

**Part II**  
**Examples of Global Diversity**

# Changing Cultures: Changing Lives—Mobilising Social Media During a Health Crisis

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**Abstract** Though developing continents such as Africa continue to be challenged by the prevalence of certain health related matters, the emergence of Information and Communication Technologies seems to be promising in managing and monitoring a number of health related diseases. The rapid growth of mobile phones, computers, and other social media devices in almost all cities and rural areas in Africa has been the catalyst for this change. The use of m-Health and e-Health care strategies developed in tandem with industrialised countries has increasingly contributed to improvements in healthcare. Illustrative are m-Health applications in Africa with particular reference to its use during the recent Ebola crisis in Sierra Leone.

**Keywords** Healthcare • Digital information sharing • Ebola

## Introduction

The rapid development and growth in digital technologies has significantly transformed global and local patterns of communication and dissolved continental and regional boundaries. These innovations have included the World Wide Web, mobile phones, and online social networks such as Facebook, WhatsApp, twitter, LinkedIn, and much more. Social media for example, has transformed and enhanced how families and friends communicate with each other. While a digital divide continues to exist between global north and south, social media has gained currency and popularity at a faster rate than expected in Africa, reaching rural and most remote villages. Most people can now boast of having a mobile phone regardless of where they live and work. The rapid response of social media and other forms of digital communication in Sub-Saharan Africa has seen a steady stream of innovation and

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© The Author(s) 2016  
M.E. Robertson (ed.), *Communicating, Networking: Interacting*,  
SpringerBriefs in Global Understanding, DOI 10.1007/978-3-319-45471-9\_4

advancement in health, education, governance, and economic development. Communications technologies have redefined and revolutionised traditional communication protocols and cultural practices. Social media provides a fast, cost-effective, and more transparent communication alternative which overcomes limitations that hindered progress in the past. Sectors such as banking and finance have been swift to embrace and exploit digital technologies extensively to improve service delivery. In almost every remote part of Africa, financial transactions are executed across the globe securely and rapidly through one form of technology or the other. Most families with relations around the world can now send and receive money through a simple mobile phone by financial institutions and agents in countries that provide such services.

Notably, the health sector has realised a rapid growth in the use of digital technologies in recent years (Bruce 2002; Khan et al. 2010; Thinyane et al. 2010). Considerable interest in the use of information and communication technologies for health-care delivery has significantly transformed the administration and management of health service delivery globally. Essentially, there has been significant improvements in responding to health service delivery through e-health, a cost-effective and secure use of information and communication technology for health and health-related purposes through the use of various applications and tools (Cole-Lewis and Kershaw 2010).

Industrialised countries such as Australia, USA, Canada, and the UK are now relying on electronic medical records (EMRs) in its various forms to provide quality health care efficiently and effectively. At a universal level, there has been widespread support for an integrated approach to activate global e-health (Blaya et al. 2010) paying particular attention to developing countries in Sub-Saharan Africa. The case of adopting these technologies has been widely embraced though not without enormous challenges as a partial solution to improving universal healthcare with developing countries the most vulnerable due to cultural and financial constraints (Edejer 2000). In an increasingly digital world, prompted by technological advances, economic investment, social and cultural changes, there is growing recognition that inevitably the health sector must integrate information communications technology into its practices if universal healthcare is a priority for world leaders as pronounced by the United Nations and its key agency, the World Health Organisation. This applies whether the goal is to reach all citizens with high quality, equitable and safe care, or to meet obligations for public health records and research.

## **The African Context**

Rapid readiness to embrace the use of communication technology with the potential to improve development projects in Africa, has witnessed significant improvements in facilitating clinical and managerial decision-making in some parts of the African region thanks to the work of health agencies and other non-government

organisations such as United Nations Development Program, and World Health Organisation (UNDP 2015a, b). Africa has slowly migrated to e-Health solutions from storage of patient information which traditionally involved stacks of manila files and handwritten notes, to diagnosing, treating, and monitoring of certain diseases such as HIV/AIDS (Ediger 2000) with penetration of digital devices. Being part of a global village has substantially increased and created new opportunities in Sub Saharan Africa though significant challenges are acknowledged. For example, an equitable share of resources in developing countries remains a major challenge in terms of affordability and reception. Migrating to e-Health has so far been of immense benefit though the level of development in technology is remains low, and coverage of digital health technologies in large economies such as Nigeria is still in a neophyte stage (Batta et al. 2015). For the continent, the majority of the population is living in abject poverty with little access to healthcare for medical assistance. Countries such as Kenya, Ghana, Nigeria, Rwanda, Ethiopia, Uganda and South Africa are slowly migrating to e-health facilities in an attempt to facilitate National Health Service delivery in response to achieving United Nations Millennium Development Goals (MDGs) and match the resolution of the World Health Assembly urging nation-states to embrace e-health in an effort to improve and strengthen health systems (Asamoah-Odei et al. 2007).

In Kenya for example, text messages have been used to provide services to HIV/AIDS patients thanks to the rapid spread of mobile phone use. In Nigeria, it is reported that phone companies are providing frequent free text messages on HIV prevention to all subscribers. In South Africa a number of measures have been taken to establish e-health practices in the treatment of diseases such as HIV/AIDS and zoonotic diseases in remote communities. Networks of e-Learning and telemedicine have been established in other countries such as Mali, Senegal, Cameroon, Burkina Faso and Niger in collaboration with some industrialised nations such as France and Switzerland. Such cooperation has been noted with other African countries in promoting transnational e-Health and Telemedicine (Asamoah-Odei et al. 2007).

## Sierra Leone—A Case Study

The recent Ebola crisis has had a profound impact on Sierra Leone. At the time of the outbreak there were severe shortages of doctors with only two doctors per 100,000 people (Momodu 2014). Admittedly, the health care system in the country was considered weak, lacking good laboratory facilities for early detection and diagnosis.

