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APPLICATION OF CONJOINT ANALYSIS TO MODEL MILLENNIALS' PREFERENCE FOR SMARTPHONE ATTRIBUTES

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Abstract:
The decision to buy smartphones comes with the consideration of several factors, especially among millennials who have been known to be very painstaking when it comes to smartphone specs. With this, this study was conducted to provide a scenario of how millennials behave when it comes to buying smartphones and identify the relative importance of the features or attributes (battery, screen size, storage, storage space and main camera resolution) in determining millennials' best and least-preferred models of a smartphone. A total of *N*=400 millennials responded to a market survey that employed twenty (20) software-generated plancards. Using metric conjoint analysis (a marketing research technique), this study found out that as far as millennials in Digos City are concerned, the screen size of a smartphone is the most important attribute, while the battery of a smartphone is the least important attribute. On aggregate, a smartphone with 6 inches screen size is most preferred, while a smartphone that has a non-removable battery is the least preferred attribute level. The additive model of conjoint analysis further revealed that the most preferable smartphone is one that has a removable battery, with 6" screen size, has a microSD slot storage, with 64 GB storage space and 12 megapixels as main camera resolution, while the least preferred combination is one that has a removable battery, 4" screen size, no microSD slot storage, 16 GB storage space and 16-megapixel main camera resolution. Implications of this market research are also discussed.

JEL: D01; D40; D83; L63

Keywords: millennials, smartphone, preference, conjoint analysis, orthogonal design, market survey

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1. Introduction

Smartphones have become an inevitable part of current existence because of their usage, flexible applicability, and connectivity (Szymczak, 2013). Nevertheless, smartphone technology had undergone numerous transformations resulting from the smartphone subscribers' changing needs (Kushchu, 2007; Hakoama & Hakoyama, 2011). Its usage is observed to increase day by day and is certainly changing peoples' behavior, particularly the millennials who are very addicted and are particular with smartphone specifications. The need of the millennials to relate to society has created the need to integrate smartphones into their day-to-day activities (Mudondo, 2014).

Today, smartphones are comparable in terms of features and capabilities with that of mid-range computers (Hingorani, Woodard, & Askari-Danesh, 2012). Being more portable, they have far more dynamic uses that are becoming more relevant in people's daily lives. Thanks to their more potent computational power, they are now being employed in uses such as email, bill payments, online banking and, online shopping (Barot, Amdawadkar, Singh & Panchal, 2014). Users of these modern handheld devices realized that with its many features bring about a varied level of satisfying experience (Oulasvirta, Wahlstrom, & Ericsson, 2011). Features include complete programmability, high-resolution displays, wireless connectivity, multimedia presentation and capture, movement sensors, application installation, file management system, inherent web browser, and a considerable amount of storage location. Most smartphone users aim their attention on the operating system and the image capture components of a particular phone. Succinctly put, users look for certain benefits in product attributes that create definite results that are complementary to personal values. The emphasis on integration is based on deciding which products contain features that augment these aspects (Wickliffe & Pysarchik, 2001). Nevertheless, users compare the specs of competing brands. Marketers then exploit this focus on features in their advertising campaigns. They intend to influence user evaluation of exchange by highlighting certain features (Puth, Mostert, & Ewing, 1999).

In the Philippines, the huge penetration and quick-growing demand for smartphones in the domestic market are evident (Kimiloglu, Aslihan Nasir, & Nasir, 2010). Smartphones have become more than a communication device with their increasing and growing advancement to connect to people in different ways (Walsh, White, Cox, & Young, 2011). However, the advanced functions and features of a smartphone were still relatively unusual and not yet fully grasped. As such, consumers have to take extra effort to be acquainted with the existing and upcoming new models of smartphones in the market (Turnbull, Leek, & Ying, 2000; Yoo, Lyytinen, & Yang, 2005). In addition, millennials are one of the largest generational groups that own a smartphone and their preference and inclination toward it are vastly considered (Suki, 2013). Setting aside the communication means, millennials nowadays are purchasing smartphones because of their various features (Ahonen, Kasper & Melkko, 2005). It appears that millennials these days are high concern with the progress and advance in technology.

