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Finding the Sophisticates: Socio-demographic Profiling of Environmental and Health Awareness among Mobile Technology Consumers in Botswana

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Abstract: Consumer sophistication is defined by multiple characteristics of consumption including: Product knowledge; brand awareness; environmental and health awareness; intellectual property awareness; and judgement of quality. From a research perspective, a very limited body of work exists that places the current discourse on environmental and health sustainability within the context of consumer sophistication. Further to that, no study has attempted to identify consumer demographics that can help predict environmental and health awareness looking at mobile technology consumers. This study therefore explores the link between consumer demographics and consumers' environmental and health awareness in relation to their consumption. The results suggest that income has a bearing on the consumer's environmental and health awareness. The results also suggest a link between education level and disposal rate of mobile devices. Implications of the outcomes for both policy makers and marketers are discussed at the end of the paper.

Key words: consumer sophistication; mobile technology; environmental awareness; health awareness; Botswana

JEL Codes: M1, M3, O3, Q5

1. Introduction

Rapid mobile phone uptake in Botswana has been lauded as a sign of the enabling regulatory framework (McCormick, 2001; Sebusang et al., 2003, 2007; ITU, 2001, 2003). The existence of mobile technologies has brought about immense change to the way of living in Botswana and other developing countries on the African continent. There is now an availability of innovative and convenient services like mobile money, and first time users experience the internet through their mobile connection (BOCRA, 2012). "In short 10 years, what was once an object of luxury and privilege, the mobile phone, has become a basic necessity in Africa" (CNN, 2012). These were the words of Rwandan President Paul Kagame back in 2007 acknowledging the impact mobile phone technologies have had on daily lives of people on the continent of Africa. However, instead of the predominant focus on devices and their pervasiveness, the researcher calls for a detailed look into the consumers, who they are and what lessons can be drawn from their consumption practices by both marketers and regulators alike.

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1.1 E-waste

E-waste is a global problem but it has become an issue highly synonymous with developing countries. Some of the most documented cases of poor e-waste management include China, the Philippines, Ghana and Ivory Coast. Issues surrounding e-waste mostly get attention when developed counties dump their electronic waste in developing countries under the guise of recycling. What is not highlighted is the fact that even countries as small as Botswana are grappling with e-waste management issues. The Global Partnership in Waste Management (UNDP) indicates that the lifespan of computers has decreased rapidly from six to two years, and for countries like Botswana with high mobile phone penetration it means equally high rates of disposal since cell phones have an even shorter lifespan. As recent as March 2015, the Botswana telecommunications authority held a stakeholder workshop on e-waste management. The workshop concluded a general call to sensitize the nation about the pitfalls of poorly managed electronic waste. In terms of defining the role of consumers going forward, in this regard vigilance and information seeking was encouraged. The consumer is the last point before disposal and therefore the researcher agrees with sensitizing and encouraging vigilance among the consumer constituency. However, before educating the consumer there is a need to identify and profile consumers, and using consumer demographics to explore levels of awareness among them is a good starting point for effective sensitization.

1.2 Health

The UN reports 6.9 billion mobile phone subscriptions around the world, with the ubiquity of the technology rising by the day. Studies continue to probe the relationship between mobile phone use and health, particularly exposure to electromagnetic fields. Despite that, the international centre for Research on Cancer under the auspices of the World Health Organization has proceeded to categorize electromagnetic fields generated by mobile phones as possibly carcinogenic to humans. Carcinogens are basically agents or substances that can cause cancer by way of altering the genetic structure of cells so that they multiply and become malignant (NCBI, 2000). In a world of growing demand for information disclosure, this is another debate that simply refuses to go away. The Botswana communications regulatory authority had to respond to increasing public concern about the health effects of electromagnetic fields generated by mobile phone devices. “Wefurther assure the public that there is consensus in scientific literature that there is no evidence of adverse health effects by use of cell phones and their radio base stations with the applicable limits as mentioned above.” (BOCRA, 2009).

