

# Factors Driving Handheld Wireless Media Usage

Mary R. Lind  
[lindm@ncat.edu](mailto:lindm@ncat.edu)

Chi Anyansi-Archibong  
[archiboc@ncat.edu](mailto:archiboc@ncat.edu)

North Carolina A&T State University  
School of Business & Economics  
Greensboro, NC 27411

Peter M. Anyansi  
[p\\_anyansi@yahoo.com](mailto:p_anyansi@yahoo.com)  
Founding Country Director,  
Society for Free Enterprise: Nigeria

## Abstract

The influence of the cultural context on the usage of wireless media in Nigeria as compared to usage in the United States is examined in this paper. Here the factors ease of use, fun, and flow are examined in a cross cultural context. While wireless media are at an earlier stage of adoption in Nigeria than the United States, according to the respondents' comments these media are having a significant impact on their lives and the research question of this research addresses the impact on their culture.

**Keywords:** handheld wireless device, culture, ease of use, fun, flow, Nigeria, United States

## 1. INTRODUCTION

While wireless media use is widespread in the United States and Europe, wireless devices have become a significant force enabling economic progress in Africa. In particular, this research will address the use of these wireless devices by college students in Nigeria as compared to the United States.

Communications to others and access to Internet information make the wireless media a powerful tool in American culture. While culture frames American usage of these media, culture is also impacted by wireless media usage. In Nigeria with an economy driven by abundant natural resources such as

petroleum, the citizens are in the relatively early stages of wireless media adoption. This research provides an interesting context in which to examine the cultural impact of wireless media across two very different cultures in different stages of wireless media adoption.

## 2. CULTURE

Handheld digital devices shape culture by creating groupings or phratria (Shiller, 1979) in which individuals of these clans are closely connected to others through the communications enabled by these devices. Thus the phratria can branch beyond the immediate social network contacts and family of a

person to connect with others not in close proximity either on a permanent or temporary basis. In developing countries such as Nigeria these devices enable coordination and organization for those individuals loosely connected to enable collective action. Granovetter has examined the strength of weak ties where communication with individuals not in your immediate social network can result in job leads and discussed the application of this concept to economic development (Granovetter, 2004). The weak ties for the phatria enabled by the wireless communication devices could lead to other forms of serendipity besides collective action.

Crane (1972) in his writings on the diffusion of knowledge in scientific communities discussed the importance of the "invisible college" of experts in the scientific area. In developing countries, wireless handhelds bring to the citizens the ability to form digitally connected phatria for the sharing of knowledge as well as social interaction. Thus the wireless media can help to overcoming barriers of a developing country's lack of transportation infrastructure and can have a tremendous impact on the country's potential growth and their culture.

As in most cultures the early adopters of these digital wireless media are the young and, in particular, many are students. These devices can be particularly useful in coordinating class activities and in working on team projects. Thus the interconnected phatria enable this invisible college (Crane, 1972). Also the phatria share the use of the wireless devices not only as a means of communication and coordination but also as a means of organization using the calendar, clock, and the calculator function. Fun is also a shared aspect of the phatria in common games, web sites, and in listening to music. Thus the phatria gain power through their connectedness to impact their surrounding culture.

Cultural driven changes in the United States has been evident for decades but the connectedness enabled by the digital handheld phone, the Internet, and mass communications such as the television have enabled changes such as hip hop music, slang terminology, dress styles, etc. that become accepted. Thus as Shiller (1979) noted culture then is a way of life that shapes one's activi-

ties and the activities in turn shape the culture.

**RESEARCH QUESTION:** The cultural context for digitally enabled communication will result in significant differences in terms of usage of those communication devices.

