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Factors Influencing the Consumer Tendency to Use Mobile Instant Messaging (MIM): A Mixed Method Study

Jorge Cruz-Cárdenas¹, Jorge Guadalupe-Lanas², Carlos Ramos-Galarza³, and Andrés Palacio-Fierro⁴

ABSTRACT

Mobile instant messaging (MIM) is currently one of the most influential areas of technology. MIM applications have experienced substantial growth in the number of users; however, research on consumer behavior regarding the use of these applications is relatively scarce. The present study seeks to fill this gap, with the objective of identifying, understanding, and establishing the determinants of MIM use. The current study takes place in Ecuador, a developing Latin American country, and focuses on WhatsApp, the leading MIM application. The study is based on a sequential exploratory mixed method design with 25 in-depth interviews and a subsequent survey of 504 adults. The qualitative phase allows the establishment of a qualitative theoretical model in which the core category studied to understand the tendency of people to use WhatsApp is the perception of its utility. The qualitative phase and a literature review are the basis for formulating the study hypotheses. Finally, the quantitative analysis, based on structural equation modeling, yields the conclusion that network externalities, perceived usefulness, and perceived ease of use are the constructs that explain the tendency of individuals to use WhatsApp.

KEY WORDS:

Consumer behavior, mobile instant messaging, network externalities, WhatsApp, technology acceptance model.

JEL Classification: D11.

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1. Introduction

Technology is one of the most dynamic and influential forces in the lives of people and societies. In the social sphere, technology allows the generation of spaces for the cocreation of value, participation and cooperation between individuals (Mačiulienė et al., 2018). In the sphere of business and organizations, technology drives the continuous innovation of products, which incorporate new value for consumers (Geldres-Weiss et

al., 2018). Among the wide variety of technology-based products available, mobile instant messaging (MIM) stands out as a type of application-based messaging for smartphones that allows individuals to send and receive messages and files through the Internet.

Because of its advantages, MIM is experiencing rapid growth in the number of users. For example, in the period 2013–2020, WhatsApp, the leading application in MIM, saw an increase in its number of users from 200 million to 2,000 million worldwide (Statista, 2020). Additionally, previous studies have established that WhatsApp, the leading brand of MIM, may already be the preferred form of social interaction

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over the leading social network, Facebook (Elangovan & Agarwal, 2015; Simon et al., 2016).

Although MIM greatly impacts the lives of people and societies, academic research on this topic is scarce (Aharony & Gazit, 2016; Cruz-Cárdenas et al., 2019; Montag et al., 2015) because of the relatively recent appearance of MIM and its subsequent rapid growth. Another important aspect is that research into the use of technology in general has been strongly concentrated in developed countries, with developing countries receiving less attention (Abbasi et al., 2015). However, it is expected that as the markets of developed countries become saturated and several developing countries continue their rapid economic growth, the pace of expansion in users of products and services based on technologies will increase in developing countries (International Telecommunication Union, 2017).

Given the aforementioned background, the current study has the general objective to identify, understand, and establish the factors that determine the tendency of people to use MIM. In addition to this contribution to the theory of consumer and human behavior in MIM, the present study seeks to provide a better understanding of the use of technologies of this type in developing countries.

With these objectives, the current study considers Ecuador, a developing Latin American country where the leading brand of MIM is WhatsApp, as an appropriate setting for this investigation. Given the relatively scarce previous research on human behavior in MIM, the present study was initiated cautiously with a sequential exploratory mixed method design as the research approach. In this form of research, a qualitative stage is oriented toward exploring and understanding a phenomenon of study and developing hypotheses, followed by a quantitative phase devoted to testing those hypotheses (Creswell & Plano Clark, 2011; Teddlie & Tashakkori, 2009).

2. Theoretical Framework

This section has been divided into three subsections ranging from the most general to the most specific. First, consumer behavior in technological environments is discussed; then, the knowledge of consumer behavior regarding MIM is reviewed; and finally, the theory of network externalities is developed.