They are looking at smartphones different from the others and understanding their preference is not an easy undertaking (Anderson & Wolff, 2010). Thus, smartphone distributors should need to understand the millennials purchasing behavior to survive in the market.

Finally, there is no research conducted in determining the smartphone preference among millennials in the Philippines related to its features such as the battery, screen size, storage, storage space and main camera resolution. Despite the advances in marketing and advertising, distributors still tend to deploy traditional methods and techniques to push their products and services to the market. With the observed scenario, the researcher wants to determine the preferred smartphone features that largely influenced the buying decision of millennials in buying a smartphone.

2. Literature Review

The considerable usage increase in smartphones has sparked interest among researchers and academics (Massoud & Gupta, 2003; Barnes & Scornavacca, 2004; Park & Yang, 2006) where the unique features gave rise to greater attention and outlook (Edell & Burke, 1987; Aaker, 1997). Product features are what users demand as a prerequisite. Product's features generally attract customers which leads to the choice of the product (Nowlis & Simonson, 1996). Similarly, it is feasible to gain new users and maintain current users by offering enticing features that dictate the outcome of user-product selection. These features could be a hardware component or a software component of a smartphone (Larivière & Van den Poel, 2004; Thompson, Hamilton, & Rust, 2005).

Past research has concluded that battery life is one of the important parameters in gauging user preference for smartphones. This is a crucial consideration because smartphones are becoming more viewed as a gateway to one's daily life. Battery life management develops into an essential task with all the messaging, social networking, and emailing (Filieri, Chen, & Lal Dey, 2017). However, users have a lack of understanding of proper battery charging to facilitate their intended usage (Elnashar & El-Saidny, 2014; Ta, Baras & Zhu, 2014; Byrne, 2016). Still, the increase in performance of smartphones entails energy drain in batteries with daily use. Sensors, feature sets, and processing power are curbed by battery life constraints. Usually, a common battery now has no higher than 1500 mAh capacity (Hosio et al., 2016; Buyukozkan & Guleryuz, 2016; Mugge, Jockin, & Bocken, 2017). It was argued, however, that there is a possibility of lowering energy drain by re-evaluating user interaction with smartphones and supplying improved feedback (Chun, Lee, & Kim, 2012; Jariyasunant, Sengupta, & Walker, 2014; Qian & Andresen, 2015). While prior studies have concentrated on the flaw of user interfaces in connection to battery life. There is an urgency to gauge the real-world behaviour of an extensive number of users in terms of times, duration and method of charging batteries (Peltonen, Lagerspetz, Nurmi, & Tarkoma, 2016).

As the technology matures, substantial developments in the battery area also occur. Batteries can be now identified as removable and non-removable. Purchasing a

specific smartphone, removable and non-removable batteries can influence the consumers buying decision because of their respective distinction and deterrent quality. In contrast, purchasing removable and non-removable batteries are a success or failure since a battery feature as removable or non-removable is not extensively publicize by the distributors (Batt, 2017). In the latest era of smartphones, phone manufacturing companies endeavor to make the phones smaller and slimmer to prevent users from changing batteries when needed (Uppal, 2016). In comparison, non-removable batteries allow slimmer smartphone designs with better performance. Some parts are also not exposed to the typical wear and tear of a removable battery set-up. A phone with a non-removable battery has a better look (Batt, 2017). Smartphone's screen size was said to have an impact too. It's becoming a virtually universal tool for communication with an accelerated rate of implementation. Preference for larger screens has been the trend among users in recent years (Kim & Sundar, 2014; Kim & Sundar, 2016; Xiong & Muraki, 2016). Recent studies reveal that screen size has steadily increased from 2008 to the present and nearly a third of sold smartphones during 2012 featured a larger screen size by 4.5 inches (Rigby, Brumby, Cox, & Gould, 2016).

