

# Methods for Analyzing Millennials' Characteristics and Contexts of Media Usage in Multi-Device Environments

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**Abstract**—It is an era of multi-device. Today's users produce and consume media by using various devices in various environments. Especially millennials have been in contact with digital devices like PC, tablet, and smartphone since childhood, so their behaviors to produce and consume media by using the digital devices can be displayed diversely compared with other generations. Their needs on the media products can also be diverse. In developing process of media products, it is important to grasp users' media usage patterns and divide them into several groups that show similar characteristics to appropriately respond to their needs. By doing this, it is possible to understand the user more precisely, and developers or marketers can develop appropriate functions or strategies for each group to improve the users' satisfaction. For that reason, this study is a research related to investigation of millennials' behavior to produce and consume media by using multiple devices. It suggests a method to group millennials by their context of media use based on a survey of their media and related devices usage. The result of the study can be used to develop a user model or user scenario for product development and marketing.

**Keywords**—Millennials; Multi-device experience; Media; User modeling; Use case.

## I. INTRODUCTION

It is an era of multi-device. With the development of information and communication technology, various types of devices have been developed. Users can utilize a number of devices to achieve their own needs, including desktop computers, laptops, smartphones, tablet PC, cameras, media players, and TVs. Nowadays, users perform activities that span devices, rather than using different devices for different activities [1]. Even if users do the same activities, they use the appropriate devices according to occasion and location. Cisco estimates that there will be around seven internet-connected devices per person by 2020 [2]. Due to the multi-device environment, designers and marketers have become more anxious. Even if you create a service or function, they need to consider many devices associated with it (Figure 1). If internet of things (IoT), where all things are connected to the Internet, become more widely commercialized, there would be much more devices to consider.

Designers and marketers need to take a deeper look at the

device as well as the user. As users are able to use many devices, their usage patterns have become more diverse. As a result, users shouldn't be viewed as a group, and it is necessary to divide them into several segments according to the patterns and purposes of use.

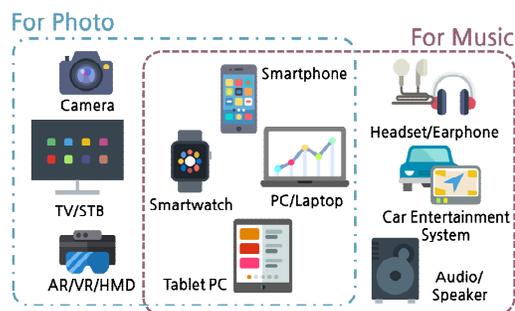


Figure 1. Many devices associated with media (Photos and music)

In particular, millennials are experts in multi-devices [3]. Millennials, also known as Generation Y or Net Generation (or Generation N), are a cohort that directly follows Generation X [4]. Generally, researchers define millennials as births from the early 1980s to the early 2000s [4]. According to a survey of Americans' generation and gadgets, millennials have more devices than previous generations, such as Generation X and Baby Boomer Generation (Table 1) [5]. In addition, since they have been in contact with devices since childhood, they have better understands how to connect and use digital devices. Thus, it is expected that millennials show much diverse usage patterns and needs in a multi-device environment than other generations. Even the purpose of utilizing multi-devices can be different.

It means that we require a deeper understanding of millennial Generation. Especially when using media, it is necessary to understand how millennials consume the media, for what purpose they use the media devices, and in which environment they are consuming the media. This can help developers to develop appropriate functions or services for millennial Generation.

This study is a basic research on media usage behavior of millennial Generation in the multi-device environment. In particular, this study proposes a way to classify millennials

into several types based on the survey on them and to derive where and when they use media with multiple devices. This study suggests an objective and quantitative analysis method that utilizes statistical techniques.

TABLE I. % OF AMERICANS IN EACH GENERATION THAT OWN EACH DEVICE [5]

	Cell phone	Desktop	Laptop	MP3 player	Tablet PC
Millennials	95%	57%	70%	74%	5%
Generation X	92%	69%	61%	56%	5%
Younger Baby Boomers	86%	65%	49%	42%	4%
Older Baby Boomer	84%	64%	43%	26%	3%
Silent Generation	68%	48%	30%	16%	1%
G.I. Generation	48%	28%	10%	3%	1%

Section 3 presents the user survey on millennials’ media usage. Section 4 explains how to derive the user groups of millennials based on the user survey data. Section 5 accounts for how to derive the representative use cases of millennials for two types of media (music and photos).

II. EXISTING STUDIES ON CHARACTERISTICS OF MILLENNIALS

There were many studies that had characterized millennials. These studies yielded common characteristics of millennials compared to other generations, such as Baby Boomer or Generation X. According to a survey of millennial generations conducted at the Pew Research Center in 2010 and 2014, millennials had the characteristics of being individual, confident, self-expressive, liberal, and not afraid of change [6]. In addition, they valued the family and were less likely to identify with a particular political party [6]. They were identified as “digital natives”, who tried to do many things using digital devices [7]. Millennials in adulthood were detached from institutions and networked with friends [7].