2.1. Consumer Behavior in Technological Environments

Although the literature on consumer behavior related to technology and technological products is vast, central to these studies is the models used to study the use of or intention to use technologies or related products. The most widespread model in explaining the adoption and use of technologies is the technology acceptance model (TAM), proposed by Davis (1989). The TAM specifies that two factors, perceived usefulness and perceived ease of use, are central determinants of the use (or intended use) of products or services based on technology (Davis, 1989). These relationships in the TAM have been confirmed in extensive meta-analyses (e.g., Blut et al., 2016; Schepers & Wetzels, 2007) based on studies that have used the model.

Subsequently, several models emerged that sought to incorporate an additional series of variables to improve the predictive power of the TAM. Models based on the unified theory of acceptance and use of technology (UTAUT) incorporate demographic variables in moderating roles related to variables that predict behaviors surrounding technology use (Venkatesh et al., 2003; Venkatesh et al., 2012). Technology readiness and acceptance models (TRAMs) for their part seek to incorporate consumer attitudes toward technology (technology readiness) into the TAM, mainly in an indirect role mediated by perceived usefulness and perceived ease of use (Lin et al., 2007).

Notably, the three types of models, TAM, UTAUT and TRAM, continue to be valid and are widely used in current research on consumer behavior in the use of and intention to use technologies.

2.2. Consumer Behavior in the Use of Mobile Instant Messaging (MIM)

The use of MIM is a particular case of consumer behavior related to technologies and technological products. The behavior of consumers in using MIM has attracted the attention of some previous studies, albeit to an insufficient degree given the very rapid growth in the use of this technology. Regarding the profile of substantial MIM users, young people and women stand out (Ahad & Lim, 2014; Montag et al., 2015).

MIM in general and WhatsApp specifically are widely used for family interactions and in study and work environments. In this sense, previous research highlights the ability of WhatsApp to provide and obtain social and emotional support from family and friends (Aharony & Gazit, 2016; Wang et al., 2019). Popular functions of WhatsApp, as reported by previous studies, are the sending of messages, photos, and videos and the functioning of groups (Ahad & Lim, 2014; Cruz-Cárdenas et al., 2019; Elangovan & Agarwal, 2015). In fact, WhatsApp has been positioned for its broad array of functions and resources offered (Elangovan & Agarwal, 2015).

Regarding predictive models on the use of MIM, the TAM prevails over the UTAUT and TRAM. Bere and Rambe (2016) confirmed the relationships in the TAM, indicating that perceived usefulness and perceived ease of use were associated with attitudes toward adopting MIM for learning. By contrast, in a recent investigation in a setting similar to that of the present study (developing countries), Cruz-Cárdenas et al. (2019a) found that demographic and attitudinal variables (components of the UTAUT and TRAM) presented low predictive power for the use of MIM.

Although the TAM offers great potential in explaining the use of MIM, recent research has been directed toward adapting the main relationships of the TAM to MIM. In one of the most promising lines of work, various efforts have been made to use theories such as network externalities. This concept was originally proposed by Katz and Shapiro (1985) as a more specific form of the perceived usefulness component of the TAM. Because of the importance of these initiatives, this topic is discussed in the next section.

2.3. Network Externalities and MIM

Another important aspect of consumer behavior in MIM is network externalities, which, in their positive sense, refer to the utility that a consumer obtains as a consequence of an increase in the number of users of a service or application (Katz & Shapiro, 1985). These externalities can be generated through direct or indirect effects. Direct effects emerge as a greater number of users of a service or application generate the potential for a wider network within which to interact (Katz & Shapiro, 1985; Lin & Bhattacharjee, 2008).

Indirect effects arise because as the number of users grows, the company or provider may identify the need to introduce complementary services and functions (Katz & Shapiro, 1985; Lin & Bhattacharjee, 2008).

Although the concept of network externalities is fundamental to understanding the perception of value for the consumer, it is also a strategic aspect for corporations and businesses because in industries where this externality is important, it defines the strategies of new entrants and of established companies (Gallaughier & Wang, 1999).

In an effort to apply the concept of network externalities to interactive information technologies and instant messaging (IM), Lin and Bhattacharjee (2008) argued that in the case of direct network externalities, what truly generates utility or network benefits for consumers is not the total number of service or application users but the number of users belonging to the social circle of a specific individual. That is, they refer to the individuals with whom one can effectively interact; therefore, the authors renamed this externality referent network size.