In addition to battery life as a factor in smartphone preference, screen size is now included among the key choice factor along with price, operating system, and brand reputation (Cecere, Corrocher, & Battaglia, 2015; Smith & Chaparro, 2015; Le, Bader, Kosch, & Henze, 2016). Given the detailed effects in influencing user perceptions, screen size is becoming a psychological determinant in implementation and usage (Kim & Sundar, 2014). Larger screens are suspected to expand the sensory experience by bombarding users with more means to relay visual information not possible (Frijda, 1988; Detenber & Reeves, 1996; Koh & Sundar, 2010). Large screen sizes though at times are inappropriate for every user. Users are employing different sizes of smartphones. Large sizes have the tendency to be cumbersome to operate with one hand. While small sizes are troublesome for those with big hands (Sweeney & Crestani, 2006; Findlater & McGrenere, 2008; Smith & Chaparro, 2015). The portability of mobile devices allows users to transport them anywhere they go. Operating with a single is a need when dealing with other activities with the other hand (Lee, Kyung, Lee, Moon, & Park, 2016).

In addition, it was consistently found that positive influence in many cognitive and active areas of user awareness, containing immersion, satisfaction, presence, realism, and enjoyment is co-related with an increase in screen size (Lombard, 1995; Detenber & Reeves, 1996; Maniar, Bennett, Hand, & Allan, 2008). As smartphone screen sizes increases, the higher resolution screens accommodate the bigger and better view of the display (Barredo, 2014). A larger view screen size could lead to greater effectiveness (Kee, 2017) and that better quality and quantity of data can be conveyed by large screens suitable for simultaneous application of multiple modes than smartphones with small screens (Kim & Sundar, 2014). Being fitted with touch-based interfaces that grant dynamic and intuitive, an addition in screen size allows smartphones, a bigger area for interactions and better ease of control. Large screens also facilitate the use of different

transmission methods (Kim, Sundar, & Park, 2011). Hence, access and transfer of data became easier as smartphone screen sizes gain.

Moreover, having a larger smartphone screen size as well allows users to execute more and have better viewing. It is greatly efficient to effectively edit, view and productively use software applications such as documents, presentations, documents, calendar, and email. Increased screen size may efficiently do multitasking by means of viewing two applications at the same time. It is further illustrated by replying emails or text at the same time as viewing videos (Arnold, 2017). Consequently, smartphone users choose smartphones with larger displays that are increasing in size in consuming wide range of content of data (Victor, 2016). However, from an operational point of view, Improvements in smartphone screen size could create different user issue complications in using the device (Lee, Cha, Hwangbo, Mo, & Ji, 2018).

The importance of smartphone storage also cannot be put aside. Storage capacity on mobile devices is essential for the end-user experience now and its relevance is predicted to advance due to many conditions (Aminzadeh, Sanaei, & Ab Hamid, 2015; Chen et al., 2015; Ji et al., 2016). First, emerging wireless technologies present the possibility for better network performance for mobile devices. Second, while network performance is improving drastically. Therefore, connection to different cloud services gains from a division of processing between the cloud and the device, imposing a bigger load on local assets along with storage. Third, mobile devices are more and more treated as the main computing device, performing more complicated operations than formerly thought up (Ho & Intille, 2005). However, storage has commonly been ignored as an important aspect of phones, and tablets at least in terms of capabilities (Zhong et al., 2014; Son, Lee, Kim, Yoo & Lee, 2015; Zhong et al., 2016). Although the impulse to produce a more agile mobile connection to content locally and through cloud services, the capacity of the basic storage system on mobile devices is not thoroughly understood (Zhauniarovich, Russello, Conti, Crispo, & Fernandes, 2014).