Sierra Leone a multi-ethnic country located in West Africa with an area of 71,730 km<sup>2</sup> and a population of approximately 6 million people gained independence from British indirect rule in 1961. According to the Human Development Index in 2011, it is one of the world's poorest nations ranking 180 out of 187 countries. English is the official language. Krio is widely spoken by 90 percent of

the population and represents the dominant lingua franca of ethnic groups. Poverty is widespread with more than 60 percent of the population living on less than \$1.25 a day (UNDP 2015a). Illiteracy and unemployment are very high. Despite social, economic and political problems, there is steady capacity rebuilding in collaboration with aid agencies such as UNDP in mobilising the nation's opportunities since the end of the civil war in 2002 (UNDP 2015b). Along with infrastructural rebuilding across the nation, mobile communications technologies have become central to programs for change. Although mobile phone companies are established in major cities, the population has embraced technology at a faster rate than expected including a significantly illiterate population living in rural areas and villages. Local village traders are now empowered to transact business directly with customers by minimising third party reliance on external agencies.

### ***Sierra Leone and Modern Telecommunication***

Paradoxically, while communication gap between governments and communities undermined the efficacy of the emergency response, closely linked to weak national capacities overall, especially in terms of ensuring access for all to basic services for health, water, sanitation, education and social protection, more people in Africa have access to mobile phones. In Sierra Leone, mobile phone usage has increased tenfold with only about 113,000 subscribers; however by 2008, there were over 1 million subscribers (Petifor 2011). The most prominent users are young people between 15 and 35 years. It is reported there are about 2 mobile phone users per household in the rural areas (thanks to the provision of Solar photovoltaic (PV) which provides a solar mobile phone charging system (Mansaray 2013). The promptness and capacity of instantaneous communication via social media, the internet and Facebook in this instance of crisis brought to bear the ways in which traditional social and cultural practices relating to communication protocols were being transformed. Populations within Sierra Leone are no longer isolated from the world. Social media provides a means to bypass traditional knowledge cultures and practices and opens up possibilities for widespread mobilisation of news and information through communications technologies. Nonetheless, it has taken a crisis in the health sector such as Sierra Leone and other developing countries in Africa to move e-Health from the periphery to the centre of strategic health planning.

### ***The Ebola Crisis***

While there are distinct social and economic differences between affluent city residents, villages, and transient slum dwellers, the Ebola crisis demonstrated an instance where social media became a significant communication medium for

reaching populations within Sierra Leone, for communicating to the global world and the Sierra Leonean diaspora.

The Ebola Virus Disease (EVD) crisis highlighted the fragility of Sierra Leone's health, education and social structures when faced with the rapidity of disease. As noted by the President of Sierra Leone at the recent Ebola Conference held in Brussels, noted that at the outbreak of the virus, 3100 citizens died which included over 400 children and hundreds of orphans. This situation decimated an already crumbled economy with heavy casualties in the education and health sectors. Schools, colleges, universities, hospitals, clinics, commercial centres went into lock down. There was widespread flight of residents from cities, towns, and villages in fear of being contaminated even though most residents did not fully understand the ramifications of the outbreak. Sadly, a crippling government most willing to protect and secure its residents did not have immediate answers nor the resources to manage the enormity of the situation. Frontline health workers became casualties including a few specialised physicians. The EVD made no distinctions between social status, wealthy or poor, village or city. The population was extremely vulnerable, fearful and anxious about where and when, and who the disease would take. Unfortunately, the crisis took the entire world by surprise and a rapid response to treatment and management was slow, fragmented, and challenging.

The health crisis exacerbated the fragility of a nation recovering from a 10 year brutal civil war in which 50,000 people were killed, infrastructure destroyed, and more than 2 million residents displaced. Thousands of professionals left for Europe, America, and Australia, leaving a significant intellectual, social, economic vacuum to overcome for rebuilding the nation's political system, civic infrastructure, health, education, and the economy. Health and education are two critical areas where much help is needed to meet the UN Millennium Development Goals of eradicating poverty, hunger and disease and for developing more resilient nations. The challenges of power shortages was one of the major catalysts in casualties that decimated the country. For example, speaking on a mobile phone a dying woman's last words to a relative from her Ebola bed were "I need to desperately charge this mobile phone but there is no power and I have been abandoned here by the health workers". Ultimately, her voice faded as the phone shut down. Shortage of protective equipment, ignorance of the outbreak, and cultural practices hampered prompt treatment of patients.

Despite the spontaneous outbreak, international agencies in a coordinated effort eventually mobilised to reach out and intervene with high tech equipment and management strategies, in cooperation with the entire nation. For example, UNDP offices were upgraded in the three hardest hit countries in West Africa—Liberia, Guinea, and Sierra Leone to provide videoconferencing kits to boost internet bandwidth worth over a million dollars. The provision of this facility made all the difference in coordinating efforts of staff in the affected countries and industrialised nations where medical staff were located. In part, the widespread use of social media and other forms of telecommunication became one of the catalysts for combating the disease though there was less readiness for telehealth services. It became expedient for a paradigm shift in an integrated approach to re-establish

institutional frameworks with greater adoption of digital technologies. One of the critical steps taken at the time was the proper establishment of telecommunication channels and training of health service staff in the treatment and management of a crisis of that magnitude. To facilitate and harmonise communication nationally, Ebola centres were established in certain regions of the country and the internet became a reliable facility at Ebola Response Centres (ERC) managed by e-Health at the “Alert Pillar” unit of the Ebola Response Centre or C Command Centre in major cities. The Alert Pillar was assigned the responsibility for receiving all alert calls (sick, death, suspect, and security). These calls were then redirected to the appropriate response wings of various unit—dignified burial, surveillance, life case, psychosocial and social mobilization, and Security units for necessary action. The availability of the internet greatly facilitated administration and management between the government and agencies in speeding up communication between districts when recording information on the number of outbreaks and death notices. The setting up of a database was helpful on many fronts in assisting access to information that communities would not normally receive if relying on traditional technologies of communication (for example, fixed telephone, mail, newspapers). Having up to date accounts around the country assisted government officials and medical staff to understand patterns of disease by having reliable statistics on actual and approximate figures.

