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A COMPARATIVE STUDY OF MOBILE TECHNOLOGY ADOPTION IN REMOTE AUSTRALIA

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Abstract. The paper presents a comparative study of mobile technology adoption and use by two communities – one Aboriginal and the other non-Aboriginal – both located in a remote region of Australia, the Bloomfield River Valley of Cape York. Both communities have high levels of ownership of mobile phones relative to, on the one hand, the low uptake of other ICT such as fixed-line phones by the Aboriginal community at Wujal Wujal and, on the other hand, the poor mobile coverage in the non-Aboriginal community at Bloomfield. For both groups communication is of paramount importance, followed by listening to music. In addition, the Aboriginal community make extensive use of other multimedia and Internet features of their devices. Key factors in the motivation to acquire mobile phones, in comparison to other ICT, are the superior cost management that mobiles offer for Aboriginal people and the convenience of being able to communicate while away from home for Bloomfield residents. The authors conclude that mobile technology needs to be taken seriously, even in areas of limited coverage such as the Bloomfield River Valley.

1. Introduction

There have been many studies of mobile technology adoption and use focused on a single community or social grouping, as well as many comparative studies between one nationality and another, but few comparing distinct groups within the same locality. By contrast, the research reported in this paper concerns two communities living side by side within the remote and beautiful Bloomfield River Valley of Far North Queensland, one Aboriginal, the other non-Aboriginal. The triangulation of evidence from the two community cases provides for potentially more robust explanation of this complex social phenomenon than can be expected from a single case study (Trimarchi, 1998). By examining the differences between the two groups' uptake of mobile technology a better insight may be gained into the powerful motivations which have fuelled the exponential growth in adoption of mobiles both in regions where there is already a rich and diverse

communications ecology (first-world urban situations) as well as in the poorest regions of the world (Castells, Fernandez-Ardievol, Qiu and Sey, 2007).

The focus of the study is the mobile phone. However, we also comment on other mobile technologies – mainly MP3 players – that have been adopted in the Bloomfield Valley, as well as noting other available Information and Communication Technologies (ICT) such as fixed-line phones, public telephones and access to computers and the Internet. This is necessary as a new technology cannot be seen in isolation but interacts with and is supported by other technologies in use at the same time.

Our paper begins by situating our study within the literature of mobile phone adoption with an emphasis on non-mainstream contexts and developing countries. This is followed by a description of our research methods and the locality in which the study was conducted. We present an overview of the ICT available in the valley before we set forth our findings on mobile ownership, uses and issues.

2. Mobile Technology Adoption in and outside the Mainstream

We found a number of studies useful in providing insight to the overwhelming desire for mobile phones evidenced across the globe both within the economically developed, urban context and outside it. Katz and Aakhus (2002) posit an enduring human need for communication as the driving force for mobile phone adoption, with perpetual contact the goal. The studies collected in their book focus on social usage of mobile phones in different nations across the developed world and suggest that times are changing owing to mobile technology. Building this focus on communication, Geser (2004) proposes a sociology of the mobile phone linking mobility and communication from an evolutionary perspective. He draws a fundamental tension between the need of organisms for proximity in order to co-operate and form complex societies and their need for mobility, and suggests that mobile phones can resolve this tension.

Within the context of experiences common to our project – low income, poor infrastructure, minority Indigenous status, remoteness, rural-urban divide – there are a number of case studies which argue that the mobile phone does not change society, but that its attraction lies in its ability to extend existing forms of communication. Horst and Miller (2006), in their seminal study of low-income Jamaicans, found that the mobile phone had become essential as a communication device for maintaining and extending personal networks vital for day-to-day survival and leveraging monetary and other resources. Hahn and Kibora (2008) explored the boom in mobile phones in a poor African country and noted the “domestication” of the mobile through selective usage of its technical possibilities. The phone had become an important tool of communication between the village and the city, binding the two together and reinforcing cultural obligations. Portus’ (2006) study of mobile phone culture amongst Indigenous people in remote villages in the Philippines showed how, despite poverty, mobiles had become highly valued for communication with relatives, friends and government entities in town. Calling saved travel money, and people who could not afford one could get access for a fee. The phones enhanced their sense of security and became a status symbol. In the Australian context, Sinanan (2008) found that mobiles were important tools for solidifying existing social ties in a rural Aboriginal community. Calls and text messages

to friends and family were highly normalized, although there was a reluctance to use mobile phones for business matters.