Much research has been conducted on the analysis of the media use characteristics of millennials. These studies have analyzed the way they consume music or TV/video contents. According to these studies, millennials had the following characteristics:

- This generation streams music through technological devices, via the use of social media among other platforms [8].
- To this generation, it is important habits not only to download music online but also to share music [9][10]. They express emotions, share with friends, and reinforce each other's relationships through music [9].

- This generation downloads digital music. However, this generation purchases CDs to express the tribute to the artists [11].
- This generation wants to listen to music instantly whenever and wherever [8].
- This generation is a user of the online platform to access and share music files [11][12].
- This generation consumes video contents with the second screen devices rather than on the TV [13].
- This generation is good for multitasking, and they consume the video contents in multitasking environment [13].

However, previous studies had analyzed the millennials as only one group of user and derived unique characteristics for whole millennials by comparing them with the other generations. Millennial Generation is a generation with a population size of about 20 years. Generally, about 25% of the world's population is millennials. It is difficult to interpret their characteristics, seeing millennials as a group. For a more sophisticated understanding of Millennial Generation, it is necessary to analyze the millennials more finely.

III. USER SURVEY

In this study, we conducted a user survey to identify the media usage of millennials. The purpose of this survey was to collect basic data for user analysis.

TABLE II. SUBJECTS OF THE SURVEY

Millennials who are actively using media	- Millennial Generation (the early 20s to mid 30s)
	- Actively use music, photos, and videos
	- Connect various electronic devices to utilize media

The survey was conducted on millennials (Table 2). In this study, we defined births from the mid-80s to early 2000s as Millennial Generation. However, the survey was conducted only for those aged 20 years or older, because it was judged that adolescents have limits to use media due to academic reasons. We expected that millennials are familiar dealing with digital devices and they have the highest desire to achieve their needs by utilizing various types of devices. In addition, millennials are the primary consumers of various media devices, so they must be considered to develop media devices or create marketing strategies.

This study focused on the media usage. In particular, we focused on creating and consuming photos and videos and listening to music. Therefore, respondents who did not produce or consume media were preferentially excluded.

The following items were surveyed (Table 3). First, demographic information of respondents was collected. Age, sex, occupation, and family members of the respondents. Next, the respondents' degree of interest in the media was collected. We collected that the number of times they used music, pictures, and videos for a day. Respondents were also asked to answer the question about the degree of interest in media devices.

TABLE III. SURVEY ITEMS

Survey items	Descriptions
Demographic information	Basic demographic information such as age, sex, and occupation of the respondents
Degree of interest in the media	How much are the respondents interested in media and media-related products
Products in use (Devices & Apps)	The types, names, manufacturers, model names of the products or apps that the respondents are using
Context of using the products	The purpose of each product, where to use it, and when to use it
Cognitive Style	Psychological test for the classification of the respondents' psychological types (short MBTI)

In addition, information about the media devices and apps in use were collected, such as the types (smartphone, tablet PC, TV, laptop, camera, audio, etc.), the manufacturers (Apple, Samsung, LG, Canon, Bose, etc.), and model names of the devices and apps. We also asked when, where, and for what purpose each device was used. Finally, we added a questionnaire item (short version of Myers-Briggs Personality Test) to identify the relationship between respondents' personality and their media usage.

360 millennials participated in the survey, and it was conducted for a week. A web-based questionnaire was constructed for the convenience of the survey. Respondents were able to access the questionnaire via the web URL. For those who participated in the survey, were provided with certain rewards.

IV. USER CLASSIFICATION

In this study, we tried to classify media usage of millennials into several types. People have their own needs of using media. It is most ideal if you are able to provide customized strategies for all of them. However, this is technically and costly difficult. Instead, if we can group users with similar tendencies and derive their common characteristics, we can achieve a better strategic effect than treating all millennial users equally.

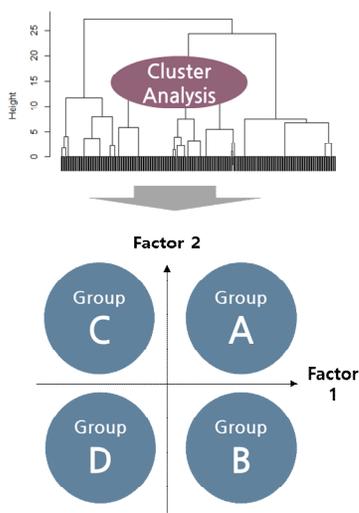


Figure 2. Cluster analysis to divide millennials according to common characteristics

The data collected from user survey was used to divide user groups. The data were divided into two sets. First one was the data for classifying the user groups, such as the number of products and apps currently in use (Figure 2). The remaining data was used as data to determine the characteristics of the group.