In the case of indirect network externalities, the mentioned authors emphasized that in order to generate utility, complementary services and functions must not only exist but also be perceived by users; for this reason, they renamed this externality as perceived complementarity. In addition to this contextualization, the cited authors generated scales for measuring these externalities.

Regarding empirical results in IM settings, Lin and Bhattacharjee (2008) found a significant positive association of referent network size and perceived complementarity with network benefits and of these network benefits with the intention to use IM. Zhou and Lu (2011), when applying their study to MIM, found that referent network size and perceived complementarity were associated with perceived usefulness and that perceived complementarity was associated with satisfaction with MIM use.

While these previous model studies paved the way for the application of network externalities in predicting people's tendency to use MIM, more studies are needed to understand in depth the mechanism of this application.

3. The Study Scenario

The current research took place in the city of Quito, the capital of Ecuador, a Latin American country. The urban area of Quito has approximately 1.6 million inhabitants, while the population of Ecuador exceeds 16 million inhabitants (National Institute of Statistics and Censuses of Ecuador, 2010). Ecuador is a developing, middle-income country where the majority of its inhabitants speak the Spanish language and profess the Roman Catholic religion. Ecuador shares these economic and cultural characteristics with most Latin American countries, with the important exception of Brazil and, more specifically, the principal language spoken there, Portuguese.

4. Mixed Methods Approach

Considering the relatively scarce existing research on MIM, a sequential exploratory mixed method approach was selected as the research design for the current study. A mixed method approach consists of a qualitative phase oriented toward exploration followed by a quantitative phase aimed at confirming the findings (Creswell & Plano Clark, 2011; Teddlie & Tashakkori, 2009). The design of the research, as well as its ethical protocols and the formats used (informed consent forms, questionnaires, etc.), were approved by the university that funded this study. The detailed research design is displayed in Figure 1 and presented in detail in the following sections.

5. Qualitative Phase and Hypotheses

5.1. Qualitative Design

The first phase of the mixed method design was a qualitative approach that aimed to obtain insights and findings. This phase was based on in-depth interviews and occurred during the months of September to December of 2017 and in January and February of 2018. The main objective of this phase was to identify and understand the factors related to people's tendency to use MIM, specifically WhatsApp, the most widespread application used in Ecuador. The participants were 25 adult individuals from the city of Quito who received 30 USD for their participation. An important criteria for participation in the interviews was that the potential participants were WhatsApp users. Initially, the sampling was purposive,

and in this way, the first interviewees were university students, given that young people use cell phones extensively (Aharony & Gazit, 2016; Montag et al., 2015) and constitute the most accessible segment for the authors of the current study. After the first findings, particularly from interviews with young people who worked and studied at the same time, the sampling became theoretical (Glaser & Strauss, 1967), and the authors incorporated other population segments (not students). The authors considered that after interviewing 25 individuals, they had reached the saturation point, that is, the lack of emergence of new relevant categories (Glaser & Strauss, 1967). The final sample obtained was very diverse and involved adults aged 18 to 57 years; it consisted of 11 men and 14 women from diverse occupations, including students, administrative workers, manual workers, and housekeepers.

The interviews were conducted by the authors with experience in interviewing techniques. The interviews were semistructured and began with the presentation of the study and the explanation of the interview rules and interviewee rights. Each participant read and signed the informed consent form, which explained the research and participants' rights. The interviewees were then asked about their personal characteristics and their physical (home) and social (family) environment. Once the interviewees seemed more comfortable, the interviewer explored the digital behavior of the interviewees to later focus on MIM and WhatsApp. In this part of the interview, the interviewer emphasized the reasons that the interviewees had to use MIM and the benefits they perceived in using this application. A more detailed outline of the interview questions is presented in Appendix 1.

Although the abstractions and generalizations of the interviewees were very important during the interviews, they were also asked to check their smartphones to discuss specific events (Patton, 1999). In this way, during the interviews, messages, emojis, gifs, and other fundamental communication resources in MIM (Chen & Siu, 2017), either sent or received by the interviewees, were reviewed. The interviews lasted between 30 minutes and one hour, were carried out in Spanish, and were recorded and subsequently transcribed.