### 3. WIRELESS MEDIA USAGE

As Gaver (2005) noted information technologies are pervasive in our culture and handheld digital wireless communication devices have become the most pervasive. While these handheld phones are used to conduct business, they have become instrumental in social interaction, organizing and for keeping in touch. As Lind (2007) noted these wireless devices are artifacts by which work, social, and play activities are conducted in our cultural context; yet the cultural context is, in turn, shaped by the use of the wireless artifact. While Davis (1989) noted that the adoption of technology is rooted in its usefulness and usability, communication technologies enable the enactment of social interaction so that the use of the technology is embedded in the interaction and responding to the communication overtures of members of the person's social network. Thus while there is a push to use the technology on the user side there is a pull from the user's social network either through voice or text messaging.

While digital phone usage is a complex milieu of social interaction, these phones are also used as time pieces, calendars for appointments, global positioning systems, Internet browsers, and music players. In essence the digital phone is becoming the pocket computer, communicator, and organizer. In developing economies cell phone technologies can be installed with relatively little infrastructure investment. While use of the technology involved costs, it is changing lives and allowing small businesses to locate the best markets for their products before engaging in travel on a transportation infrastructure that is limited at best.

These wireless digital communication devices while an instrument of commerce and connectivity are also an instrument of play for the homo luden which Huizinga (1950)

described as humans engaged in action for entertainment as well as goal accomplishment. Along with the play, fun aspect of these digital devices and the ability to engage in social and business interaction, they also enable a feeling of control where the user can easily coordinate meetings, make adjustments on the fly, and convene gatherings of their social contacts as the need arises. This feeling of control leads to a feeling of flow (Csikszentmihalyi, 1975) so that the homo luden can easily engage in work and play activities becoming totally immersed in the activities.

The use of the wireless communication device as an instrument of commerce and connectivity is often depicted as rooted in Ajzen and Fishbein's (1981) theory of reasoned action with utilitarian motives behind the usage. Davis (1989) developed the "Technology Acceptance Model" based on this utilitarian view where in the early stages of technology adoption (Rogers, 2003) use is often predicated on ease of use and usefulness of the technology. Another dimension discussed in the earlier technology acceptance literature was accessibility (Zmud, Lind, and Young, 1991) where accessibility can deal with ease of use but in most cases the issues were proximity and cost accessibility. Wireless technology devices have negated issues of physical proximity but cost is still a barrier to accessibility.

Counter to this utilitarian view of wireless device usage is the ludic perspective of immersion in the technology where it becomes an escape, an element of entertainment, or just fun. Games, music, videos delivered via wireless devices enable this homo ludic (Hui-zinga, 1950) view of technology. As seen with cell phones they become an extension of the homo luden's persona with custom faceplates, ring tones, and backgrounds on the lcd screens.

The technology adoption literature has shown the stages through which users progress in adopting new technologies. While there are a smaller number of early adopters, the number of users of a successful technology will increase in a S-shaped diffusion curve (Roger, 2003) once the newness effect is over. When considering wireless devices which enable communication there is a critical mass (Markus, 1987) that

must be achieved for applications such as text messaging or cell phones where there are sufficient numbers of people in a person's social network using the electronic medium to make it worthwhile. Wireless handheld communication devices however can be used to communicate with land phones so from the voice perspective in most developed economies critical mass is not an issue. Cell phones however in developing economies provide a way around a lack of infrastructure for land phones and certainly critical mass is more of an issue in these economies for voice communications.

Another aspect to wireless handheld device usage introduced by Lind (2007) is that all the features of the wireless digital phone collectively enable the homo luden to become so immersed in the technology that while there is fun with the technology the homo luden becomes even more focused (locked in) to the technology enabling a feeling of control. The homo luden using the digital communication device is not buffeted by missed news or time zone or distance issues, the technology enables the "flow" experience (Csikszentmihalyi, 1975) of control and immersion with the technology.

In this research, the following propositions will be examined:

- 1) Wireless handheld device users will feel more flow and fun with the technology when they find it easier to use.
- 2) Wireless handheld device users' opinions of the technology will be influenced by the norms both technology and infrastructure of their culture.
- 3) Wireless handheld devices which enable spontaneous collective action can impact culture.

#### 4. RESEARCH DESIGN AND ANALYSIS

Students in undergraduate classes in the United States and in Nigerian were asked to participate in this study. As Table 1 shows there were 62 respondents from the United States and 63 from Nigeria. There was not a significant difference in gender and most respondents were under the age of 25.