The crisis illustrated the critical need for communication efficiency to reach populations in educating them about health and disease prevention. Mobile technologies and internet access indicated fundamental shifts in managing crises of this nature. There was a ground breaking innovation of mobile payments to Ebola staff, cloud computing and open source information management systems to efficiently manage the crisis with the UNDP as frontline agency (WHO Ebola Response Team 2014). During this time there was an exponential increase in the use of social media, from villages to cities, and to the broader world. Sierra Leoneans themselves utilised social media to convey news, find relatives and friends and post updates on the progress and status of individuals as the disease unfolded in time. Already grappling with a struggling economy for Sierra Leone the socio-economic impact will be lasting. It will need a global effort to re-establish education, health, and other social services in the country. The unflinching efforts of the Sierra Leone government to provide universal health care has been dealt a blow.

### *The Way Forward*

While it may take a number of years to rebuild the struggling economy, good strategies will progress the efforts of international bodies and the government. Essentially, some long term investment and commitment is required from all key stakeholders. Global resilience, preparedness, and response have been widely criticised (Brown and Cropley 2014). Lessons learned in the hardest possible way are essential starting points for reforming recommendations from the World Health

Organisation (WHO) in implementing policy initiatives from the country. Fundamentally, education is a key target in the recovery process. Basic primary health care training is necessary. Health care staff including community health care workers need to work collaboratively to maximise the impact of containing the disease; yet even is challenging since affected countries are grossly understaffed. It is imperative that the presence of the United Nations and other international agencies remain is a priority even when a zero target had been reached. As a developing country, it is important that cultural practices that have been long established and which may have a potential to counter recovery practices are dealt with in a sensitive manner. A dialogic process with community people will yield better answers and empowerment than coercive measures. The outbreak has created high rates of unemployment particularly among the youth. The implementation of vocational education programs could be the answer to engaging this cohort. Consequently, it will need a genuine effort from the government and citizens to ensure that resources provided for the recovery process are utilised accordingly.

## Conclusion

Though wireless technology has altered health care delivery, there remain enormous possibilities in responding to health epidemics particularly in emerging countries. With the widespread use of mobile technology and social media platforms in Africa, there is opportunity to capitalise on e-Health and e-Education modes of delivery that should incorporate culturally appropriate ways of accessing and interacting with such technologies. Harmonising education and health systems through cultural and social interfaces along with the development of specific applications for mobile phone use may provide a way forward to overcome significant challenges presented at the time of the crisis. No doubt there are important lessons learned at various levels nationally and internationally. With the widespread use of mobile phones and other telecommunication devices, a new direction in enhancing the provision of cost-effective devices and services will play a major role in e-Health service delivery not only for diseases such as Ebola but other life threatening diseases.

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# Bridging the Digital Divide: Everyday Use of Mobile Phones Among Market Sellers in Papua New Guinea

George N. Curry, Elizabeth Dumu and Gina Koczberski

**Abstract** Access to mobile technologies is transforming the daily lives of poor subsistence farmers in Papua New Guinea. However, the success of this access depends on infrastructure and where connectivity is poor there is evidence of a digital divide. Nevertheless, increasing affordability of internet access is helping to bridge the development gap.

**Keywords** ICT revolution · Developing world · Gender divide · Transformation

## Introduction

Papua New Guinea, like many Pacific Island nations and most of the developing world, is experiencing an ICT revolution as access to information and communication technology (ICT) infrastructure expands rapidly (Cave 2012). This ICT revolution has the potential to revolutionise areas like agricultural extension (E-Agriculture), Health (E-Health), Banking (E-Finance) and Education (E-Education) (Cave 2012; Maumbe 2013; PRIF 2015). Ownership of mobile phones is expanding rapidly and smart phones are putting internet technology into the hands of poor subsistence farmers following a way of life largely outside the market economy (Curry and Koczberski 2013). The rapid uptake of ICTs by the poor can be attributed to greater affordability, accessibility, and adaptability of ICTs (McNamara et al. 2011; GSMA 2015).

The recent wave and adoption of new technologies and digital applications across the globe has been likened to a “Great Transformation” (Fuchs 2013, p. 16) that is fostering rapid growth in accessing information and new ways of producing,

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creating, sharing and communicating knowledge. It is suggested this revolution is at least as transformative as the Green Revolution technologies once heralded as the panacea for world hunger as they were rolled out across the developing world in the 1960 and 1970s (Fuchs 2013). This remarkable transformation is at once liberating and socially and economically empowering, with the potential to transform gender relations and bridge the economic and social divides within and between countries.

However, whilst there has been an enormous increase in ownership of, and access to, ICTs worldwide, the growth across the globe has been uneven. The developing and least developed countries lag well behind developed industrial countries in engaging in the digital age. Although the majority of people accessing the internet live in poor countries, per capita use is much lower than in developed nations. About 21 percent of the population of the developing world have internet access compared with around 84 percent of the developed world's population (ITU 2014). For example, while access to the internet has increased in PNG since the introduction in 2011 of a mobile broadband service and the expansion of high-speed 'third generation' (3G) and 4G mobile broadband networks, only 9 percent of the population have access to the internet (ITU 2014; see also Cave 2012; Logan 2012).

The digital divide is not only between countries, but within countries. Despite more rural people gaining access to ICTs in poorer countries, there remain large differences in the extent of network coverage between rural and urban areas. In a study of 17 Sub-Saharan countries in 2010, 69 percent of urban respondents owned a mobile phone compared with only 53 percent of rural respondents (Totora and Rhealt 2011). Similarly, a 'gender digital divide' is typical of many developing countries where women and girls have less access to ICT than men and boys (GSMA 2015). These divisions in the ownership of and access to ICTs further marginalise the rural poor and women from the benefits of social and economic change resulting from the expansion of ICT availability.