Figure 1
Mixed Method Research Design

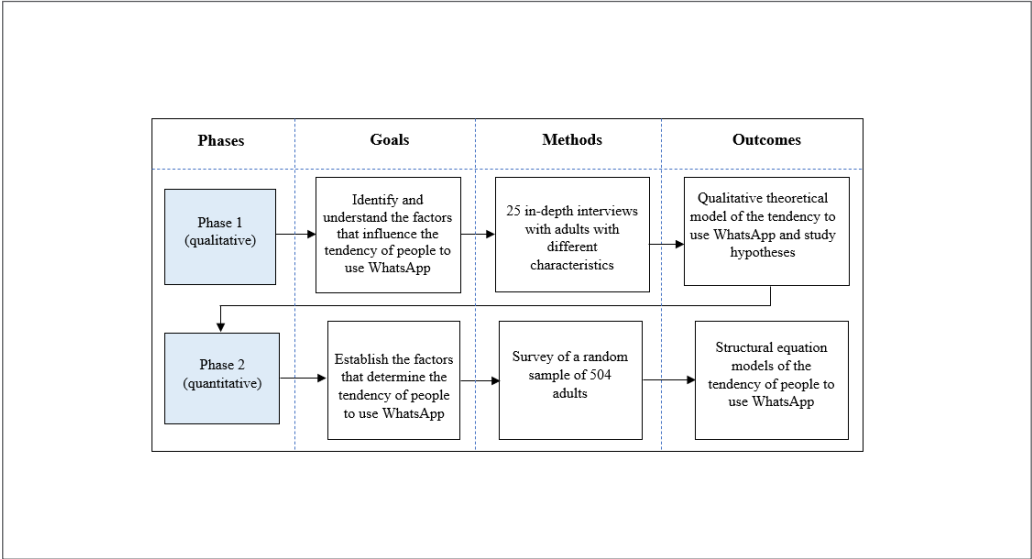
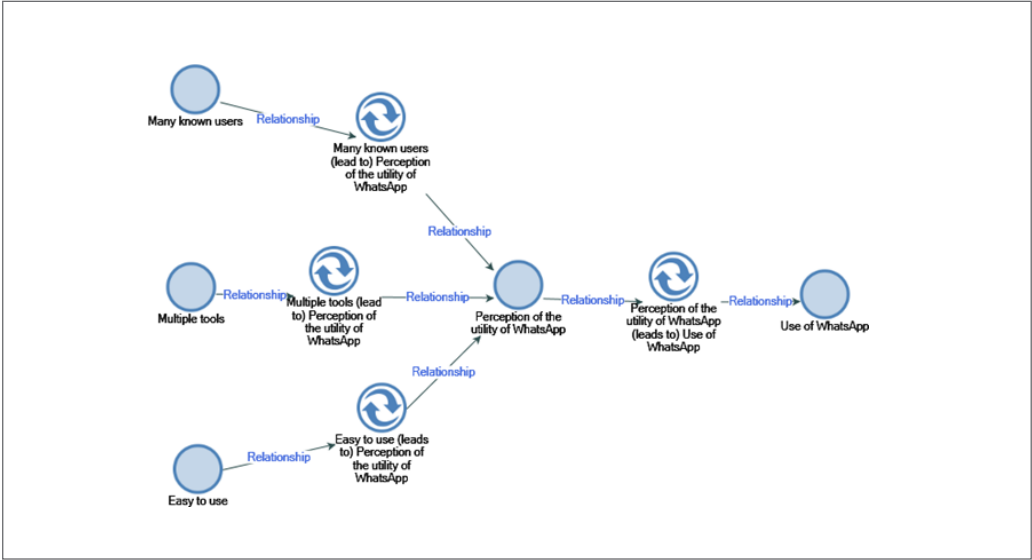


Figure 2
Qualitative Theoretical Model of WhatsApp Utility and Use.



5.2. Qualitative Analysis, the Theoretical Model, and the Formulation of Hypotheses

The authors used QSR International's NVivo 12 software (QSR International, 2018) for the qualitative analysis, which was carried out in two stages. To guarantee the reliability of the interpretations, two authors with qualitative training analyzed the data. The first stage was oriented toward the systematic revision of blocks of text and the inductive construction of categories through open coding. In the second stage, the authors sought to establish relationships between categories in order to integrate them into a theoretical model (Glaser, 1978). In the construction of this theoretical model, the category perception of the utility of WhatsApp was identified as the core category since it allowed the connection of all other categories (Strauss & Corbin, 1998). The theoretical qualitative model is presented in Figure 2.