Through these cases, the literature reveals an extraordinary variety of methodologies for studying mobile phenomena. Ito (2005) proposes socio-cultural history of technology, cultural studies, the sociology of communication, and ethnography as appropriate disciplinary frameworks. Donner (2008a), in his review of the literature about mobile use in the developing world, notes a variety of perspectives including those with a strong economic development focus and design approaches. He proposes an increased integration between ICT for development studies and other approaches; the need to understand linkages between richer and poorer communities, and between rural and urban users; and the desirability of considering the various functions of mobile devices, regulatory and coverage aspects of mobile networks, and the communication ecosystem in which they operate. In our Bloomfield River Valley study, we have tried to incorporate some of these suggestions, for example, by comparing two groups of people, their access and use, the diverse functionality of the 3G phones used in the valley, and the ICT environment in which mobile technology operates.

3. Methodology

This study is based on:

1. Interviews with people living or working in Wujal Wujal
2. Surveys and interviews with residents of Bloomfield
3. Observations by the researchers, which were tested against the perceptions of local residents and publicly available documentation.

All interviews and surveys were conducted in November 2008 and handwritten notes of the interviewees' responses made. The qualitative research methods employed were good for uncovering attitudes and issues surrounding technology uptake and use, and provided rich description and explanations (Trimarchi, 1998). Any quantitative results presented can be taken only as indicative for several reasons: the number of respondents was low; our sampling of Wujal Wujal managers and high-end users was purposive, not random; there was an under-representation of children as the study took place in term time when most high-school age children would have been away at boarding school; and an under-representation of young working adults, since job opportunities in the valley are few and some move to other localities to find work.

Interviews were unstructured and lasted about half an hour (although some were longer) and began with the questions "Do you have a mobile phone?" and "What do you use it for?/Why don't you have one?". Open questions allowed the interviewees to choose their own words and they were given plenty of leeway to comment on whatever aspects of mobile technology were important to them. Surveys were short, beginning with the two questions above, but also asking respondents if they carried their phone with them all the time and if they owned an MP3 player, with opportunity to make other comments if they wished.

The Wujal Wujal interviews numbered 27 and included 7 managers or supervisors, 9 high-end users of mobile technology and 11 short interviews with low-end users. All

were Aboriginal people, apart from 6 of the managers/supervisors. The latter were asked about issues concerning mobile technology connected with their role rather than their personal use and ownership. Excluding the managers, there were 9 females and 13 males. Only 3 children were included, all primary school boys.

The Bloomfield respondents numbered 20 and consisted of 7 interviewees and 13 people who completed survey forms. All of these were non-Aboriginal. There was a gender imbalance, with only 5 males included, possibly because the data was collected at a local market, to which women may have been attracted more than men. Again there were only 3 children, in this case all girls.

4. The Bloomfield River Valley

This study takes place in a small locality in Far North Queensland (Figure 1). It is a coastal river valley with approximately 450 inhabitants (ABS, 2006). The valley is relatively isolated as the road from the regional centre Cairns in the south (180km away) contains 30km of 4WD track and is impassable during the wet season. The small town of Cooktown in the north (80km) has a better road although it is still subject to flooding. Within the valley there are two distinct populations with services provided by separate councils although some services, such as the clinic in Wujal Wujal and the primary school and airstrip in Bloomfield, are shared.