This chapter examines the extent to which a digital divide exists in PNG. The chapter reports on preliminary research on the recent uptake of mobile phones to investigate whether service and economic divides between urban and rural PNG and an entrenched gender bias in PNG are also reflected in new digital divides. The question this chapter addresses is whether mobile phone technology is bridging existing gender and spatial inequalities or simply reinforcing them. The chapter begins with a brief overview of spatial and gender inequalities in PNG and then considers how mobile phone technologies are being taken up and used by men and women in both urban and rural/remote locations. The data for the chapter are drawn from several research projects in which the authors are engaged: (1) fruit and vegetable sellers at informal markets in Mt Hagan, the capital of Western Highlands Province (WHP) and Kokopo, the capital of the island province of East New Britain (ENBP); (2) cocoa growing households in ENBP, Milne Bay (MBP) and the Autonomous Region Bougainville (ARB); and (3) oil palm smallholders in West New Britain (WNBP) and Oro provinces (OP) (Fig. 1).



Fig. 1 Papua New Guinea

## Papua New Guinea

PNG has experienced a mining and mineral boom over the past few decades (UNDP 2014), with GDP growth rates averaging above 6 percent for over ten years (ADB 2014). Despite this mineral-driven growth, poverty remains widespread with the majority of the population, especially the rural population, benefiting little from this growth. Approximately 87 percent of the national population of over 7 million live in rural villages and are highly dependent on agricultural-based activities to meet their everyday social and economic needs. Most people rely on their own food gardens for everyday consumption and for income, and there are very few cash-earning opportunities outside of agriculture. Nearly 90 percent of cash income in rural areas is from export cash crops such as cocoa and coffee and the local marketing of food crops and betel nut (Allen et al. 2001; Sharp 2012), with over two-thirds of this income from export cash crops.

### *The Rural-Urban Divide*

The physical geography of PNG presents major challenges to the provision of basic infrastructure and services. Approximately 52 percent of the total land mass in PNG is classified as mountains and hills (Allen et al. 2005). Access to roads, health, education, telecommunication networks, and markets by rural villagers, especially



**Plate 1** Coffee often has to be carried long distances to market in the PNG highlands

those isolated by rugged terrain (Plate 1) is very difficult and costly to the point that livelihood options are severely curtailed. Often migration to urban and rural resource development sites is the only viable option for people from these communities. Indeed, migrants from remote, poorly serviced and disadvantaged rural areas and small islands constitute a high proportion of the growing urban population (Koczberski et al. 2001; Storey 2010; Curry et al. 2012; Numbasa and Koczberski 2012).

The rural-urban divide is very marked in PNG and is apparent across a wide range of variables including cash income levels, food security, education and literacy and a whole suite of health indicators. The UNDP (2014) point out that while an urban/rural divide in human development is common in many parts of the world, it is particularly stark in PNG. For example, despite fairly good access to customary land for most of the rural population, food poverty at 28.5 percent of the rural population has been estimated to be double the urban rate (NSO 2011). The poorer quality diets in rural areas are also reflected in adverse nutritional outcomes. Nationwide household surveys in 1996 found almost half of rural children were stunted compared with one-fifth of urban children (Gibson 2000). Rural people also have less access to primary health care compared with the urban population, and rural children are more likely to carry a greater burden of infection because of their poor access to good health care (Gibson 2000; Howes et al. 2014). Similarly, illiteracy is more prevalent in rural areas. At 40 percent, the rural illiteracy rate is three times the urban rate (13 percent) (NSO 2011; Kare and Sermel 2013). The considerable gap in literacy rates between urban and rural PNG reflects not only the poorer access to

schools in rural and remote areas, but also the difficulty for schools in maintaining staffing levels to teach literacy and numeracy skills (Waffi et al. 2015). Such low rural literacy rates and the very different education levels between rural and urban PNG also help explain the lower nutritional status of rural children (Gibson 2000).

These service and income inequalities also apply to material conditions of living. In housing, for example, 72 percent of rural houses have walls constructed from bush materials compared with 7 percent of urban houses (NSO 2011). Roofing iron is highly prized in PNG and is considered to be an indicator of wealth and status. In rural PNG, 29 percent of houses are roofed with corrugated iron compared with 89 percent of urban homes (NSO 2011). In terms of durable household goods, the same pattern is repeated with urban households having much higher ownership rates of consumer goods. For example, almost half of urban households have a stove compared with just 4 percent of rural households; 46 percent have a refrigerator while less than 3 percent of rural households do so (NSO 2011).

### *The Gender Divide*

PNG's constitution, written in 1973, has a provision for equal opportunities for all citizens. Despite its noble intentions, and PNG being signatory to several international conventions on gender equality (e.g., Convention on the Elimination of all Forms of Discrimination against Women—CEDAW), discrimination against women and girls is pervasive. The Gender Inequality Index (GII) ranks PNG 134 out of 148 countries (GoPNG 2013), and gender inequalities in PNG have proven extremely hard to address. On virtually every socio-economic and health indicator, women fare worse than men (GoPNG 2013), and the country is one of the few nations in the Asia-Pacific region yet to achieve gender equality at primary school level. Rates of gender-based violence are amongst the highest in the world (World Bank 2012a; GoPNG 2013; UNDP 2014): two-thirds of women are estimated to have experienced gender-based violence (GoPNG 2013). Women in PNG not only risk high rates of violence, but also have fewer economic opportunities than men, have high maternal mortality rates (over 100 times higher than the rate for Australia—UNICEF 2013) and shorter life expectancy than men. They also experience inequalities within the home which limits their access to household income and participation in decision-making (Overfield 1998; Wardlow 2006; Koczberksi 2007; Macintyre 2008; World Bank 2012b; UNDP 2014).

Education statistics also show a strong gender disparity, despite recent improvements (NSO 2011; UNDP 2014). PNG women are more likely to be illiterate, have lower levels of primary and secondary school attainment, and to be less represented (38 percent) at university level than men (e.g. Gannicott and Avalos 1994; Gibson and Rozelle 2004; ADB 2012; DFAT 2012; Kare and Sermel 2013; UNDP 2013). A higher proportion of males than females can read and write (69 percent compared to 57.3 percent) and just 6.8 percent of adult women have secondary or tertiary level education compared with 14.1 percent of men (UNDP 2013).