Consuming sustainably can be a mark of sophistication in a consumer, and sophisticated consumers go a long way in determining the path that economies chart by deciding the success and failure of products as they enter the markets. It is therefore in the best interest of policy makers and marketers to ensure continued education of consumers through among others the provision of information. Further to that there is a need to establish whether the education is indeed reaching its intended target and effecting change, if so how does the change vary within the population. The study seeks to establish the levels of health and environmental awareness of mobile technology consumers among various socio-demographic groupings in Botswana.

1.3 Japanese Consumers

Japanese consumers are credited with having largely influenced firms by their demanding nature. This notion of Japanese consumers is backed up by a study conducted by JETRO (2006) to assess the Health and Environment sector in Japan in an effort to identify Investment opportunities for foreign investors. “Pressure from demanding and sophisticated buyers is widespread in Japanese consumer industries. Japanese consumers will reject a product because of a small surface defect, one reason for the attention of Japanese consumers to “it’s and finishes”. Consumers demand high quality and superior service. Japan has a visual culture, in which the presentation, and

the packaging, are as important as the product. Japanese consumers are also fickle in comparison to those in most other nations. They will readily switch brands if a quality difference is noticeable. The sophistication of Japanese buyers is reinforced by an extreme abundance of product information (Porter, 1990).

The consumer is generally unable to observe the environmental impact of goods in the purchase situation, during consumption or post-purchase. The study among other things explored the awareness and behaviour of consumers regarding the environment and health. The respondents were asked whether at the time of purchase they had any awareness of whether the products were environmentally friendly. On a 7-point Likert scale from "considerably aware" to "completely unaware" at least 50% of them said they were "aware". A more detailed look into environmental awareness and consumption behaviour reveals that around 80% of respondents are environmentally aware, making comments like "fond of nature" and "choosing products that can be used with refills" (Jetro, 2006).

That said, being aware and actually acting this knowledge or awareness are two different things. The study revealed that less than 30% of the 2859 respondents actually consume sustainably by way of collecting recyclable objects, purchasing products that bear the eco-mark and making efforts to purchase recycled or second hand products. The assumption however is that a consumer exhibiting environmental and health awareness is more likely to act sustainably than one who is unaware (JETRO, 2006).

Table 1 Awareness at Time of Purchase of Whether Products are Environment Friendly

Considerably Aware	Aware	Fairly Aware	Neither Aware Nor Unaware	Not really aware	Unaware	Completely unaware
2.7%	11.8%	37.6%	20.7%	19.1%	4.9%	3.3%

Note: Sample size 2859; Source: JETRO 2006.

As far as health conscious awareness is concerned in relation to consumption about 80% of respondents in Jetro's study reported awareness by giving a response that corresponded with "health is the most important thing in life" (Jetro, 2006). The study also reported a positive correlation between environmental awareness and health awareness and concluded that segmentation of consumers can be done on the basis of awareness and behaviour of both environment and health.

Table 2 Amount of Care Taken over Health

Take anenormous Amount of care	Take care	Take Some care	Cannot say either way	Do not take much care	Do not take care	Take absolutely no care
4.8%	22.5%	44.4%	11.8%	13.4%	1.9%	1.4%

Source: JETRO 2006.

2. Review of Literature and Hypotheses

2.1 Gender

A study by Gilg et al. (2005) showed gender as insignificant in all but one of environmentalist groups. Other studies exploring the significance of gender in this regard like Roberts (1990), Ines et al. (1987) and Barr et al. (2001) reported a higher female dominance in environmental awareness. This finding is attributable to the commonly perceived gender roles and context of division of labour in household in relation to the consumption of goods (Gilg et al., 2005). The different socialization of boys and girls also has a bearing on their eventual interpretation of environmental and health issues according to Diamantopoulos et al. (2003). The aforementioned studies were undertaken in developed economies and based consumption of multiple products including

household. Since this study is about technology adoption and previous studies (Comber, 1993; Jackson et al., 1997; Benbasat & Barki, 2007; Kennedy et al., 2008) have established familiarity as a barrier to adoption when it comes to women as compared to their male counterparts, the hypothesis is therefore that:

H1a: Male consumers are more likely to be aware of the environmental implications of their mobile phone devices than female consumers

H1b: Male consumers are more likely to be aware of the health implications of their mobile phone devices than female consumers

2.2 Age

Diamantopoulos et al identifies 33 studies that have explored the relationship between age and environmental consciousness and only two of them reported some significance. Arcury et al. (1987) and Grunert and Kristensen (1993) reported a higher level of consciousness among the younger members of the population. Contrary to the above statement however, Gilg et al. (2005) found that the mean age of committed environmentalists was highest and the mean age of non-environmentalists was the lowest. It is important to also note that the type of "good" in question is also central to determining the significance in this case. For example, Gilg et al. (2005) further note that the incorporation of other variables such as "fairly traded goods" and "recycled products" may offer alternative hypotheses. Considering the fact that discourse on environmental and health awareness continues to steadily gain traction as years go by, as well as the relative newness of mobile phone as technological products the hypotheses is that

H2a: Younger consumers are more likely to be aware of the environmental implications of their mobile phone devices than older consumers

H2b: Younger consumers are more likely to be aware of the health implications of their mobile phone devices than older consumers

2.3 Income

A higher income may mean one has a range of alternatives in terms of products to choose from and a lower income may infer the direct opposite. It is on the basis of this that income has been utilized widely in research as a predictor of consumer behaviour. When it comes to environmental and health issues however, income means different things at different stages of consumption. In terms of awareness during the purchasing process Gilg et al. (2005) found it challenging to reach a conclusion on income as a predictor among various groups. However post-purchasing practices, for example consuming consciously, Hines et al. (1987) discovered a trend indicating a positive relationship between higher income consumers and environmentally conscious actions. Instead of Income, Diamantopolous et al. (2003) utilized a variable termed social class, which factored in income levels of a household. They concluded that people who belong to higher social class indicate greater concern for health and environment. The aforementioned studies were all conducted on the basis of household goods and not specifically technological products, which pose unique challenges environmentally and health wise. These studies were also carried out in developed countries and it will therefore be interesting to find out how the income dynamics of a developing country come into play. Due to potentially wider income disparities and the issue of choice range introduced earlier, we hypothesize that:

H3a: Consumers with higher income are more likely to be aware of the environmental impact of their mobile phone devices than those with lower incomes.

H3b: consumers with higher incomes are more likely to be aware of the environmental impact of their mobile phone devices than those with lower incomes.

2.4 Education

Another factor more central to the investigation of environmental and health awareness is Education. Discourse on this subject matter often drifts into issues that may be difficult to readily grasp. According to Maloney et al. (1975) the very nature of ecology with its complex interactions between organisms and environment serves to make its subject matter difficult to understand and assimilate (Read et al., 1994; Straughan & Roberts, 1999; Peattie, 2001; Pinto et al., 2011; Lin & Hyuang, 2012). There are exceptions to this largely homogenous body of findings however. For example, Ling (1975) and Samdahl and Robertson (1989) both report a negative relationship between self-reported consciousness and education. Looking at the time these studies were undertaken and how much of a leap green consumption has taken over the past two decades, we will conclude that:

H4a: Consumers with higher levels of education are more likely to be aware of the environmental implications of their mobile phone devices as compared to those with lower education levels.

H4b: Consumers with higher levels of education are more likely to be aware of the health implications of their mobile phone devices than those with lower education levels.

2.5 Behaviour

This study also explores a potential link between the socio-demographic factors and actual behavioural practice. To get an idea of the disposal rate of mobile phone devices, this study will also establish the period of ownership for each consumer's primary mobile phone device. As mentioned before, the product life of mobile devices is declining at a dramatic rate, and in other instances the fickle nature of consumers adds to the shorter usage span. Existing research (Tanellari et al., 2012) has put females behind males in the rate of technology adoption but in terms of general consumption rates (Mertens & Casey, 2007), females are linked to higher rates of consumption. This development is attributed to the notion of domestic roles and socio-economic relations. Smith, 2012 puts rate of adoption and device ownership as equal across income levels in a study conducted by PEW in the USA. It is safe to assume that the larger income disparities of a developing economy might derive opposing results. Education levels and age are also interesting variables to explore against the consumption behaviour of mobile technology consumers. Therefore, the following relationships are hypothesized.