Still, smartphone usage is rising; smartphones and tablet computers are becoming favorite substitutes for laptops. In growing economies, a mobile or upgraded phone is often the only available computing device for different needs (Azaria & Hong, 2016; Dai, Chen, Qiu, Wu, & Liu, 2017). Application performance can often be unexpectedly affected by storage. This also applies to applications considered as CPU or network bound (Zhong et al., 2014).

External storage is ultimately helpful in keeping extra huge files of music, images, or other essential files. Adding extra storage capacity could be realistically or essentially considered in buying a smartphone (Ware, 2018). A removable microSD card is an expandable and external memory that is or is not readily available depending on the unit. Nevertheless, not all phones have an extra storage space included or even have the facility to add external memory. The iPhone, for example, has never given users the ability to add more storage space by using an SD card.

It further entails that having a lot of storage could mean saving all files that needed to be saved, but the downside is it affects the performance of a smartphone. Excluding a

microSD slot simply means creating a device with an outstanding performance. Apparently, a lot of consumers buy cheaper models with micro-SD slot that gives a poor performance consequently giving a company's name a bad reputation. When a user's phone is running slow, it usually doesn't say it is because of a microSD card that is affecting their device's performance instead the users complain about the device itself as it used to be which could result in bad publicity for the manufacturers (Sanhz, 2016).

A smartphone with a microSD slot will not perform as well compared to one with flash memory. The manufacturers take advantage of the setup because smartphones that usually have a microSD are cheap or medium-priced phones and the performance may not be affected by having a microSD card full of music, movies, and other multimedia content. Some manufacturers also make high-end smartphones because of the extra speed and performance on the unit that something that the microSD slot is not included. Besides, microSD cards can consume a lot of a smartphone's battery life during transfers and during the viewing of files when used that sometimes users were complaining too how bad their smartphone's battery and it clearly says that it could bring bad publicity to the name of the device itself (Sanhz, 2016).

A study carried out that the use of a microSD card can cause slower performance in a device. Drop-in overall performance range from 100 percent up to 300 percent in a study. In an extreme case, the drop reached a severe 2000 percent decrease in performance. The reason for the performance loss is the microSD cards are not fast enough (Rogerson, 2014). Likewise, storage space refers to the expandable memory of a smartphone or a space that allows its users to save files. Typically, it is set with a memory of 16 gigabytes, 32 gigabytes or 64 gigabytes (Ware, 2018). In selecting a phone, storage capacity is often one of the deciding factors in its purchase. Seldomly, it depends primarily on personal needs. If the user plans to keep the smartphone for a longer time, a 32 GB storage space is enough (Singh, 2015).

Under other conditions, camera resolution is one of the factors that affect the preference of the users (Ling, Hwang & Salvendy, 2006). Photography is an art form of taking images and sharing them with the viewers. With the consistent development of technology, it has grown in execution and remade as an art, especially with the current smartphones (Farnand, Jang, Han, & Hwang, 2016; Alaei, Raveaux, & Conte, 2017). As smartphone cameras get better over time, photography became much more user-friendly (Peters & Allan, 2018). These built-in camera functions are now an inclination and established attach features to the mobile phone. The so-called number of pixels a camera's image contains is measured in megapixels or MP for short. A megapixel is a term used to describe a camera's resolution based on the number of pixels it's capable of capturing (Eadicicco, 2016). A larger number of dots or pixels in an image mean that the image has more definition and clarity, which is also referred to as having a higher resolution (Thomas, 2017). Regardless of camera operator skill, an 8-megapixel camera might take better pictures than a 21-megapixel camera (Kidman, 2017). Photos captured in low resolution could mean saving more space on a smartphone. However, photos taken with lower resolution cameras could lead to a problem in resizing the picture, in which

cropping the picture would become much smaller than the original one and the most important detail will be lost.