## *The Introduction of Mobile Phones to PNG*

The mobile phone was introduced in 2003 into a country where telecommunication networks are relatively recent. The first radio and telephone technologies were installed in Rabaul, ENBP in 1907 (Fig. 1) and over the following two decades they were extended to other major centres of the country (Sinclair 1984; Suwamaru 2013). In 1933, PNG established its first government information radio station and by 1975, when PNG gained political independence, the telephone network was accessible only to a small group of the urban elite (Ogden 2013). Fixed line telephones remained out of reach of most of the population and in 2007 PNG had one telephone per 100 inhabitants; the lowest penetration rate among the Pacific Island nations (Ogden 2013; Crocombe 2001).

With limited telecommunication networks up until the introduction of mobile telephony, most information was relayed locally using traditional communication devices such as conch shells, drums, yodelling and slit-gongs (*garamut*). Radio and postal services were commonly used for communications over longer distances (Suwamaru 2013). As Telban and Vavrova (2014, p. 3) point out, prior to mobile telecommunications in PNG, “[r]emote villages were relying mainly on letters and *tok save* ‘announcement, notification’ over the radio or on traditional means of carrying the messages by either word-of-mouth or a drum signal”.<sup>1</sup>

When mobile phone services were introduced, coverage was provided by the state-owned Telikom PNG monopoly and limited to major urban centres like Port Moresby, Lae, Madang, Goroka and Mt Hagen (DFAT 2004). In 2006 there was one mobile phone subscription per 100 people (World Bank 2012c). In 2007 mobile phone access improved considerably when the government removed the Telikom PNG monopoly on fixed line and mobile phone services, allowing new providers to enter the market. There are now three mobile phone providers in PNG. One of the first new players, Digicel, entered the market in July 2007. Within eight months of Digicel’s arrival, coverage had expanded from two to ten per cent of the population (Watson 2011), and by 2010 it had reached 28 percent of the population (World Bank 2012c). This initial rapid uptake of mobile phones is reflected in the data collected for WHP and ENBP, with most of the uptake occurring within two years of the arrival of Digicel services (Fig. 2). Over time, mobile phones have penetrated remote rural villages and outer islands that hitherto had been extremely poorly serviced, and often without electricity, health services, reticulated water or road access. By 2014, 41 percent of the population had mobile phone access (Suwamaru 2015).

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<sup>1</sup>Radio ‘*tok save*’ is an announcement or message relayed over the radio waves via radio stations. People deliver hand-written messages to the radio station to be read on air to relatives and friends living elsewhere.



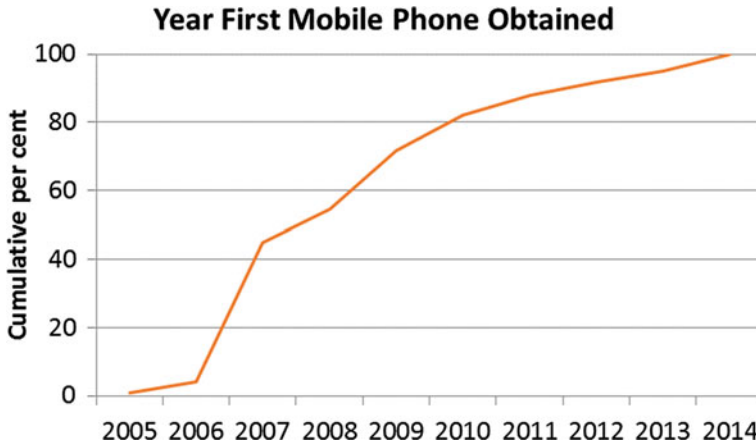


Fig. 2 The uptake of mobile phones in WHP (n = 51) and ENBP (n = 24)

More recently there has been significant growth in the use of mobile broadband to access the internet. This is driving the massive rise in the use of social media in PNG. By November 2015, there were 625,874 internet users (Internet World Stats 2015). Facebook is the most common use of the internet and it is the largest online network in the Pacific with around 700,000 Facebook users in Pacific Island Countries (PRIF 2015). In November 2015 there were over 350,000 registered users of Facebook in PNG, many of whom were aged 18–24 years (Internet World Stats 2015; see also Logan 2012).

### *The Rural-Urban Digital Divide*

Although the uptake of ICT continues to rise in PNG and network coverage continues to improve, preliminary evidence indicates that the so-called ‘digital age’ remains an elusive dream for many Papua New Guineans, especially those living in remote areas (Cave 2012). In 2010, 39 percent of households in four field sites in EHP owned a mobile phone. Although the data are not directly comparable, more recent data collected from urban markets in WHP and ENBP (sellers from relatively accessible locations), show that almost 100 percent of sellers or someone in their household owned a mobile phone. The same data set revealed that 75 percent of individuals over 18 years of age owned a mobile phone. Mobile phone uptake appears to be reaching saturation point, at least for some urban locations and rural villages with relatively good access to town.

There is, however, a clear spatial divide. Mobile phone ownership rates are considerably lower in remote rural locations than in urban areas or rural villages near town (Table 1). Initially, this urban-rural divide would have reflected mobile phone access and connectivity prior to 2007 when mobile telephony was limited to



**Table 1** Mobile phone ownership among export cash cropping households in PNG by remote and accessible locations\* (percent of households)

Location	Year**	Accessible locations (percent of households)	Remote locations (percent of households)
EHP	2010	66.5 (n = 195)	12.5 (n = 137)
WNBP	2012	87 (n = 206)	
ENBP	2014	99 (n = 59)	
WHP	2014	99 (n = 63)	
ARB	2015	84 (n = 98)	
ENBP	2015	89 (n = 88)	
MBP	2014		40 (n = 63)

\*Accessible means within a half day's travel by road of a major urban centre

\*\*Denotes year of data collection

major urban centres and areas close to town. Data collected in 2010 in the EHP (following the expansion of mobile coverage to rural areas), found that the rate of ownership of mobile phones in villages close to town was five times higher than in remote locations in the province.<sup>2</sup> It is likely that this divide has become less marked through time as mobile phone coverage has expanded to include many remote areas. However, in 2014, on Misima Island, MBP the rate of phone ownership was about half that of the accessible sites (Table 1).