H5a: Male consumers own devices for longer periods before disposal as compared to female consumers.

H5b: Low income consumers own devices for longer periods before disposal as compared to high incomer consumers.

H5c: Older consumers own devices for longer periods before disposal as compared to younger consumers.

H5d: Lesser educated consumers own devices for longer periods before disposal as compared to highly educated consumers.

3. Methodology

This study profiles urban mobile technology consumers in Botswana. In total 307 people completed the survey. With more than 150% mobile penetration rate in Botswana (ITU, 2014), this constituency is excellent as a choice not only because it captures a variety of demographic subgroups but also because they represent a higher likelihood of familiarity with the variables of interest in the study. Discourse on issues such as health and environment in relation to consumption start in urban centres, even though such discourse exists simultaneously in rural areas, an urban centre such as Gaborone represented a good starting point for this study and for subsequent

studies as well. Data was collected both online and offline using a questionnaire survey tool. The online questionnaire was disseminated via email, whilst the offline survey was administered via an assigned device (tablet) using the mall intercept approach. The study was conducted over a four-week period from August 21st 2014 to 21st September 2014.

The survey was completed by 307 individuals. The following provides a basic overview of the study sample. 55.9% were male while 44.1% were female. 36..9% of the respondents were between the ages of 16-25, 47.8% were between the ages of 26-35, 10% were between 36-45, 3.4% were between 46-55 and only 1.9% were over the age of 56. 11.5% of the respondents reported no income while 6.3% said they were unemployed. 42% were regular employees whilst 12% reported as self-employed.

For purposes of this research only single item measures were used to collect data. Age, gender, income, education, environmental awareness, health awareness and purchase date (period of device ownership measure) represent the items measured. Questions regarding environmental and health awareness were structured on a 5-point Likert scale, 1 being agree strongly and 5 being disagree strongly in response to statements; I am aware of the environmental implications of my mobile phone" and "I am aware of the health implications of my mobile phone device". Both were amended from five categories to 2 categories of "aware" and "unaware" using the mean to determine the categories. The alteration was necessary for the statistical analysis using either t-test or one-way ANOVA.

4. Results

T-tests, logistic regression and one-way ANOVA were used to examine the hypotheses in this study and below is a table with the summary of results.

Table 3 Environmental Awareness

Hypothesis	Dependent variable	Independent variable	Test statistic
H1a	Aware or unaware	Gender	0.205
H2a	"	Age	1.482
H3a	"	Income	2.387**
H4a	"	Education	0.533

Note: *Statistically significant at $p < 0.10$; **Statistically significant at $p < 0.05$; ***statistically significant at $p < 0.01$

Table 4 Health Awareness

Hypothesis	Dependent variable	Independent variable	Test statistic
H1b	Aware or unaware	Gender	0.051
H2b	"	Age	0.323
H3b	"	Income	1.847 *
H4b	"	Education	1.806*

Note: *Statistically significant at $p < 0.10$; **Statistically significant at $p < 0.05$; ***statistically significant at $p < 0.01$

Table 5 Period of Device Ownership

Hypothesis	Dependent variable	Independent variable	Test statistic
H5a	Purchase date	Gender	1.128
H5b	"	Age	1.804
H5c	"	Income	0.247
H5d	"	Education	4.828***

Note: *Statistically significant at $p < 0.10$; **Statistically significant at $p < 0.05$; ***statistically significant at $p < 0.01$

4.1 Environmental Awareness

On the basis of the self-reported environmental awareness/unawareness, the aware group (N = 124) was associated with a monthly income M = 4.21 (SD = 2.35). On the other hand, the Unaware group (N = 183) had a numerically lesser monthly income at M = 3.58 (SD = 2.22). An independent samples t-test was undertaken to test the hypothesis that environmental awareness and unawareness among consumers is associated with statistical significance to different income means. To test the assumption of homogeneity of variance Lavene's test was used. It was satisfied by F(305) = 1.06. The t-test results pointed to a statistically significant association t(305) = 2.39, p = 0.018. This confirms that environmental awareness in consumers is statistically significantly associated with a higher monthly income mean than unawareness.