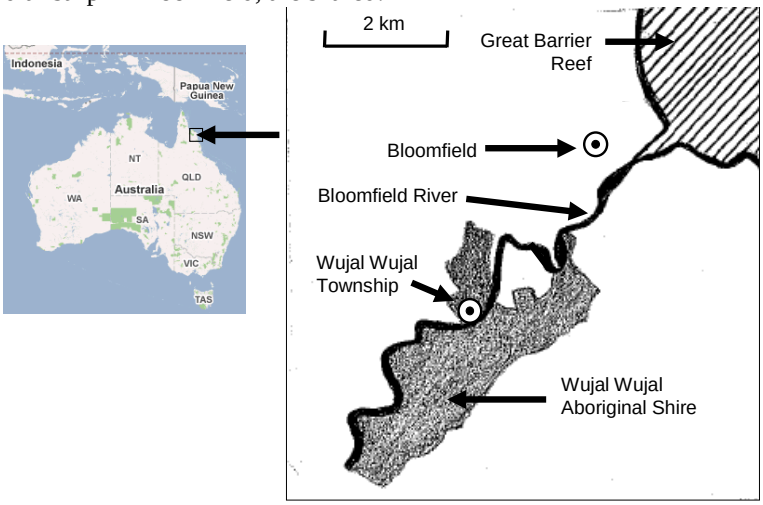

Figure 1. Location of Wujal Wujal and Bloomfield communities.

The Aboriginal people were never removed from the area in large numbers and, following first European contact in the 1800s, continued with many aspects of pre-contact culture and economy, gradually adopting aspects of mainstream culture and involving themselves in non-Indigenous enterprises over time (Anderson, 1989). From traditional land owners, they became part of a Lutheran mission and are now self-

governing. Wujal Wujal Aboriginal Shire covers 11.2 sq km and comprises an urban community with a population of 324, 95% of whom identify as Indigenous (ABS, 2006).

Since 1870 the valley has also had a non-Indigenous population involved in sporadic development such as sugar cane, tin mining, pastoralism, forestry, market gardening, and more recently fruit crops, crafts, tourism and service provision. The Bloomfield census collection district is 85.2 sq km and has a more dispersed population of 127 in a small village surrounded by rural residential and general farm holdings. Of this population, 80% identify as non-Indigenous (ABS, 2006).

Differences in the two populations include age, education and economic status (ABS, 2006). In Wujal Wujal only 29% of people are over 40 years old compared to 63% in Bloomfield. Bloomfield has a higher level of educational attainment and much higher home ownership. Income levels show both groups earn substantially less than the Australian average weekly wage, although in Wujal Wujal 92% of workers receive below the average while in Bloomfield this figure is 63%.

5. ICT Ecology

When we talk of ICT ecology we reflect changes in the study of technology prompted in part by the history of ICT implementation failures in developing nations (Villanueva, 2007). The biological metaphor promotes an understanding of ICT as a dynamic process that cannot be studied in isolation from its surroundings, animate or inanimate. At its most comprehensive it can be a study of "the complete range of communication media and information flows within a community" (Slater and Tacchi, 2004, quoted in Horst and Miller, 2006, p. 12). However, we are not making such claims in this description.

The Bloomfield River Valley is well supplied with ICT, considering it is in a remote area with a small population and little industry, although there are marked differences between ICT access in Wujal Wujal and Bloomfield. The council, clinic and school have the normal range of ICT for administrative purposes. Fixed-line phones have been available since 1988, but only 7% of private households in Wujal Wujal are listed as having one (Cook Shire Council 2008/2009). There is a public telephone in each centre. A mobile network service has been available for several years, although since the replacement of the CDMA service with the 3G network in January 2008, coverage has become more restricted and is focused on Wujal Wujal and spots along the River (Brady and Dyson, 2009). This means that most residents of Bloomfield do not have mobile phone coverage although pre-paid mobiles are on sale in both Wujal Wujal and Bloomfield. There are public computers in the Cape York Digital Network Centre at Wujal Wujal, but at the time of research this was not staffed and so not used by residents, apart from two mornings a week when an employment agency opens it for its clients. There is a touchscreen computer located in the clinic at Wujal Wujal with health information adapted for Indigenous people. There are no figures available for private computer ownership in Wujal Wujal, but it is reported to be very low and home Internet connections were only 8.3% in 2006 (ABS, 2006). Therefore, apart from the employment agency's clients and a minority of people who work for the council most Wujal Wujal residents cannot access a computer. By contrast, Bloomfield has a public access computer in its library which opens three half-days a week, and home Internet

access is higher at 46% (ABS, 2006). Wujal Wujal is supplied with public radio and TV access, compared with Bloomfield where most people have to purchase an expensive satellite dish for these services.

