described how he now coordinates the ordering of cargo from Tropicana in East New Britain Province without the need for expensive physical trips.

> I use the mobile phone to get information on goods and services. I call Kokopo Tropicana wholesalers to inquire about availability and price when my stock is running low. Mobile phones have helped very much in accessing information regarding my business. (#1530)

Mobile phones are experienced both as an enabler of business and as a direct earner of income through sales of mobile phone handsets, call credits (known as prepaid cards) and other accessories. Respondents also used their phones for mobile banking (m-banking), including checking of balances, transferring funds, paying bills and topping-up phone credits over the internet.

> The mobile phone helps me to transfer money and check my bank balance and helps me to maintain business contacts. This is a new development

way to do banking and business, one that was never made available with Telikom. Digicel mobile phones offer new ways for business and banking. (#1205)

This respondent embraces m-banking and the convenience of keeping business contacts through mobile phones. This theme concurs with PCA 2 from Table 1 and PCA 1 from Table 2. Although m-banking is a recent offering its conveniences and secureness ensured acceptance by citizens. In this way, the PNG experience is similar to other studies conducted in Kenya and South Africa (Donner and Tellez, 2008). Another village trade store owner talked about how he uses the mobile phone to organize new stock and fortnightly salary for his three employees.

> The mobile phone is magic. It helps me to order my cargoes from town where I call my daughter who lives there and she places the orders for me. I transfer the money to her mobile and she pays for all the cargoes. When they are ready, my employees go to town on the truck and pick them up. I also pay my employee wages through the mobile phone fund transfer reducing the risks involved in handling and dealing with cash. (#1066)

The comment from this village trade store owner describes multiple roles of mobile phones in the business. First he uses the phone to place new stock via the daughter away in town which also has a social aspect in that he keeps in regular contact with her. Second he transfers funds to her mobile phone which is a business or financial transaction over the phone. The daughter pays for the required cargoes in town which are collected by the trade store employees when ready. Finally this trade store owner pays fortnightly wages to the employees by transferring funds to their accounts, an aspect of m-banking. In this there is a safety aspect, especially in PNG where thievery can occur. This is especially true where travelling along highways with cash can be risky.

Across the developing world, similar experiences have been noted, in particular with a service called M-PESA, in Kenya. Well documented experiences enabling transfer of money through mobile phones using the M-PESA service are available (Greengard, 2008). M-PESA allows users to conveniently save, transfer and spend cash irrespective of their physical location (Heeks, 2010). The M-PESA service has been experienced to be reliable and affordable to people with no access to banking 'the unbanked'. The success of M-PESA has been manifested by its replication in other countries such as Tanzania, South Africa and Afghanistan (ITU, 2009).

The use of mobile phones for job search and similar opportunities by citizens was also evident. Such usage manifests similar connotations with examples in Bangladesh (Yunus, 2007). In contrast, there were certain negative perceptions regarding usages in activities deemed incongruent with customary norms of PNG. Adverse impact of mobile phones usages were also identified in other earlier studies in PNG (Watson, 2011).

Conclusion

The data from the survey conducted over seven provinces were reduced using principal component factor analysis. In all seven PCA components representing user's perceptions and another five PCA components representing their experiences were harvested. Juxtaposing these components with thematic networks from the qualitative strand offered improved illumination. The identified themes concerning mobile phone usage are predominantly supportive of healthcare and school systems across PNG. Such a supportive role for mobile phones in these systems is vital in PNG where conditions of public infrastructure such as roads continually suffer. Surveyed respondents also identified other applications which helped them organize their daily chores by using clock, alarm, calculator and camera features of mobile phones. These may seem to be mundane chores but are essential in helping people keep up with time and daily schedules. The use of Bluetooth among certain respondents was also evident. Both quantitative and qualitative data provided evidence suggesting that mobile phones are gradually becoming an indispensable for Internet access for many due to lack of other ICT services across PNG.

Regarding income-generating activities, mobile phones are enablers of business as well as direct revenue earners through sales of call credits (such as flex-cards often called prepaid cards) and associated accessories. Triangulation of quantitative and qualitative data readily enabled the research to draw this conclusion. Whilst certain non-utilitarian aspects of mobile phone usage were also noted, by and large mobile phones are considered as beneficial for socio-economic development in PNG. Non-utilitarian aspects of mobile phone use predominantly relate to activities that are deemed incongruent with societal norms. While these adverse mobile phone usages have been identified, beneficial aspects seemed to have been significantly appreciated thereby leading to their adoption and use. Needless to say that quality of outcomes from mobile phone usages may only be as good as the intentions of the users.

This study shed light on mobile phone usage in market access and price negotiation opportunities for local producers as they are able to assess demand and seek better prices for their produce. It showed that the expansion of mobile phones has ably supported business and access to markets for citizens. SMS use in school systems and by health agencies to promote awareness was evident. SMS use among students is high because it saves time and convenient to use. The use of SMS also enables shy people to express themselves without the need for face-to-face conversation. SMS usage was also evident in mobile banking and income-generating activities such as accessing price information for fresh produce.

Mobile phones have positively impacted on income earning among citizens in PNG. Mobile phone now covers urban and rural areas predominantly through Digicel. Notwithstanding certain perceived non-utilitarian usages, overall users are appreciative of mobile phones and view them as utility appliances. Some claimed that the presence of mobile phones in villages is a sure sign of development. Outside major towns of PNG, Digicel is the only mobile phone

service provider. Hence it is an emerging monopoly in these areas and could be limiting choice in price and value to users. With lack of choice in price and value, there emerges the possibility that citizens may be charged monopolistic tariffs and rents. It is therefore important that competent policy and regulatory interventions are enforced so that tariffs are fair and healthy growth of ICT sector is promoted.

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