4.2 Health Awareness

The second set of hypotheses sought to establish the relationship between health awareness/unawareness to demographic variables presented in the previous hypotheses. The aware group (N = 167) was associated with a monthly income M = 4.05 (SD + 2.308), while the unaware group (N = 140) was associated with a numerically lesser monthly income M = 3.57 (SD = 2.245). Once again an independent t-test was used to test the hypothesis that health awareness or unawareness among mobile technology consumers is associated to different means in a statistically significant way. The result of the Levene's test satisfied the assumption of homogeneity of variance by F(305) = 0.94. The t-test results revealed a statistically significant association t(305) = 1.84, p = .066. This result demonstrates a statistically significant association between health awareness and a higher level of monthly income among mobile phone consumers in Botswana.

For health awareness/unawareness in relation to education levels, those reporting awareness (N = 167) were associated with an education level M = 4.28 (SD = 1.353) and those that reported unawareness (N = 140) were associated with a lesser education level M = 3.99 (SD = 1.442). An independent t-test was employed to test the hypothesis that health awareness among mobile consumers is statistically significantly associated with different education level means. The assumption of homogeneity of variance was satisfied by a Lavene's test at F(305) = 0.262. The test also revealed a statistically significant association t(305) = 1.81, p = 0.072. This result therefore confirms that there is indeed a statistically significant association between health awareness and a higher level of education.

4.3 Device Ownership (Disposal Rate)

The third set of hypotheses sought to establish the predictive value of demographic variables in the length of device ownership. In other words, identify associated link between various consumer groups and device disposal rate and whether there is statistical significance. Despite numerical support, the findings do not statistically support H5a, H5b and H5c. For H5d the descriptive statistics associated with length of device ownership across the various education levels are all reported in Table 1. Table 1 indicates that the lowest education group was associated with the highest mean of device ownership (M = 3.50) and the highest education group was associated with a significantly lower, but not lowest mean (M = 2.43). In an attempt to test the hypothesis that the level of education the consumer has completed has a statistical bearing on how long they will use their mobile phone device before disposing it, an ANOVA was undertaken. It has to be mentioned that before proceeding with the ANOVA, the assumption of homogeneity of variables was tested and did not satisfy based on Lavene's F test, F (4,84) = 5, p = 0.015. As a result of the violation of the equal variance assumption, an adjusted F statistic was required. This adjustment was provided by the Welch statistic and Brown-Forsythe test, both tests gave us $p<0.05$ which allowed us to proceed and compare the groups.

A statistically significant effect was yielded in the independent between groups ANOVA, $F(4.83) = 5$, $p = 0.00$, $n^2 = .074$. Therefore, the null hypothesis of no difference between the means is rejected. 7.4% of the variance in device ownership period was accounted for by education level.

5. Discussion and Conclusions

The results of this study confirm that higher income mobile consumers in Botswana are more environmentally aware than lower income consumers. There are several possible scenarios that can be used to explain this finding. One could be that people with higher levels of income are faced with more options when purchasing a mobile device, as result they are always on the look-out for products that are differentiated hence their environmental awareness. Another explanation could be that, even though education levels did not prove statistically significant in relation to environmental awareness, the high income earners have relatively higher levels of education and therefore are more likely to be exposed to environmental discourse than lesser income consumers. As already indicated, the environmentally aware consumers represent a base constituency of the growth in this particular market. Issues of sustainability are often referred to as first world problems, meaning developing countries have more pressing basic needs than sustainability. Similarly, and contextually in the case of a developing economy such as Botswana, the idea of sustainability is largely sellable to those in the higher income bracket as they have lesser pressing needs than it is to low income people who struggle with basic necessities of everyday life.