Three categories contributed to the core category of the model (perception of the utility of WhatsApp). These categories were tagged based on the words of the same interviewees: many known users, multiple tools, and easy to use. The first two categories are closely related to the theory of network externalities proposed by Katz and Shapiro (1985). These two categories, together with the category of easy to use, recall the structure of the TAM proposed by Davis (1989). Additionally, the perception of the utility of WhatsApp was closely associated with and led to the category use of WhatsApp.

In the next subsections, the elements of the model are presented in more detail, accompanied by the words of the interviewees and previous related literature. This analysis scheme allows the authors to derive the hypotheses of the current study. Throughout the article, interviewees' names have been changed to preserve their anonymity.

5.2.1. Many known users.

The presence of other people is important to online behavior, either because of the generation of positive network externalities (Katz & Shapiro, 1985) or because of their influence on the individual in adopting these online behaviors (Akar & Dalgic, 2018). The first qualitative theme concretely revolved around the presence of other familiar people on WhatsApp, or in

the words of the interviewees, "many known users on WhatsApp"—that is, the existence of a referent network size (Lin & Bhattacharjee, 2008).

María (female, 50 years old, secondary teacher) recounted in a retrospective way how she first encountered WhatsApp. In her story, her belief that WhatsApp would be useful to her is important, a conclusion that she came to based on observing users she knew who had the application. Here is an excerpt from her comments:

At first, out of curiosity [I installed WhatsApp] because I listened to young people [talking about WhatsApp], although I did not really know much about the application ... after I discovered it, I thought it would be very useful for me to communicate with many friends and family who already had it.

Ramiro (male, 19 years old, administrative employee), on the other hand, used the comparison with a popular social network to illustrate how WhatsApp's growth was taking place and how that growth encouraged him to become a user of the application. His comments were as follows:

I remember that we were in that transition when everyone was going to stop using Facebook Messenger and change to WhatsApp and WhatsApp became the most important ... so one day, everyone had WhatsApp on their cell phone ... so I changed to WhatsApp because I saw that it could help me communicate with my girlfriend, with my friends, and so on.

Interestingly, in the cases of María and Ramiro, as well as a good number of the interviewees, the approach of Lin and Bhattacharjee (2008) was verified in that consumers' attention is focused less on the size of the total user network but mainly on only part of it, the part relating to their relatives, friends, and acquaintances (referent network size). Additionally, based on the interviewees, of whom María and Ramiro are representative examples, the perception of many known users on WhatsApp (referent network size) was closely linked to the possible utility of WhatsApp.

To these qualitative findings should be added the results of previous studies that highlight the importance of the popularity of WhatsApp for its users (Elangovan & Agarwal, 2015) or the finding in IM service environments of a direct positive effect of ref-

erent network size in terms of either network benefits (Lin & Bhattacharjee, 2008) or perceived usefulness (Zhou & Lu, 2011). Based on all this evidence, the following hypothesis for the current study related to WhatsApp is proposed:

H1: Referent network size positively influences the perceived usefulness of WhatsApp.

5.2.2. Multiple tools.

A second subcategory related to the interviewees' perception of the utility of WhatsApp was labeled as multiple tools on WhatsApp, and its meaning was very close to that of perceived complementarity (Elangovan & Agarwal, 2015). Isabel (female, 18 years old, university student) explained in her own words the evolution of the features and functions of WhatsApp and the ways in which this has added utility to the application. Below is an excerpt from her interview:

Now WhatsApp can be used for many things, for important things and also for unimportant ones ... at the beginning were the messages, which were replacing SMSs [short message services], then they implemented emojis, gifs, calls, groups, status, and so on ... over time you can use WhatsApp for more and better things.

Although the view of Juan (male, 30 years old, administrative employee) generally coincided with that of Isabel, he made a more detailed account of the functions of WhatsApp. Particularly striking is the fact that he used the strong word "essential" to refer to WhatsApp's utility. The following excerpt is from his interview:

Now you have many functions to choose from; maybe other people do not like it, but in my case ... There are many emojis ... the possibility of seeing the status of people informs me how they are ... share photos ... I especially share documents ... also videos ... in short, WhatsApp has become essential ... For example, just today, when I could not answer the phone because I was in a meeting, someone sent me a message, and I just sent an emoji of approval, and that's it.