Even where people have ICT, there is a major problem with the amount of time they are off the air. The Bloomfield River locality is subject to frequent power and communications black- and brownouts, particularly in the wet season. However, people report that the mobile service is not as susceptible to disruptions as the fixed-line phones.

6. Ownership of Mobile Devices

Our research showed that 55% of the respondents at Wujal Wujal owned at least one mobile phone (Table 1). Some people shared a phone, for example, one couple used a phone between them. Most people carried their phones with them all the time and had them turned on. An indication of the level of interest in mobile technology is the sequential ownership pattern, driven both by the changing infrastructure (CDMA to 3G) and by the susceptibility of phones to water damage when fishing or washing clothes. While only 1 person owned more than one phone simultaneously, more than half the owners were on their second phone. It is interesting that mobile phone ownership is about the same as that found by two other studies of Aboriginal mobile phone adoption: 56% in Alice Springs and 58% in Lockhart River (Tangentyere Council and Central Land Council, 2007; Dyson and Brady, 2009). The relatively high rates of adoption of mobile phones contrast with low rates of fixed-line phone and Internet connections.

Table 1. Ownership of Mobile Device.

Technology	**Wujal Wujal** (Aboriginal) (% of respondents)	**Bloomfield** (non-Aboriginal) (% of respondents)
Mobile Phone	55%	71%
MP3 Player	39%	56%

In contrast to Wujal Wujal, most Bloomfield residents cannot use their mobiles where they live because of lack of coverage in their part of the valley, and therefore rely on their land-lines at home. Considering this, there is still a surprisingly high rate of ownership of mobile phones: 71% compared to the Australian average of 88% (Tangentyere Council and Central Land Council, 2007). The convenience of being able to communicate when visiting other localities for shopping, business or seeing friends or relatives is sufficient to justify the purchase and ongoing charges associated with mobile phone ownership. Ownership of mobile phones in areas without coverage has also been reported in Africa (Scott, n.d.). Again in Bloomfield sharing of phones occurs, for example children using their parent's phone.

The most frequent reason given by both Wujal Wujal and Bloomfield residents for not owning a mobile phone was the lack of signal in many places. Other reasons given by multiple respondents included having alternatives available (e.g., a landline or a neighbour's phone) or no interest in having a mobile.

The ownership of MP3 players is lower than mobile phones, but again with a greater percentage of Bloomfield residents owning them (56%) than Wujal Wujal residents (39%) (Table 1). This compares with an ownership rate of 69% given in one study of Australian university students (Kennedy, Judd, Churchward, Gray and Krause, 2008). MP3s have the advantage that they can be played while driving on rough roads where CDs cannot. One Wujal Wujal parent stated that being able to listen to music she liked was important as her taste was not the same as her children's. Most MP3 owners also had a mobile phone with two exceptions, one man from Wujal Wujal, who had had a mobile phone previously, and another from Bloomfield who owned a landline. Both were music lovers. On the other hand, a reason given by Wujal Wujal residents for *not* owning an MP3 player was that one could listen to music on one's mobile phone.

7. Uses of Mobile Phones

Reported phone uses are set out in Table 2. It should be noted that, because respondents were not prompted and could choose their own words in replying, some uses may be underreported. For example, only one respondent suggested that keeping a contact list was important, but presumably most mobile phone users would maintain one.

In both communities, mobile phones are employed predominantly for communication, with all respondents reporting that they make phone calls or send text messages or do both. Phone calls are more common. Text messaging is much higher in Wujal Wujal, and this represents one of a number of cost-saving strategies for mobile phone use by Aboriginal people. With regard to the lower rate of messaging by Bloomfield residents (who are not a wealthy group either) we can speculate that phone calls are a more convenient mode of communication when visiting other localities. Making use of mobiles when away from the valley is more important than local use for this group as many have landlines when at home and no mobile coverage. Differences in work-related calls probably also reflect the coverage issue.