**Table 1 Demographics**

Gender	No. of	No. of Wom-
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	<b>Men</b>	<b>en</b>
<b>Nigeria</b>	<b>35</b>	<b>28</b>
<b>United States</b>	<b>33</b>	<b>29</b>

<b>Age</b>	<b>&lt;18</b>	<b>18 to 25</b>	<b>25 to 35</b>	<b>35 to 45</b>	<b>45 to 55</b>	<b>55 to 65</b>
<b>Nigeria</b>	<b>19</b>	<b>25</b>	<b>8</b>	<b>7</b>	<b>3</b>	<b>1</b>
<b>United States</b>	<b>49</b>	<b>12</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>

Using the items from the dimensions of wireless communication presented in Lind (2007), the students responded with respect to their use of their handheld wireless devices that were Internet ready. The three factors as proposed in Lind (2007) are shown in Table 2: ease of use, fun, and flow – this study will assess the reliability and validity of these constructs. The purpose of this analysis is to assess the reliability and validity of these items in order to investigate the impact of culture on wireless device usage.

**Table 2 Wireless Factors**

**Rotated Factor Matrix**

	<b>Factors</b>		
	1	2	3
<b>Ease of Use Cronback Alpha = .84</b>			
Cell phone increases your productivity	.778	.091	-.070
Features of cell phone are a challenge to use	-.749	.056	.140
Easy to get cell phone to do what you want it to do	.767	.347	-.077

You find your cell phone understandable to use	.788	.230	-.007
It is easy for you to become skillful at using your cell phone	.696	.317	.255
<b>Fun Cronback Alpha = .75</b>			
You enjoy playing with the features of your cell phone	.219	.601	.021
Your cell phone makes it easier for you to do your daily activities	.031	.730	.037
You find using your cell phone a pleasant experience	.296	.756	-.075
Your cell phone enables you to accomplish activities more quickly	-.163	.565	.378
Using the cell phone is a fun experience for you	.180	.698	.193
<b>Flow Cronback Alpha = .78</b>			
You get so involved with your cell phone that you lose track of time	-.073	-.031	.746
Your cell phone makes you feel more in control	.189	.459	.478
Using your cell phone gives you more control over your activities	.069	.419	.702
Using your cell phone is a challenge that makes good use of your skills	.037	.027	.691
Using your cell phone you lose track of time	-.243	.031	.612

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

N = 125

Results of the reliability calculations with Cronbach's alpha values are found in Table 2 where commonly acceptable values for Cronbach's alpha for research purposes are at least .60 and ideally closer to .90 (Aron, Aron & Coups, 2006). As shown in Table 2, the three factors showed high reliability as measured by Cronbach's alpha values approaching .90 for each factor.

In Table 3 analysis of variance was calculated for each of the factors comparing the United States responses to those from Nigeria. The United States respondents found the technology easier to use as evidenced by the significance of the F-test and the higher mean for ease of use for United States respondents. Nigerian respondents found more fun and flow in their handheld wireless device usage as compared to the United States respondents.

**Table 3**

**Factors: USA Compared to Nigeria**

Factors	USA	Nigeria	Ftest	Sig
Ease of Use	4.14 (62)	3.41 (63)	34.3 35	***
Fun	3.41 (62)	3.68 (63)	4.11 1	*
Flow	2.50 (62)	2.92 (63)	10.5 10	**

\*  $p < .10$

\*\*  $p < .01$

\*\*\*  $p < .001$

Assessment of the degree of likeness of the respondents from Nigeria to the United States respondents was done with intraclass correlation coefficients shown in Table 4. The intraclass correlation coefficient represents the degree of likeness among the United States respondents as compared to the responses from Nigeria and is preferred over other correlation methods as it accounts for the correlations of respondents within a group (Twisk, 2006). The closer the intraclass correlation coefficient is to one the more similar are the two categories (United

States and Nigeria) to each other. Intraclass Correlation Coefficients are not bounded at 0, instead they can go from +1 to -1 where a negative ICC means that the between group variation is less than the within group variation. The one negative but near zero intraclass coefficient indicates a lack of significant similarity for the flow factor for the Nigerians and the United States respondents. Overall all three intraclass correlations indicate that there is little relationship for each factor when comparing Nigerian to American respondents.