As such, having a 12-megapixel camera, the actual camera sensor contains twelve million light-sensing pixels that could have better viewing of picture captures (Thomas, 2017). With a 16-megapixel image, cropped pictures of up to 50 percent if printed will not look pixilated or stretched (Sathe, 2014). On the other hand, the higher the camera resolution is expensive as well; the bigger the image size the more it needs space. Likewise, a phone with a high camera resolution needs bigger storage space, thus, more expensive (Mansurov, 2015). It is believed that having more megapixels does not mean more quality of the image. The crisper the original photo, the better the results that a camera with fewer pixels could get. Offering an exceedingly great number of pixels, digital zooming results in closer images with an immense level of detail when it comes to printing (Peterson, 2016). Higher the pixel size, the higher the overall sensor for better the overall performance of the smartphone camera (Kidman, 2017). Offering an extremely high number of pixels, digital zooming could result in closer images that offer a high level of detail when it comes to printing.

Most likely there is a notable downside for a larger megapixel photo. Using a smartphone in capturing images at the max settings results in higher storage requirements than taking them at minimal settings (Kidman, 2017). If a consumer wanted a longer battery life, slim and built, a more spacious, smaller sensor than the lens is being compromised (Sathe, 2014). However, megapixels in camera resolution are sometimes misleading. As such, the size of the image captured is measured by resolution.

In sum, the related literature and studies of millennials' preference for buying smartphones provided a systematic foundation for finding the hole in the literature. With the literature stated above, several factors are identified in determining millennials' demand for smartphones. To fill this gap in the literature, this study aims to determine the preference of millennials in buying smartphones through conjoint analysis in the Philippines and to further determine the best attribute of a smartphone that fits to the daily activities and lifestyle of millennials.

3. Material and Methods

This study utilized a causal research method through a market research technique to determine how millennials' preferences for smartphones are affected by the five attributes, namely battery, screen size, storage, storage space and camera resolution. Conjoint analysis was also used in the study. It is a procedure in which a respondent needs to choose over various selections that differ at the same time between at least two attributes or features (Green & Srinivasan, 1978). Investigators illustrate products by sets of attribute values or levels and then determine the respondents' interest to buy.

A total of 400 millennials in Digos, a city in Southern Philippines, participated in the survey. Millennials refer to individuals born between 1982 and 2000 (Howe & Strauss, 2000). Sample sizes of conjoint analysis generally range from 150 to 1,200 respondents,

adequate to acquire a dependable conjoint-estimating means to attend to the concerns of the study (Orme & Huber, 2000). Selection of the respondents is done randomly and depends upon the willingness to respond to the survey questionnaire through quota sampling. The study made use of non-probability quota sampling as this study's sampling technique gathered data from a group. Non-probability sampling technique was done in identifying millennials in Digos City. Based on the survey, most of the respondents of this study were males (51%), mostly 23 to 28 years old (47.8%), and college graduates (50.5%).

A key informant interview (KII) was conducted to determine the five most preferred attributes of millennials' preference for smartphones derived from the review of related literature and studies before finalizing the survey questionnaire. The key informant interview (KII) involved 10 individuals to pilot-test the survey instrument used. Choices of conjoint methodology where the researcher utilized the full-profile method in designing millennials' preference for evaluation by establishing combinations of attribute levels. The full-profile technique illustrates all the accepted attributes for the presentation of the stimuli as this was more practical, and more precise in the description of the trade-offs among attributes. The full profile approach is also the most established scheme. Essentially, due to its capacity to lessen the quantity of distinction during the use of a fractional factorial design. Furthermore, the approach elicits fewer judgments; the number of attributes is limited to five, however, each judgment is more complex. This study used the additive model which supposes that individuals just "add up" the part-worths to analyze the general worth or preferences indicated total worth score and in absence of connections among attributes.