The most frequently reported use is making calls to family and friends. In both communities, mobile phones are essential for parents and children away at boarding school to stay in touch with each other since there is no high school locally: 'I pretty well talk to them every day', reported one mother. 'All the kids have them at school there', stated another.

Almost 30% of Bloomfield and Wujal Wujal phone owners included "emergencies" in their reasons for having a phone despite the limited areas of coverage. The benefit, though unlikely, appears highly valued either directly (to call emergency services) or indirectly by feeling more secure and knowing that they can call for help (Portus, 2006; AMTA, 2007). This reinforces the value of the mobile for its ability to bring some peace of mind, rather than its real contribution to a person's risk management strategies. A non-mobile phone owner, by contrast, may "carry a tin of

bully beef and some tea" (as one interviewee told us) in order to wait more comfortably until someone came by to help.

Table 2. Mobile Phone Uses and Functions.

Mobile Phone Use or Function	**Percentage of Users Reporting this Use**	
	Wujal Wujal (Aboriginal)	**Bloomfield** (non-Aboriginal)
Communication	100%	100%
▪ Phone calls	▪ 82%	▪ 93%
▪ Calls to family and friends	▪ 82%	▪ 21%
▪ Call children at boarding school	▪ 27%	▪ 14%
▪ Work-related calls	▪ 64%	▪ 7%
▪ Text messages	▪ 73%	▪ 36%
▪ Videocalls	▪ 9%	▪ 0%
▪ Emergency use	▪ 27%	▪ 29%
▪ Location of calls		
▪ In Bloomfield Valley	▪ 46%	▪ 21%
▪ When away from valley	▪ 27%	▪ 43%
▪ Keeping a contact list	▪ 9%	▪ 0%
Entertainment	73%	14%
▪ Listen to music	▪ 55%	▪ 7%
▪ Play games	▪ 36%	▪ 0%
▪ Watch movies/TV/sport	▪ 27%	▪ 0%
▪ Take photos with camera	▪ 9%	▪ 7%
Internet uses	46%	14%
▪ Download music, games, movies	▪ 36%	▪ 7%
▪ Email	▪ 9%	▪ 0%
▪ Weather reports	▪ 0%	▪ 7%
▪ Football scores	▪ 0%	▪ 7%
Personalization	55%	7%
GPS	9%	0%*

* One respondent had a separate GPS handheld device

Work communication was a major reason offered by Wujal Wujal respondents for owning a mobile phone. A small percentage of people use their mobile for their own direct benefit while looking for employment, but more commonly personal mobiles are used to keep in contact while on the job: "I need a phone for three clients. … I need a phone for clinic or the police. … I'm worried about my clients," said one aged-care worker. Another example is the councilors who choose to be "on-call" to the community they represent. Using personal devices for work is unusual in Australia, although perhaps more common elsewhere (Katz and Aakhus, 2002).

A major difference in mobile phone use is the much greater reported utilization of the multimedia features by the residents of Wujal Wujal. Entertainment uses (73% of users) are common and include listening to music, playing games, and watching movies,

TV, music programs or sports from Foxtel. Personalization features such as wallpaper and ringtones are also very popular. Surprisingly, only 1 person reported using their camera and only one said they use the videocall function, but this may represent a case of underreporting. Interviewees obtain their multimedia content from various sources, including from people they know via Bluetooth, downloading content from the Internet using their mobile phones, and downloading from various work computers at Wujal Wujal. Given that the only phones that can be used in Bloomfield River Valley are Internet-enabled, uses of the Internet figure prominently. On the other hand, only two Bloomfield residents reported making use of the 3G features. To some extent this may be because of the greater dependence on short surveys which did not explicitly ask for information about multimedia, although even the detailed interviews failed to highlight many multimedia uses. Further investigation is required to identify ownership of other multimedia devices by both groups (cameras, videos) to show whether this is an access, mobility or cultural issue.