The comments of the Nigerians in Table 5 indicate their pleasure with having handheld wireless devices not only for communication but as time pieces, calendars, calculators, and reduced their need to travel. Their comments show that wireless communication devices have had a huge impact on their daily lives. Even though the digital phone call rates are high, they still use these devices for text messaging, calendar, clocks, GPS, and Internet browsing. The devices are indeed empowering the Nigerians to gain knowledge and not rely on controlled or dated sources of information.

**Table 4 Intraclass Coefficients**

Comparison	df	F	Interclass Correlation
<i>Ease of Use</i>			
USA Between items	62	37.6	.061
Nigeria Between items	63		
<i>Fun</i>			
USA Between items	62	3.95	-.033
Nigeria Between items	63		
<i>Flow</i>			
USA Between items	62	9.59	-.089 **
Nigeria Between items	63		

- \*  $p < .10$   
 \*\*  $p < .01$   
 \*\*\*  $p < .001$

**Table 5 Comments: Nigeria**

Cell phone is of great importance to me from my home to my workplace, it enables me to communicate and disseminate information within a short space of time.
It is very expensive to use. It is educative. I has made my life easy and comfortable.
Enhances educational researches. It enhances information technology, etc.
Very helpful in reducing traffic on the roads
It is necessary but not indispensable
Reduce my calculation – brain strains
It saves me time, money, travel for much needed contacts. From the comfort of home/office I do a lot of business or pass out information. It is a pocket dictionary, calculator, time-keeper, directory, music box, etc.
Cell phone has made my day to day activities a lot more easier and my daily appointments are made appropriately and timely
Improved my communication, save time and money on travels.
I love it. It has improved distant communication daily
Use of my cell phone is very great extent. Its impact is also to a very great extent.
My use of the cell phone which the impact is positively immeasurable is to a very great extent generally.
Cell phone has done great on my day to day activities by making it easier
The use of cell phone has been wonderful as it has been my main channel of information especially of critical events in school and makes my friends seem close. However it was continue to be the largest part of my incurred expenses.
Thanks for the use of cell phone. It's help me a lot most especially when I am making use of clock on it, I worried less concern of wrist watch because I make use of time.
Cell phone has made so much impact

in my day to day activities and improve my productivity very rapidly, I would imagine how world could have been without using cell phone, thanks for those who invented cell phone and god bless for be because they have putting a smile on my face.
To an extent, it has really boosted my day to day activities
Has made life less painful however recharge card/ timing is costly.
The use cell phone has contributed a bit in my daily activities as it make sit passable for me to send message, talk with friends, even my private businesses, with contact with my family both home and abroad, etc.
Good but not easy for me to use.
Helps me a lot
It helps me a lot
It is the best thing that has happened to Nigeria as a country. It is my best business partner everyday.
It solves my calculations, time-piece, quick communication.
Cell phone is fun, easy life for me, but it is expensive to use in Nigeria.
The use of cell phone has increased my level of communication and has enabled me to connect to my friends and loved ones any time, any day.

Comments in Table 6 from the United States respondents show that this group valued their wireless handheld devices for communications as well as Internet access. However, the joy of freedom afforded by the wireless devices indicated by the Nigerians is not present in the American comments. Most appear to be purchasing the latest, high tech phones that have so many features that their battery runs low and/or the computer freezes from lack of memory. In the United States with a reliable transportation infrastructure and land phone system, the benefits from the wireless communication devices accrue more from their advanced technology features such as Internet and gaming as opposed to providing the ability to communicate so highly value in Nigeria.