Consequently, the design of the experiment that the study used was the fractional factorial design to avoid the need to evaluate all possible combinations of the five attributes (to be ascertained by the key informants) by choosing a smaller number of these alternatives. This study used the orthogonal array design to generate 20 plancards which were used in the survey questionnaire. The main function of the orthogonal array design is to lessen the number of evaluations collected so that respondent preferences to the five attributes can be fitted to convene the statistical criterion such as orthogonally, and efficiency among the levels and succeeding part-worth estimates. Additionally, the plancards contain 20 hypothetical statements bearing the random distribution of any levels of the five attributes (battery, screen size, storage, storage space and main camera resolution). In addition, the scale was scored with 1 which embodies the option "least preferred" to the option 5 which represents the option "most preferred".

In the analysis of the data, the metric conjoint analysis (CJA) was used to determine the order of relative importance of the five chosen attributes. This study runs a conjoint analysis' SCORE sub-command to rate the smartphone purchase profiles. Ratings on the profiles were decomposed, resulting in part-worth estimates of each attribute level. CJA's additive model is used to measure the total utility of smartphone purchases. The total utility was calculated by adding the constant and the highest utility estimations of levels of the five attributes. Statistical analyses were performed in IBM-

SPSS version 20. Finally, the results were then analyzed and interpreted based on the purpose of the study.

4. Results and Discussion

The relative importance of the five determining attributes of millennials' preference for a smartphone is shown in Table 1. Importance measures are relative and within this study. If the range of the attribute levels that were tested changes, the relative importance of that attribute will also be likely to change. Table 1 reveals that the screen size is considered the most preferred and most important attribute of a smartphone for millennials with an overall value of 31.088%. The millennial's choice can also be defined from the marginal utility assessed for every attribute level. The most important attribute level is the attribute with the highest marginal utility. Looking at its attribute levels, the millennials prefer a smartphone with a 6" screen size (1.376), which is preferable to 5" (0.917) and 4" screen size (0.459). Following screen size with the highest importance value is storage space (21.542%), by which millennials prefer a smartphone that has 64 GB storage (0.676).

Table 1: Relative importance of smartphone attributes with utility estimates of their attribute levels

Attribute	Importance Value	Attribute Level	Utility Estimate
Battery	14.147	removable	0.027
		non-removable	-0.027
Screen Size	31.088	4"	0.459
		5"	0.917
		6"	1.376
Storage	14.397	with microSD slot	0.005
		no microSD slot	-0.005
Storage Space	21.542	16 GB	0.225
		32 GB	0.451
		64 GB	0.676
Main Camera Resolution	18.825	8 megapixels	-0.119
		12 megapixels	-0.238
		16 megapixels	-0.357
		(Constant)	2.118

On the other hand, a smartphone that 32 GB (0.225) and 16 GB (0.451) tend to be less preferred by millennials. Meanwhile, main camera resolution (18.825%) ranked third and storage ranked fourth in terms of relative importance. Overall millennials prefer smartphones with an 8 megapixel (-0.119) main camera resolution rather than 12 megapixel (-0.238) and 16 megapixel (-0.357). In addition, millennials prefer smartphones with a micro-SD slot (0.005) for extra storage but surprisingly millennials do not prefer smartphones with no micro-SD slot (-0.005) which is indicated by a negative coefficient of the marginal utility. Lastly, the least important smartphone feature among the five attributes is the battery having a value of 14.147%. A smartphone with a removable battery (0.027) is preferable to a smartphone with a non-removable battery (-0.027).

Table 2 shows the millennial's preference of the overall sample and the individual respondents toward smartphones. Overall, respondent millennials prefer phones with utmost consideration of screen size, being the most important attribute (31.088%), followed by storage space (21.542%), main camera resolution (18.825%), storage (14.397%), and battery (14.147%). However, taking individual preferences in choosing a smartphone, we observed variations in the utility estimates of attributes and their attribute levels. For example, millennial 2 puts a premium on the phone's main camera resolution the most, having the highest importance value (51.852%), followed by screen size (22.22%), and storage space (12.346%), with both battery and storage with the least importance (6.79%). Millennial 104, on the other hand, prefers storage as the best attribute of smartphones (47.41%), followed by battery (28.48%), and storage space (17.241%). Both screen size and main camera resolution got the same importance values (3.448%). Finally, millennial 382 is battery-conscious (38.826%), followed by both screen size and storage space (19.048%), storage (13.095%) and main camera resolution (9.041%).