Such an outcome is an important outcome for policy. As mentioned before, awareness alone is a basis for consuming sustainably, therefore the task then becomes elevating those that are aware into practically consuming in a sustainable manner. It is also about identifying those that are still unexposed to the discourse of the environment and sustainable consumption and devising effective ways of bringing them into the debate. In fact, strategies to sensitize those that are unaware can be built around environmentally aware consumers to act as agents of change and educate fellow consumers. It is a matter of intervening creatively armed with the knowledge that subgroups like these do exist.

From a marketing perspective, the above finding is interesting in that a segment of environmentally aware consumers bring with it other connected aspects of sophisticated consumption including brand awareness and a penchant for new things. The fact that the most environmentally aware mobile technology consumers are statistically the ones carrying the purchasing power should act as motivation for both operators and retailers to continue to be innovative in bringing in both products and services that are sustainable and environmentally friendly. In previous studies, environmentally conscious consumers have demonstrated a willingness to pay extra for products if they believe by doing so they add to the environmental conservation cause. It is therefore in the best interest of the marketers to act in a manner that reflects an appreciation of the change in consumption trends, for the sake of their own relevance.

What the study also reveals is a difference in length of device ownership among consumers of various education levels. Consumers from the least educated group (junior secondary school or less) used one device for a considerably longer period than any other group. The product life cycle of mobile phones continues to decline, and a conscious decision to prolong the use of one device before disposing it is seen as an environmentally considerate decision and therefore a reflection of awareness. However, in the case of this particular subset the reasoning may be far from environmental consciousness. Once again it ties into the issue of income and variety of

choice, the fact that the lesser educated form the bulk of the lower income bracket and therefore repeatedly changing devices is not feasible hence the prolonged use. From high school graduates all the way to post graduate education level, there is a general trend of a steady rise in period of device ownership. There are several reasons applicable in explaining this interesting development. Firstly, the quality of the devices in question comes into play. Barring the least educated group, it's safe to assume that the quality of consumption rises with the education levels of the consumers and therefore the shorter period of ownership at high school level compared to the relatively longer period at graduate school level could be attributed to the quality and product life of the mobile devices. Another logical reason that can be put forward to support the outcome is that it could be a conscious decision as education levels increase that the period of device ownership is prolonged before disposal.

From a marketing perspective, a prolonged device usage may be indicative of a positive and satisfying experience in terms of both the device and the services. It is therefore essential for marketers to be aware of such consumer subgroups in order to continue developing and offering services on the basis of demand in order to enhance market efficiencies. Constantly changing devices could be a sign of dissatisfaction from the consumer and marketers need to be proactive in this regard to ensure they continue to build loyalty with the customer.

From a policy perspective, especially regarding the aforementioned e-waste management strategies, this finding points us to the subgroups where most of the waste is likely generated. In an attempt to formulate strategies to manage e-waste in the face of ubiquitous technological devices like mobile phones, it's important to understand consumer behaviour and profile consumers as a way of establishing a starting point in the strategy. The education levels will first determine the intervention tool, if its information that needs to be disseminated how do we package it — for each particular group, so that it yields results? What such findings reveal is that blanket interventions targeting high school leavers all the way to consumers with post graduate education are unlikely to yield the desired outcome.

In terms of the statistically insignificant hypotheses, the most surprising but interesting outcome was the lack of association between health awareness and age. On the basis of existing studies, the assumption was that a variable like age would vary greatly between consumers who are environmentally aware and those that aren't. Another surprise was on the basis of the mobile phone being a technological product, normally as in previous studies gender always comes across as significant in issues related. A lot of the numerical data exhibited means that supported the hypothesis but statistically insignificant

As far as the limitations are concerned, the mall intercept part of this study was conducted in an urban centre, and therefore this limits the heterogeneity of the sample population. A sample size in excess of 300 is large enough for reliable statistical analysis however, a much larger sample size would have lent more reliability and therefore general applicability to the study. Another factor worth mentioning among the limitations is the fact that the mall intercept and online approach raises limited chances of engaging respondents in the old age bracket whose views could have further enhanced the depth of the study.

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