**Table 6 Comments: United States**

GPS, Live TV, Chapelle Show on Demand, Internet is fast, sports information is top notch, can read the
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news everyday, current weather information. Camera has no zoom and there is not voice recorded.
Like the text feature without having to verbally contact a person but there are technical problems such as the phone freezing.
GPS, touch screen, and mobile email.
Email, instant messages, calendar dates, and notes to myself but some-time freezes.
Bluetooth, voice mail symbol not reliable
Use phone for online banking, sometimes phone will freeze.
Quick contact of others but battery does not last long.
Full keyboard but poor Internet connectivity.
GPS, bluetooth, camera, voice recognition, and video recording
SIM card allows me to move to other phones while storing information on the SIM card. Need a video camera
Feeling of safety since can always contact someone. Want more high tech phone for games, Internet access.
Convenience of contacting anyone, anytime
Convenient but lacking high tech features
Tools: alarm clock, text messaging, calculator, and Internet access; sometimes loses service
Always able to communicate and Internet anytime
Text messaging and phone is water proof, service is poor in certain areas.
Email, text, surf web, navigation, call people, watch TV, mp3 player, radio, take photos, make videos check weather, news, clock of world calculator, calendar, play games, shop, view movies, sports. Phone gets stuck sometimes.

## 5. DISCUSSION

The demographic tabulations in Table 1 show that the respondents were evenly split by gender and by country of origin. The ages of the 125 respondents were primarily under 25. This age grouping in both countries is indicative of social grouping who are

immersed in the digital wireless phones for use as a communication tool and an object of amusement.

In Table 2 a factor analysis of the survey items support the existence of three factors: ease of use, fun, and flow. Ease of use is based on the utilitarian view of wireless communication devices and is the dominant factor. The next dominant factor is fun which supports the homo ludic view of technology users. The third factor was flow as discussed in Csikszentmihalyi (1975) where the users are immersed in the technology and have a feeling of control over their lives. So across these two cultures the constructs of ease of use, fun, and flow emerge as pre-dominate in the respondent's use of digital wireless communication devices.

In Table 3 are presented the means for each of the factors comparing United States respondents to those from Nigeria. In terms of ease of use the United States respondents viewed the handheld wireless communication devices significantly easier to use than those from Nigeria. Flow and fun factors were significantly higher for the Nigerian respondents. This could be attributable to the nature of the economic conditions in Nigeria. Here the wireless communication device has really freed them from some of the constraints of their developing country's fragile infrastructure whereas on the ease of use dimension the United States respondents have had access to wireless digital devices for a longer time.

Viewing the use of handheld wireless communication devices from a cross-cultural perspective raises some interesting questions for future research. Two areas are economic conditions and the state of adoption of that technology within the culture. Needed are studies to look at the change in perceptions of wireless communication device usage as the culture progresses through the S-shaped adoption curve of Rogers (2003). Of course cost is a necessary control factor in studies of adoption and use of the technology.

The number of phone subscribers in Africa has risen to around 250 million from 10 million in less than ten years (African Monitor, 2007) and the growth rate of adoption is expected to continue to be high. In Nigeria,

prepaid minutes are the preferred method of payment and these prepaid minutes can be used as currency and transferred from digital phone to digital phone by text message. Further, in terms of commerce, farmers, fisherman and others can use the cell phone to obtain the best price for their goods. Even wildlife management put a waterproof wireless digital device around the necks of elephants to track their movement. In Nigeria as in the United States, the wireless digital device has become a status symbol this was evidenced in the comments of the Nigerian students.

## 6. FUTURE RESEARCH

This study shows that cultural differences in wireless digital device perceptions do exist between Nigeria and United States students. However this preliminary analysis seems to indicate that these perceptions are a function of the stage of adoption of the technology. Further research will be conducted to examine the impact of wireless communication device usage on performance and the work of students in these two cultures in student teams. In Nigeria where access to the Internet is primarily through Internet Cafes that charge by the minute, the most cost effective means of access to the Internet and to email is through the handheld devices. This provides important keys to education of these students and to opening up this society to others areas of the world as well as enabling commerce.

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