Table 2: Individual and aggregate models showing different preferred attributes and utility estimates of their attribute levels

Attribute Levels	Millennial 2		Millennial 104		Millennial 382		Overall Sample	
	Important Values (%)	Utility Estimate	Important Values (%)	Utility Estimate	Important Values (%)	Utility Estimate	Important Values (%)	Utility Estimate
(Constant)		**4.977**		**4.216**		**2.977**		**2.118**
Battery	**6.79**		**28.448**		**19.048**		**14.147**	
Removable		0.125		-0.187		-0.375		0.027
Non-removable		-0.125		0.187		0.375		-0.027
Storage	**6.79**		**47.414**		**13.095**		**14.397**	
With Micro SD Slot		0.125		0.313		0.125		0.005
No Micro SD Slot		-0.125		-0.313		-0.125		-0.005
Screen Size	**22.22**		**3.448**		**39.286**		**31.088**	
4 inches		0.409		-0.045		0.182		0.459
5 inches		0.818		-0.068		0.364		0.917
6 inches		1.227		-0.114		0.545		1.376
Storage Space	**12.346**		**17.241**		**19.048**		**21.542**	
16 GB		-0.227		-0.227		-0.182		0.225
32 GB		-0.455		-0.341		-0.364		0.451
64 GB		-0.682		-0.023		-0.545		0.676
Main Camera Resolution	**51.852**		**3.448**		**9.041**		**18.825**	
8 Megapixel		-0.955		0.091		-0.023		-0.119
12 Megapixel		-1.909		0.182		-0.045		-0.238
16 Megapixel		-2.864		0.273		-0.068		-0.357

Given all the results, it was observed that preference varies adding one (1) point to the scale can somehow increase the preferences. On the other hand, if one (1) point is being subtracted can lower the millennials' preference. The value of the importance of a certain attribute will surely affect his/her preference. Also, the total utility can be

determined from the combinations of part-worth utilities. This can be done by adding the marginal utility value of the attribute level combinations of each attribute plus the value of the constant derived in the conjoint estimation. Succinctly put, the best preference models can be estimated by calculating the total utility for any product profile based on possible combinations of attribute levels. For example, the most preferred profile combination in the orthogonal designs is a smartphone with a removable battery, 6" screen size, with micro-SD slot storage, 64 GB storage space and 12-megapixel main camera resolution having an overall utility of 3.964, calculated by adding the constant 2.118 + 0.027 utility for battery, + 0.005 utility for screen size, + 1.376 utility for storage, + 0.676 utility for storage space and + -0.238 utility for main camera resolution.

On the other hand, the least preferred combination of smartphone attributes is a smartphone with a removable battery, 4'' screen size, no micro-SD slot storage, 16 GB storage space and 16-megapixel main camera resolution having an overall utility of 2.467, calculated by adding the constant 2.118 + 0.027 utility for battery, + -0.005 utility for screen size + .459 utility for storage, + 0.225 utility for storage space and + -0.357 utility for main camera resolution. These kinds of attributes were not so appealing for the millennials, as it may denote that smartphone buyers may prefer a smartphone that has a larger screen, expandable and bigger storage.

5. Discussion

Conjoint analysis reveals that the screen size of a smartphone is the most important attribute of the millennials' preference for a smartphone. Following screen size is storage space, main camera resolution and storage. On the other hand, the least important attribute is the battery of a smartphone. Such finding is in coherence with Sundar's (2009), viewing that a larger view screen size could lead to greater effectiveness and that better quality and quantity of data can be conveyed by large screens suitable for simultaneous application of multiple modes than smartphones with small screens. On the contrary, the least preferred attribute is the battery. The result may further conform to the statement of Batt (2017) that purchasing removable and non-removable batteries are a success or failure since a battery feature as removable or non-removable is not extensively publicised by the distributors.