The words of the interviewees, such as Isabel and Juan, revolved around associating the WhatsApp tools and functions with its utility to stay in contact with other people. Indeed, previous studies have indicated that WhatsApp is valued for the functions it

has incorporated (Elangovan & Agarwal, 2015), so much so that WhatsApp can be considered an "all-in-one" tool (Ahad & Lim, 2014; Elangovan & Agarwal, 2015). Based on this evidence, the following hypothesis can be proposed for the case of WhatsApp:

H2: Perceived complementarity positively affects the perceived usefulness of WhatsApp.

5.2.3. Easy to use.

This third subcategory was found to be closely associated with the perceived utility of WhatsApp, and its meaning coincided with the construct perceived ease of use proposed by Davis (1989) in his TAM. During the interview, Karla (female, 22 years old, university student) highlighted the ease of use of WhatsApp compared to what happens on a popular social network. Below is an extract:

I would say that it is easier to connect by WhatsApp than by other means ... For me, that is very valuable and useful ... For example, yesterday we had a task from the university; it was more convenient to connect us [her and her classmates] on WhatsApp than on Facebook ... it is comfortable, fast, direct ... on Facebook, you get ads, you get photos, videos ... they distract you from your goal ... WhatsApp is easy and direct; with a single button, you open it ...

Interestingly, Karla associated this ease of use with the utility of WhatsApp. Karla also used adjectives such as "comfortable," "fast," "direct," and "easy" to refer to WhatsApp, along with referring to the concept of low search costs, a frequently cited benefit in online environments (Chiu et al., 2019). Adrián (male, 35 years old, small business owner) also employed some of the adjectives used by Karla to refer to WhatsApp and associated this ease of use with the utility that WhatsApp offers him. His words are outlined below:

WhatsApp is easy and direct ... in short, it is very useful ... I just write and they answer me ... or I send an emoji ... that is sometimes the most practical ... so I am always connected with the people who are important to me ... If you have already mastered WhatsApp, you can use more things from the application ... but if not, with the messages being very easy to send, you can get ahead.

Although models of MIM behavior (e.g., Lin & Bhattacharjee, 2008; Zhou & Lu, 2011) have not in-

cluded the variable/construct perceived ease of use, this attribute of WhatsApp was seen as fundamental during the interviews in the present study and was associated with the utility of WhatsApp. Additionally, previous studies have highlighted the importance that WhatsApp users give to its ease of use (Elangovan & Agarwal, 2015). Therefore, the following hypothesis is formulated for the case of WhatsApp:

H3: Perceived ease of use has a positive influence on the perceived usefulness of WhatsApp.

It is also necessary to consider evidence from the TAM, where perceived ease of use is one of the fundamental factors in explaining technology use by consumers (Davis, 1989; Schepers & Wetzels, 2007). Notably, this relationship did not emerge in the analysis of the in-depth interviews. The interviewees, as previously indicated (hypothesis 3), rather considered that the ease of use of MIM is a determinant of the perceived benefits. If the exploratory nature of qualitative research is considered, there is no contradiction between the qualitative results of the present study and those found in the previous literature, but rather there is a complementary relation. Given this consideration and previous literature, the following hypothesis is also presented:

H4: Perceived ease of use positively affects the tendency to use WhatsApp.

5.2.4. Perceived usefulness and the tendency to use WhatsApp.

The connection between perceptions of the utility of WhatsApp and its use emerged clearly in the interviews. Phrases such as the following represented widespread opinions among the participants: “It is very useful, and that’s why it’s part of my life”; “I’m on WhatsApp all day, and it’s a big help”; “WhatsApp has filled a gap that existed, and now everyone is using WhatsApp”; and “It helps me do many things, and that’s why I use it quite a lot.” Previous studies found that network benefits—that is, the benefits or utility obtained by individuals from being in a growing network of users—directly influence the intentions to use IM (Lin & Bhattacharjee, 2008). Additionally, ample evidence indicates that in technology-related behaviors, the utility perceived by consumers positively affects the intention to use and the actual use of technologies (Davis, 1989; Schepers & Wetzels,

2007). Therefore, the following hypothesis is posed:

H5: The perceived usefulness of WhatsApp positively influences the tendency to use WhatsApp.