This rural-urban digital divide is more than simply a reflection of the spatial distribution of mobile phone services. As noted above, rural and remote PNG is disadvantaged on many indicators, including health, education and income. In Table 1 mobile phone ownership was high among rural households in WNBP, ENBP and ARB who resided not far from town and had access to a regular income from export cash crops and the sale of fresh food produce at town markets. People living in remote rural areas, such as in parts of EHP and MBP have fewer opportunities to earn an income, and incomes tend to be much lower than in areas accessible to town. For example, in the relatively accessible sites in the EHP study, the average number of income sources per household (excluding coffee) was higher than in the remote sites and the potential to earn high incomes through the commercial production of vegetables was also significantly greater. Thus, acquiring and maintaining a mobile phone (e.g. charging batteries and phone charges) is a much greater financial challenge in remote locations.

Table 1 indicates that PNG, like other poor countries where there has been a large increase in the ownership of mobile phones, is showing signs of an entrenched digital spatial divide. It is possible that mobile phones will exacerbate the already stark rural-urban divide. Undoubtedly, people in rural and remote areas will benefit from new services that mobile phone telephony enables such as banking and possibly an extension of agricultural services. But the potential benefits of the

<sup>2</sup>The EHP fieldwork was in four sites: Bena and Asaro were accessible sites not far from Goroka town, and Marawaka and Baira were in remote parts of the province without road access.

technology will be much greater in urban PNG and in villages close to town where people have greater capacity to capitalise on the development opportunities of this new technology. They already earn higher incomes which gives them greater capacity to access information on the internet. Improved market information delivered through mobile phones will enable people living near town to capitalise on these new opportunities while such opportunities will be less likely to be taken up by people in rural and remote areas.

### *The Gender Digital Divide*

A 'gender digital divide' where women have less access to mobile phones than their male counterparts is also found in PNG (GSMA 2015). Watson (2011) found that men in Megiar, north of Madang in PNG, were more likely than women to own a mobile phone. This gender difference in mobile phone ownership was not detected at Watson's second field site of Orora on Karkar Island. If a gendered digital divide were present in PNG, one would anticipate that men would adopt the new technology earlier than women, and they would make more use of the technology because they have more political and economic power (higher incomes) than women.

In terms of early adoption of the technology, the 2014 data collected among market sellers in ENBP and WHP were not clear cut. At both sites the average year of adoption was 2008 for both men and women. However, in ENBP, women tended to adopt mobile phones slightly earlier than men and in WHP the reverse was the case with men adopting mobile phones earlier than women (Table 2). This gendered difference in the uptake of mobile phones between the two provinces reflects, in part, the relative status of women in the two provinces: the Gazelle Peninsula of ENBP is matrilineal and women certainly have more status than women in the strongly patrilineal highland societies of WHP.

Further evidence of this gendered difference in mobile phone telephony between matrilineal ENBP and patrilineal WHP is reflected in rates of mobile phone ownership (Table 3). While men in both provinces have higher rates of phone

**Table 2** The average year of when first mobile phone was acquired by gender for ENBP and WHP

	Female	Male	Male and Female
ENBP	2008.40	2008.83	2008.72
WHP	2008.72	2008.48	2008.64

**Table 3** Percentages of males and females over 18 years of age owning a mobile phone for ENBP and WHP

	Female	Male	Male and Female
ENBP	70.59	81.39	76.21
WHP	62.18	87.85	74.34

**Table 4** Average numbers of outgoing and incoming calls and SMS messages per day by gender for ENBP and WHP

	Mobile phone use (average per day)	Female ENBP	Male ENBP	Female WHP	Male WHP
Calls	Outgoing	1.41	0.79	1.39	2.02
	Incoming	1.03	0.78	1.68	2.27
SMS	Outgoing	0.43	0.1	0.21	0.86
	Incoming	0.4	0.5	0.8	1.17

ownership than women, the gender disparity is more marked in WHP where a strong ideology of male dominance leaves women with less social, political and economic autonomy and power than men. There is a 25.7 percent point difference in phone ownership between men and women in WHP compared with a 10.8 percent point difference in ENBP. Clearly, the relative social and economic status of women in the two provinces is reflected in phone ownership rates.

These gender differences by provinces are also apparent in how the mobile phone is used and how frequently men and women make and receive calls and SMS messages. In matrilineal ENBP, women make and receive more calls than men, whereas in patrilineal WHP the reverse is the case and again the disparity between the genders is starker than in ENBP (Table 4). Similarly, in ENBP, women send more SMS messages than men and receive about the same number as men, while men from WHP send and receive more texts than women (Table 4).

In summary, it seems that mobile phone technology is not yet contributing to a significant erosion of the gender divide in WHP society. However, it is likely that mobile phone technology is empowering women by widening their social networks beyond their immediate communities by allowing them to maintain contact with relatives and friends living elsewhere. This is especially important for women in patrilineal societies when they move to the villages of their husbands and have limited contact with their natal relatives living elsewhere. It is also likely that the technology empowers women market sellers economically through, for example, enabling them to contact relatives in town to determine prices at local markets before committing to transporting garden produce to market. These benefits, of course, pertain more to women in accessible locations not far from urban markets who can respond quickly to such opportunities.

Overall, however, when ENBP and WHP are compared it appears that the uptake and use of mobile phone technology reflects existing patterns of gender inequality. Women in matrilineal ENBP have much higher status in their society and this is reflected in their higher rate of mobile phone adoption and use relative to men, whereas in patrilineal WHP with an entrenched high level of gender inequity, men are clearly benefiting far more from the new technology than women.

## Conclusion

While the adoption and spread of mobile phone technology in PNG has been nothing short of spectacular in a ‘big bang’ expansion and adoption of the technology, the jury remains out in the capacity of the technology to bridge the rural-urban and gender divides which are so pronounced in PNG. Clearly, there are major development benefits from adopting the technology. While men and women residing in remote locations and urban centres will benefit, it is debatable whether the technology will enable a ‘catch-up’ where women’s social and economic status relative to men will increase and people living in remote areas will improve their economic situation relative to urban dwellers. As the data have revealed, the uptake and use of the technology has reflected the relative status of men and women with women in ENBP having greater gender equity in the adoption and use of the technology than their female counterparts in WHP where women’s status is much lower than men. One potential consequence of the digital divide is a growing ‘knowledge divide’ along gender lines and between urban and accessible PNG on the one hand, and rural and remote PNG on the other hand.