8. Issues with Mobile Technology

8.1. COVERAGE

The complaint raised most often by both mobile phone owners and non-owners was the poor coverage through most of the Bloomfield River Valley. For Wujal Wujal residents it chiefly impacts their ability to use their phones when going about their normal daily lives in the valley outside the township. For Bloomfield residents it usually means not being able to use their phones except when visiting regional centres such as Cairns. As one impassioned Bloomfield non-owner stated: 'I don't like one. I don't want one. They're useless. … I can't use it where I live.'

Poor coverage limits the potential of service providers to improve services in the valley, for example, to provide diabetes management, to co-ordinate emergency services in a bush fire or boating accident, or to manage work crews. Currently there is little use made of mobile technology by government or service providers.

It also limits the usefulness of mobiles as a backup when other telecommunications go down, a frequent occurrence. Currently, managers in Wujal Wujal use their mobile phones in this way but outside the township poor coverage prohibits this.

8.2. COST

In the Wujal Wujal community there is generally a high level of awareness of the cost of making phone calls. Interviewees recounted stories of mobile bills in the thousands of dollars before pre-paid phones became available. Community members identified a range of strategies to manage cost. The fundamental methods are buying prepaid phones, a strategy supported by all the shops in the valley, who sell nothing else, and keeping ones phone on one's person to stop others from using it. Other strategies include using mobiles only when away from a fixed-line or for emergency calls to family or work; minimizing outgoing calls; communicating by text message; or using a "pre-paid friends" service involving free calls to nominated contacts.

Cost was raised as an issue with only two respondents in Bloomfield, one a mother with a daughter away at boarding school, the other a non-user, who interestingly noted the cost of petrol to drive to an access point as a disincentive to ownership. This is contrary to perspectives reported in the literature where mobile phones are seen elsewhere as *saving* costs by reducing the need to travel (Portus, 2006; Overa, 2008).

8.3. MOBILE TECHNOLOGY LITERACY

In both communities some middle-aged and elderly people do not have the skills needed to use all the features on their phones and MP3 players. However, they get others to help them when necessary. One woman from Wujal Wujal said that she didn't know how to 'Bigpond or Foxtel' (i.e., access Internet and movie sites) or download music, nor did she know how to videocall but was waiting for her Year 11 daughter to show her: 'She know how to do it'. An elderly Bloomfield woman was having 'lessons' on how to text message so she could text her granddaughter.

8.4. DOWNLOADS

One finding of concern to a number of managers at Wujal Wujal is that people are increasingly using work computers to download music or other multimedia content for their mobile phones or MP3 players. This has led to two major issues: firstly, the cost to the place of employment for data downloads, and secondly the inappropriate use of work time for private purposes. One manager spends time blocking sites to music, movies and games to prevent this happening. This has resulted from the interaction of the new mobile technologies with the existing ICT ecology: Wujal Wujal residents now have a need for content to play on their mobile devices but do not have public access or home computers from which to download. Though some people access the Internet from their 3G phones for downloads, the cost of doing this would discourage others.

This problem was not reported in Bloomfield, quite likely because the workplaces are owner-operated rather than the government agencies found in Wujal Wujal, there is a lower reported use of the multimedia features of the phones, greater home Internet access for downloads and access to the public computer in the library.

9. Discussion

9.1. THE ADVANTAGE OF THE MOBILE PHONE OVER OTHER ICT

It is interesting to examine which specific qualities of the mobile phone give it the advantage over other ICT, such as landlines or the Internet. For the non-Aboriginal population of the valley, the key is probably the mobile's inherent mobility. Few of our Bloomfield residents have reception at their homes and many expressed frustration over this. Most purchased mobile phones purely to be able to use them when visiting regional towns and cities or when travelling on the road. At home, they are relatively well equipped with landlines, computers and Internet connections. Mobile phones thus represent a very clear complement to existing ICT for Bloomfield owners.

On the other hand, for the Aboriginal people in our study two attributes of the mobile phone stand out as key advantages compared with fixed-line phones, both of which are to do with costs: firstly, that it offers pre-paid cost management and, secondly, that the personal nature of the device allows people to carry their phones with them at all times and decide whether they will share their phone with others. Where extended families living in the one house is the norm and cultural obligations make it difficult for the landline subscriber to refuse phone use to family and friends, large numbers of calls often result for which the subscriber may be unable to pay, leading inevitably to disconnection of the service (DCITA 2002). A prepaid mobile kept in one's pocket or around one's neck avoids this problem.