Using marginal utility evaluated in each attribute level, the result reveals that 6" screen size is the most preferred attribute level of a smartphone. It is further supported by Kee (2017) that viewing a larger screen size could lead to greater effectiveness. Moreover, Barredo (2014) affirms that as smartphone screen size increases, the higher resolution screens to accommodate bigger and better viewing of the display. Large screens also facilitate the use of different transmission methods than smartphones with small screens (Kim, Sundar, & Park, 2011).

Secondly, storage space is the second most preferred important attribute. Is stated by Ware (2018) that in selecting a phone, storage capacity is often one of the deciding factors in its purchase. This is also supported by Singh (2015) that storage space depends

mostly on personal needs. If the user plans to keep the smartphone for a longer time, a 32 GB storage space is sufficient.

The third most preferred important attribute is the main camera resolution. It conforms to the statement of Peterson (2016) that having more megapixels does not mean more quality of the image. The crisper the original photo, the better the results that a camera with fewer pixels could get. The author further stated that offering an exceedingly great number of pixels, digital zooming results in closer images with an immense level of detail when it comes to printing. It also further relates to the statement of Kidman (2017) that the higher the pixel size, the higher the overall sensor for the better overall performance of the smartphone camera. Most likely there is a notable downside for a larger megapixel photo.

The fourth most preferred important attribute is storage. Sanhz (2016) also averred that a smartphone with a microSD slot will not perform as well compared to one with flash memory. The manufacturers take advantage of this set-up because smartphones that usually have a microSD are cheap or medium-priced phones, and the performance may not be affected by having a microSD card full of music, movies, and other multimedia content. Moreover, microSD cards can consume a lot of a smartphone's battery life during transfers and during the viewing of files.

Meanwhile, the least attribute level of a smartphone is the non-removable battery. This is parallel to the statement of Uppal (2016), averring that in the latest era of smartphones, phone manufacturing companies strive to make the phones smaller and slimmer. The design set-up prevents users from changing batteries when needed and would have to resort to taking their handsets to a smartphone repair shop or the company designated service store. Eilers (2016) added that battery removal defaults to a shutdown and reattaching along with pressing the power button leads to a reset of a smartphone unit.

6. Recommendations

The significant findings of the study will serve as a guide to developing a strategic marketing and promotion campaign for every smartphone distributor to capture the desired market. Their marketing program, advertisements and strategy can be anchored with the findings of the study for future decision-making. As such, smartphone distributors should also further consider the perception of the millennials towards the attributes of a smartphone. Since millennials grew up with many technological changes, market practitioners and researchers, telecom companies could adopt the results as a point of reference for the future study related to the topic to further know how far the technology advancement come over the years. Consequently, future researchers may conduct further studies related to the subject matter by providing more information and knowledge related to the attributes of a smartphone. Although a considerable sample of millennials is good enough to conduct a study based on the given literature, it is a much

more realistic and effective result if the maximum respondent sample will be involved in the study using the same research approach.

7. Conclusion

If the range of the attribute levels that are tested changes, the relative importance of that attribute will also be likely to change. This is how they affect one another as to how the preference of a certain respondent is being measured. Conjoint analysis reveals that the screen size of a smartphone is the most important attribute of the millennials' preference for smartphones, followed by storage space, main camera resolution and storage. On the other hand, the least important attribute is the battery of a smartphone. The analyses confirmed that the preference for smartphones can be explained by Random Utility Theory of Domencich and McFadden (1975), which affirmed the hypothesis that the probability of a consumer's choice for a product is determined by its product attributes (Hassenzahl, 2006).

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Conflict of Interest Statement
The researchers declare no conflict of interest in the conduct of this study.

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