Also, because the social and development benefits that mobile phone technology delivers will be greater in accessible locations than in remote locations, mobile phones may exacerbate existing spatial inequalities and further marginalise the rural poor. People in remote areas simply cannot act on the information that mobile phones deliver in the same way that people near town can do. High prices in town markets, for example, mean that a vegetable grower or a coffee producer living near town can act more quickly on that information than a producer in a less accessible location.

Finally, the rural-urban digital divide may also exacerbate the gender divide in mobile phone technology, such that the gender inequalities in ICT access in rural areas are more pronounced than in urban areas. This gender divide overlain and exacerbated by the rural-urban divide is not simply because of greater network coverage and incomes in urban areas, but is also likely to reflect the differential status of women in rural and urban PNG. Women’s status in urban PNG has improved with modernisation and development, whereas in rural and remote PNG, traditional gender roles and the relative status of men and women have remained largely unchanged. One would anticipate that the capacity of mobile phones to erode gender divides and improve the status of women will be stronger in rapidly modernising urban centres and villages close to urban centres thereby adding a spatial dimension to the gender divide.

**Acknowledgments** Data collection on mobile phone ownership among oil palm smallholders in WNBP and cocoa smallholders in ENBP, ARB and Milne Bay was done in collaboration with researchers from the PNG Oil Palm Research Association and the Cocoa and Coconut Institute, PNG, respectively. Data collection in EHP in 2010 was in association with PNG Coffee Industry Corporation. We are grateful for the cooperation of villagers who gave their time to be interviewed.

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# Business, Commerce and the Global Financial System

Meg Elkins and Liam J.A. Lenten

**Abstract** Commercial practices are being re-defined by disruptive innovations that are opening up new global and local markets. This chapter examines how changing technologies are creating new opportunities for entrepreneurs in both the developing and developed world. In the developing world, micro-finance and mobile technologies are linking the vulnerable to markets. In the developed world long-held monopolies in the banking, transport, and hotel industries are now subject to a more competitive market with the rise of new platforms such as the sharing economy, crypto-currencies, and crowd funding.

**Keywords** Market access • New financial platforms • Increased competition

## Introduction

Individuals and firms previously denied opportunities to participate in the market economy are integrating steadily into the global marketplace through the increased availability of information from the internet and mobile technologies. Micro-finance has given those in the developing world access to credit and micro-enterprises giving the developing world access to the market. In the developed world, the sharing economy, crypto currencies and crowdfunding are disrupting established financial market intermediaries. Internet access and mobile technologies play a significant role in how agents can communicate and interact, particularly in relation to institutions. Intermediaries and asymmetric information are becoming less significant as information and new financial platforms have the capacity to disrupt traditional networks.

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## **Micro-Finance—Connecting the Poor to Markets**

Micro-finance bridges the gap between the banks and the lenders of money to people in the developing world. These firms have been able to provide small unsecured loans to people who would be ineligible for loans from traditional financial institutions (Yunus 1999). Micro-finance refers to micro-credit, micro-savings, micro-insurance and money transfers for small amounts of money from (USD) \$50 to \$1000 (Van Rooyen et al. 2012; Yunus 1999). These loans have been attributed to helping micro-entrepreneurs create business and increase income as well as contribute to an improvement in well-being to the life of the poor (Van Rooyen et al. 2012). The Grameen Bank is attributed with the introduction of micro-finance in Bangladesh in the 1970s. It now provides loans valued at \$2 billion annually to over 30 million members (Khandker and Samad 2014).

In essence, micro-finance has been able to connect those normally excluded from local and global markets (due to poor asset wealth) to funds many assume essential to get ahead in life. Overwhelmingly, women have benefited the most from gaining access to these funds resulting in greater employment generation, increased income generation and significant improvement in social indicators these indicators include the Human Development Index (HDI), primary school enrolment and health indicators (Khandker 2005; Van Rooyen et al. 2012). Empowering women with businesses to spend their incomes on education and health for their families benefits the individual family most directly, but also has broader ramifications for their society, as it also develops the social and human capital for that society. The establishment of micro-enterprises financed through the micro-credit system creates a more socially-interactive community for the poor to participate in the broader economy.

## **Mobile Technologies—Connecting Local Businesses to Global Markets**

The proliferation of mobile technologies in the developing world has created opportunities for small landholders. Mobile phone networks have provided a more affordable alternative to landlines, which were previously too expensive for villages in remote and regional areas due to the high cost of infrastructure (Dannenberg and Lakes 2013). Farmers with small landholdings have been among the main beneficiaries of the introduction of mobile technologies due to increased access to market information. There are two reasons for this: firstly, village markets are characterised traditionally by asymmetrical information whereby intermediaries or traders are more aware of prices in the central markets. In the past, asymmetrical information has led to low productivity and low farm incomes. In the case of

interventions in areas of Kenya, mobile phones have resulted in improvements in food security and farm incomes (Ogutu et al. 2014). Secondly, the introduction of these technologies adjusts the power balance between small-landholder and agricultural intermediaries. Mobile technology allows for immediate access to up-to-date market information, and also provides the farmer with direct access to payments both for paying for agricultural resources, such as fertiliser and seeds; as well as receiving payments for their crops. In rural Kenya, the mobile payment service M-Pesa has been adopted widely by the farmers in the export market for fruit and vegetables (Dannenberg and Lakes 2013). Mobile phones allow farmers to deal directly with exporters, circumventing the need for intermediaries, and ostensibly this gives them access to the global market. Farmers are less likely to accept unfavourable prices for their crops, thus improving their bargaining power (Tadesse and Bahiigwa 2015). Mobile phones also provide important information in regards to best-practice farming, determining best timing of when to plant and when to harvest, as well as market demand for particular crops. All this provides direct benefits to productivity, which should result in higher levels of farm income.