Does this mean that mobility is of no interest to the Wujal Wujal residents? Several researchers have downplayed mobility in their studies of poor communities in developing countries. Donner (2008b, p. 32), for example, stresses the fact that mobile phones, in the absence of other communication technologies in Africa, are chiefly notable for providing "*affordable, basic, person-to-person connectivity*." Certainly, compared with most other Australians, Aboriginal people are ICT poor. Yet, residents of Wujal Wujal do have some choice, for example, the public phone, which they often continue to use as it provides much cheaper calls than their mobiles. Some interviewees obviously value the ability to keep in contact when away from the valley, too, some use their phones when out camping or down at the beach, and some need their phones for work when away from the office. The ownership of MP3 players also demonstrates the attraction of personal, portable devices. So, while mobility is not the main reason for the popularity of mobile technology with Aboriginal people, it does represent a feature which is highly valued.

9.2. MOBILE TECHNOLOGY SERVING UNIVERSAL HUMAN NEEDS

Our study has confirmed, what many other studies of mobile adoption have shown in Australia and across the developed and developing world, that there is a huge motivation for owning mobile devices *whoever you are*, whatever your cultural background.

Certainly the desire to communicate and be contactable is a universal motive. As Douglas and Ney (quoted in Horst and Miller, 2006, p. 173) stated more than a decade ago "a social being has one prime need – to communicate". Communication is not trivial but recognised as an important end in itself (Castells et al., 2007). It is the means by which networks are strengthened and expanded, and it is the vigour and number of networks that comprise a society's social capital and underpin its development (World Bank, http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTSOCIAL DEVELOPMENT/EXTTSOCIALCAPITAL/0,,menuPK:401021~pagePK:149018~piPK:149093~theSitePK:401015,00.html). Horst and Miller (2006) evolved the term "link-up" to describe mobile-phone-supported social networks and how they have become integral to how Jamaicans cope with "pressure" and get through daily life. Portus (2006) states that owning a mobile phone may bring "feelings of comfort and confidence, knowing they are connected", able to share a concern and empowered by the capacity to mobilize resources. Hahn and Kibora (2008) describe the value of the mobile phone in maintaining culture and community in Burkina Faso as families are split by economic necessity between urban and rural areas. We have observed in remote islands in the

Torres Strait the mobile phone camera being used to "show" someone working away from the island what was happening at home, thus maintaining connection, not just with family but with the community. For both populations in the valley, the most strongly expressed responses in our interviews were by mothers of children away at boarding school, no longer reliant on the public phones at school or at Wujal Wujal. It is hoped that this new level of support will increase the retention levels of Aboriginal children at high school, in the past identified as amongst the lowest in the country.

The other important human need that is answered by mobile technology is music. The findings show that more than half the people in both populations own MP3 players or use their mobile phones for listening to music. Some reasons given by users for using these devices rather than older music technology such as CD players were purely pragmatic (their superior performance when driving on dirt roads), but others focused on the personalization of music by the listener. We also know from Lockart River that mobile devices were significant in providing Aboriginal people with music and sometimes used in combination with other technologies, e.g., to play the music stored on one's iPod through the speakers of a stereo system (Dyson and Brady, 2009). More research needs to be done to explore these aspects more thoroughly.

9.3. THE CONTRIBUTION OF CULTURE TO PATTERNS OF MOBILE APPROPRIATION

While some uses of mobile technology are similar across both communities in our study, our findings also reveal major differences. Most notably, Wujal Wujal mobile phone owners exploit the multimedia and data features of their devices to a much greater extent than reported by the Bloomfield respondents. Moreover, their usage reflects a similarly high use of multimedia phone features by the Aboriginal people of Lockhart River in Cape York (Dyson and Brady, 2009) while contrasting with the general Australian population, where research has shown that there is limited use of mobile phone features beyond basic voice and text (Kennedy et al., 2008; AMTA, 2007).