After 4 groups were derived, an additional data analysis was performed to derive the characteristics of the groups. We checked for differences between groups for the other variables, including age, gender, occupation, interest in new products, frequency of purchasing new products, and results of personality test (Figure 3). For the data analysis, analysis of variance (ANOVA) and cross-tabulations were used. ANOVA was performed for continuous variables such as age. If there were significant differences, post-hoc analysis was performed to determine which groups differed from each other. Cross-tabulations was performed for nominal or ordinal variables such as gender and occupation. Likewise, when there were significant differences, post-hoc analysis identified the groups that differed.

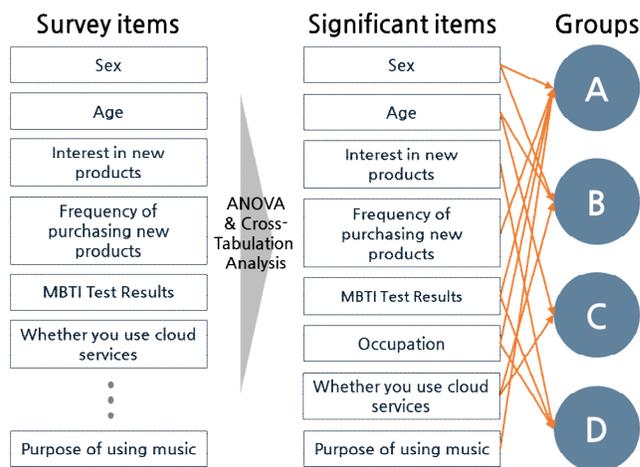


Figure 3. Statistical analysis to define characteristics of each group

Each group was defined based on the characteristics. A name and an image that can represent each group was constructed. The proportion of each group was derived. The characteristics of the group were classified into demographic characteristics, the products in use, and the context of media usage (Figure 4).

TABLE IV. EXAMPLE OF THE TATA ON LOCATION, TIME, AND PURPOSE OF USING MEDIA (PHOTOS AND MUSIC)

Sub No.	Media types	Location			Time			Purpose		
		Living room	...	Office	Time to relax	...	Time to study	To listen	...	To share
Sub01	Music	O	...	X	O	...	X	O	...	O
Sub02	Music	X	...	O	O	...	O	O	...	X
Sub03	Music	X	...	O	O	...	O	O	...	X
Sub04	Music	O	...	O	O	...	O	O	...	O
Sub05	Music	O	...	O	X	...	X	O	...	X
...	...	...	...	...	...	...	...	...	...	...

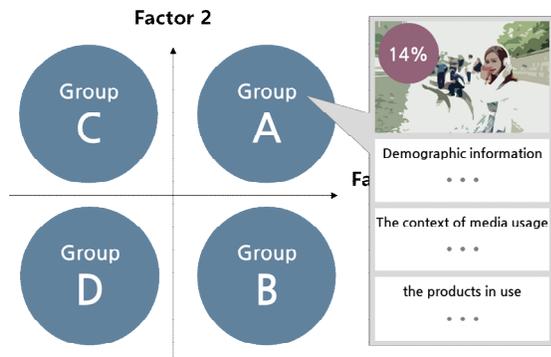


Figure 4. Example of classification results

V. USE CASE

In a multi-device environment, the types of devices can vary depending on the place, time, and purpose of using the media. As a result, the behaviors and needs of the user also can be differed. In order to accurately understand the behaviors and needs of the user, it is necessary to know precisely where, when and why the user uses the media. In this study, we tried to derive millennials’ typical use cases of music and photos, based on the data that was responded to when, where, and for what purpose the millennials used the media.

First of all, the data on location, time, and purpose of using media (photos and music) were collected from users (Table 4). "O" meant that users normally use music or photos at the place, at that time, and for that purpose. We used this data to analyze the correlation between Location, Time, and Purpose. If the correlation between ‘living room’ and ‘time to relax’ was high, we could derive that the respondents usually used music to relax in the living room. Also, if the correlation between ‘living room’ and ‘to listen’ was high, we could find out that they usually listened to music for their relaxation in the living room.

In this way, we were able to derive the millennials’ typical use cases of music and photos. In addition, we added frequency for each use case, and we were able to identify how representative each use case was.

VI. CONCLUSION

This study was a basic research to investigate and classify millennials behaviors to create or consume media

and use of media related devices. This study suggested a method to develop user groups of millennials and their context in use of media based on a survey of millennial users. Especially, the method was based on an objective and quantitative analysis that utilizes statistical techniques.

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