5.2.5. Other possible relations.

Some previous studies incorporated the perceived enjoyment construct (Lin & Bhattacharjee, 2008; Zhou & Lu, 2011) into behavior models of IM and MIM. The authors of the current study decided not to do so, based on the qualitative results of the study. These results showed that enjoyment and fun were benefits that were not present in most events reported by participants in using WhatsApp. In fact, many WhatsApp use events involved the combination of different tasks simultaneously (chatting, writing on the computer, surfing the Internet, eating, meeting people, watching television, etc.)—that is, in a multitasking environment where people are under pressure to read and respond to messages.

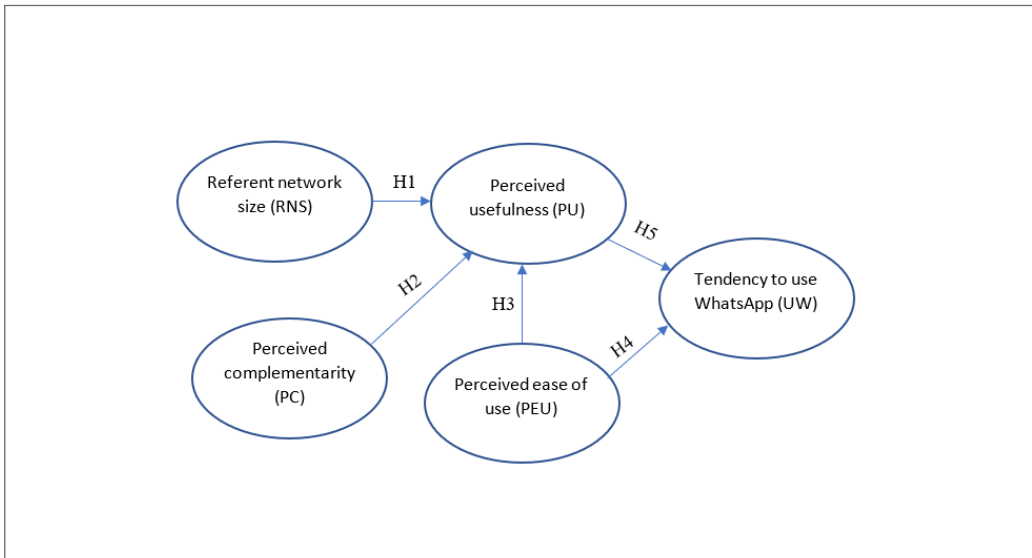
Additionally, the authors considered unnecessary the incorporation of another construct that condenses the perception of benefits or utility beyond perceived usefulness. In fact, in a previous study that included network benefits in addition to perceived usefulness, the authors (Lin & Bhattacharjee, 2008) obtained an extremely high standardized path coefficient (0.82) between the two constructs, indicating that incorporating the two constructs in the same model would be redundant.

Figure 3 presents the study hypotheses in the form of a hypothetical model to be tested in the quantitative phase.

6. Quantitative Phase and Results

6.1. Quantitative Design and the Method of Measuring the Variables

The main objective of the quantitative phase was to establish the relevant factors in the tendency to use WhatsApp by testing the hypotheses developed in the qualitative phase and reviewing the literature. During July and August 2018, the authors designed the questionnaire and tested it on a small sample of university students. Subsequently, during the period between September 2018 and May 2019, the final application of the questionnaire, the structuring of the databases and the data cleaning took place.

Figure 3*Hypothetical Model of the Tendency to Use WhatsApp*

The current study sample was randomly selected in the city of Quito, the capital of Ecuador, with adults (aged 18 years or older) chosen as participants. The sampling was multistage. Using as a basis the urban census zones of Quito, 85 census areas were chosen at random. In each area, the selection of households was systematic, and in each household, individuals were selected based on the demographic characteristics of Quito. The questionnaire was administered through in-person interviews with pollsters hired for this purpose. In this way, approximately seven questionnaires were collected in each zone. A final sample of 504 usable questionnaires was obtained.