We must then ask the question, "To what extent does culture play a part in attitudes and patterns of appropriation?" Does adoption reflect a cultural preference (Brady, Dyson and Asela, 2008; Dyson and Brady, 2009; Hahn and Kibora, 2008)? or expanding usage of the device with familiarity (Geser, 2004)? or a function of the relative availability of other ICT? In the Bloomfield River Valley it is hard to separate the various factors as they are often inextricably intertwined. It is more accurate to say that the design of the devices interacts with a range of human characteristics, including culture, socio-economics and lifestyle, and this influences technology appropriation:

- There is a fit between the multimedia features of mobile devices and the traditional strengths in Aboriginal culture, namely oral and audio practices (song, music, story-telling and ceremony) and also pictorial expression (painting, sculpture and carving). This would explain the greater uptake of the multimedia functions of mobile phones by Aboriginal people.
- The portability of the technology favours its incorporation into the lifestyles of both Aboriginal and non-Aboriginal users, for example, allowing Bloomfield people, and to a lesser extent Aboriginal people, to make calls when away from the valley, and

allowing Aboriginal people to make calls while they or their relatives are camping, a typical practice in keeping with their culture.

- The personal nature of the devices allows the owner to decide whether they will share it with others. This permits Aboriginal people to control costs by *circumventing culture*, that is by avoiding the norm of reciprocity which typically encourages sharing.
- The text messaging function of the phones allows both Aboriginal and non-Aboriginal people in the valley to communicate more economically. In the case of the Aboriginal users – since writing is not part of their traditional culture – this again shows that cultural traditions can be overcome if motivation (to communicate cheaply) is strong.
- The relative availability of mobiles compared to other ICT influences their popularity. The lower ICT access of Wujal Wujal residents is a function of both socio-economic constraints (e.g., low incomes and overcrowding) and cultural factors (e.g., the difficulty of refusing fixed-lined phone access to family).

9.4. MOBILE TECHNOLOGY FOR ECONOMIC DEVELOPMENT

Our results show very limited use of mobile phones in income-generating businesses for either Wujal Wujal or Bloomfield residents. The patchy nature of the coverage across the area is certainly a factor although there may well be other reasons. Studies of the developing world have found higher status groups benefit most from telephone use (including mobiles) to improve their livelihoods (Souter et al., 2005). Any link, therefore, between mobile phones and economic improvement for low income groups is problematic because it is likely to be indirect and difficult to quantify as it involves the mutual exchange of assistance and support (Hahn and Kibora, 2008).

10. Conclusion

Despite the limited coverage in the valley, mobile technology needs to be taken seriously. This study of two very small, remote communities with relatively restricted infrastructure has implications for the provision of services more generally. It shows the importance of a varied communications ecology to support the range of individual and community needs. Mobile phone companies across the world know that people will pay a "healthy price premium [for mobile] over fixed voice services" (Access Economics, 2007, pp. 37-38) but there has been some confusion as to why. We hope that this study has extended our understanding for why people own a mobile phone and the role of mobile technology in the emotional lives of people.

Final usage patterns for Bloomfield River Valley residents will be a unique product of cultural mores and practical constraints. As Baron (2008, p. 131) notes:

> Mobile phones are like cars and rice. The practices through which we encounter these items are only partially determined by the objects themselves, with the rest of their functioning often shaped by the culture norms – or pragmatic necessities – of the society in which they are embedded.

The mobile telephone represents important but different improvements to the communications of each community in the valley. The people in our study were selective about their ICT, choosing between public telephone, fixed-line phone, mobile phone and the Internet which they would own and which they would use, where and for what purpose. People virtually boycotted what did not fit and were prepared to pay more for what did, even though it represented sometimes only a small extension to their existing service.

However, given the widespread adoption of mobile phones, and that all phones in this remote region are 3G, this technology has the potential to make significant improvements to the lives of people in remote Australia. There was a huge motivation for owning a mobile, despite the poor coverage for many residents and despite the cost. As one resident stated: 'If I could, I would use my mobile more – I would!'

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