## The Changing Role of Markets

There is an increasing recognition of the role and importance of communication, networks and groups in the determination of economic outcomes—employment, income and wealth among these—demonstrative of the shift away from the traditional rational individual (*homo economicus*) assumption that underpins many long-standing models in the discipline.

As both a wonderful reference tool and literature survey, Paul Frijters (Queensland) and Gigi Foster (UNSW) deal with these themes in intimate detail in their recent book (Frijters and Foster 2013) *Economic Theory of Greed, Love, Groups and Networks*. Tellingly, against the background of the basic economic activity of trade, they describe networks as: "...a crucial component of the modern economic system of production and exchange" (p. 5), with Winters et al. (2004) making a useful extension to this. They then proceed to invoke microeconomic theoretical modelling (see pp. 349–396) to extend on several in-text examples.

Frijters and Foster proceeded to cite numerous specific examples of similarly-themed studies in the literature. Some focus on topics that are highly-aligned with identifiable fields within the discipline; such as political economy, public, experimental, development, finance, education, industrial organisation, management, monetary, labour, behavioural, social science and agriculture—see, for instance, Becker (1974) and Caskie (2000) as examples of the latter two. Others are included that cross-over into other (largely exclusive) disciplines, such as psychology, biology, and reproductive science.

## The Sharing Economy

The rise of the ‘sharing economy’ is one of the clearest comparisons between developed and developing nations, with respect to the effect of communication technology on everyday practice. The sharing economy has the potential to disrupt the way we traditionally exchange goods and services and function as markets. This technology is underpinned by the recent growth of application-based programs on mobile communication devices that have decreased the transaction costs of exchange. Specific examples of such applications, and how they have changed the business landscape of selected industries, have already been researched and discussed in the business studies literature; such as the accommodation service AirBnB (Zervas et al. 2015) and the ride-sharing system Uber (Anderson 2014); while more generally, (Belk 2014) reinforces how such innovations force us to re-think the old adage ‘you are what you own’. The dynamic pricing model for companies such as Uber provides incentives for those with capital assets (cars) to respond to increases in demand.

In the developed world, such technology plays a significant part in collaborative consumption, essentially between strangers, thus stimulating the volume of everyday practices that typically people would otherwise often undertake in partnership with existing friends, colleagues, associates or family members (ie. within their own network of individuals). Rising incomes in the past few generations have occurred contemporaneously with losses of networks and a sense of community—consistent with other social indicators, such as declining birth rates (Ahn and Mira 2002), smaller household sizes (Australian Bureau of Statistics 2010) and an increasing incidence in mental illness (World Health Organization 2015). Under such trends, these applications have served the potential to fill the void of community breakdown in expanding non-technology collaborative consumption outcomes, which is arguably forecasted to become increasingly necessitated by dwindling global levels of natural resources relative to population.

By stark contrast, in the developing world, with far less (both) human and physical capital, but greater social capital, end users and service providers are typically already connected and have an intimate sense of each other’s preferences; while the role of trust is clearly critical. Thus, the traditional levels of collaborative consumption have not reduced significantly during the modern era in the first instance. In this environment, the uptake and impact of these applications is expected to be somewhat more limited, at least in the short-term.

## Crypto-Currencies—Financial Markets Without Institutions

One of the next frontiers in global financial systems is that of crypto-currencies. The best known of these currencies is the Bitcoin, which offers alternate methods of exchange without the use of financial institutions. Bitcoin is a system of exchange

that is not administered by a single institution, government or country for its existence (Sadeghi 2013). The software underlying its creation established that Bitcoins would be able to be ‘mined’ slowly and steadily until there was 21 million units in circulation (Cheung et al. 2015). This crypto-currency uses an innovative cryptography called a blockchain; this is a public ledger that is effectively a permanent, incorruptible and irreversible trace of all Bitcoin transactions. In traditional transactions, we use banks to determine all transactions and account balances. The uniqueness of Bitcoin is that an intermediary is no longer required—all individuals consult the most recently-updated public ledger. The Bitcoin revolution is puzzling to economists as intrinsically there is no value of exchange (Yermack 2013). However, its newness and untapped potential could see such transactions be the new protocol of exchange. Bitcoin has the potential to be a revolutionary peer-to-peer platform, akin to the disruption that Skype had on telecommunications; alternatively, this could be merely a passing fad. The biggest barrier to bitcoin and crypto-currencies is the relationship of trust, particularly as these currencies are not managed by a single authorised institution or company.

## **The Role of the Crowd in the Entrepreneurial Space**

Crowdfunding represents another disruptive method by which the internet is offering a new way of engaging the community to support new businesses and ideas. The entrepreneur raises funds by making an open call on the internet collecting small amounts of money from a large number of investors. The crowd, in turn, has a closer relationship with the firm both as consumers and investors (Belleflamme et al. 2014). The equity (profits) of the business is then distributed back to the funding ‘crowd’. Kickstarter, Fundable, and Indiegogo are the most well-known of the crowdfunding sites. The pebble ‘smart watch’ is a case whereby venture capital initially rejected the project but a Kickstarter fund was able to evidence demand for the good and an initial request for US\$100,000 for 100 watches resulted in over \$US 10 million in pledges (Agrawal et al. 2014). The crowdfunding also serves as a marketing tool to create awareness of products in their development stages (Mollick 2014).

## **Conclusion**

Integration into the marketplace—encouraging entrepreneurial activities in previously untapped markets—allows for global expansion and connectedness. Technological advances are creating new business platforms and financial innovations that are disrupting traditional institutions. Mobile technologies are benefiting consumers and producers in both the developed and developing world. Small landowners are able to make greater profits on their produce by having better access

to information in the developing economies. New business platforms are making use of scarce and idle resources such as an individual's home (AirBnB) and car (Uber) with peer-to-peer networks facilitating market transactions in the developed world. The benefit for the consumer is the reduced cost of goods and services. The benefit for the economy is that ordinary individuals are able to leverage businesses off everyday assets, which increases competition among traditional monopolies.

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