The scales used in this study are presented in Appendix 2. For the measurement of referent network size, a scale of three items was adapted from the scales proposed by Lin and Bhattacharjee (2008) and Zhou and Lu (2011). Perceived complementarity was also measured with a scale of three items adapted from the same authors. Perceived usefulness was measured with a scale of four items adapted from Venkatesh and Davis (1996), and perceived ease of use was measured with a scale of six items based on the Davis (1989) scale.

The variable to be predicted, the tendency to use

WhatsApp, was measured with a three-item scale designed to measure behavioral tendencies in the area of consumption. On this scale, one item measures the behavior tendency by itself, and two items do so comparatively (one implicitly and the other explicitly). This kind of scale has been applied to both online and offline environments (e.g., Cruz-Cárdenas et al., 2018; Cruz-Cárdenas et al., 2019b; Lee et al., 2012). All the scales applied in the study used five response options (from 1 = strongly disagree to 5 = strongly agree).

In addition to the scales used, the questionnaire gathered demographic information from the participants, such as their age, gender, income, educational level, and occupation.

6.2. Descriptive Characteristics of the Sample

The monthly family income of the sample was 1,359.29 USD (standard deviation, SD = 859.26), which is higher than the average monthly income of Ecuadorian households (1,046 USD). However, it should be considered that Quito is the city with the highest family income in Ecuador (National Institute of Statistics and Censuses of Ecuador, 2013). At the per capita level, the average monthly income of the

sample was 418.97 USD (SD = 305.25). The average age of the interviewees was 37.36 years old, which is close to the average age of the adult population of Quito, which is 39 years old (National Institute of Statistics and Censuses of Ecuador, 2010). Additionally, most respondents (61.3%) had completed secondary education as their highest level of education attained, which is a good reflection of the average education level of the adult population of both Ecuador and the city of Quito (National Institute of Statistics and Censuses of Ecuador, 2010, 2013). Details regarding other important characteristics of the sample are presented in Table 1.

6.3. Analysis of the Scales Used

The 19 items of the five scales used in the current study were jointly subjected to common factor analysis with varimax rotation. The result was the extraction of five factors, where each item loaded mostly on the expected factor. This finding, together with the factor loadings in all cases being equal to or greater than 0.50, the cutoff value proposed by Hair, Black, Babin, and Anderson (2010), indicates the existence of a well-defined factor structure. Table 2 shows the average values of the scales used and their Cronbach's alpha values. All these values exceed the cutoff value of 0.60, so the scales present very good reliability (Hair et al., 2010).

6.4. Structural Equation Modeling (SEM) Analysis

The conceptual model of Figure 3 that represents the hypothesized relationships posited in the current study was estimated via SEM using Stata 16 software (StataCorp, 2019). Due to problems of normality in the data, the present study used the Satorra-Bentler adjustment option, which generates fit indices, standard errors, and p-values robust to nonnormality. Table 3 presents the fit indices of the model posed in Figure 3, which will be called the initial model or M1. The present study used the comparative fit index (CFI) and root mean square error of approximation (RMSEA) as indices to evaluate the model fit; these indices are much less sensitive than the chi-square (X^2) to the sample size (Cheung & Rensvold, 2002; Lin & Hsieh, 2006). For models such as the present one, with a sample size of 504 individuals and with 19 observed variables, Hair et al. (2010) suggested that

CFI values higher than 0.92 and RMSEA values less than 0.07 indicate an appropriate model fit. As shown in Table 3, the CFI and RMSEA indices of the M1 model (both the regular values and those adjusted by the Satorra-Bentler method) are within the indicated ranges, signaling that the model has a good fit.

Once it was verified that the M1 model had an appropriate fit, the next step was to verify the study hypotheses. As shown in Table 4, most of the model's paths were significant and in the expected direction. In this way, hypothesis 1 (positive influence of referent network size on perceived usefulness), hypothesis 2 (positive effect of perceived complementarity on perceived usefulness), hypothesis 4 (positive influence of perceived ease of use on the tendency to use WhatsApp), and hypothesis 5 (positive effect of perceived usefulness on the tendency to use WhatsApp) were supported. However, hypothesis 3 (positive effect of perceived ease of use on perceived usefulness) was not fully supported, as the respective path was only marginally significant ($p=0.068$).

Figure 4 displays the standardized results of the WhatsApp usage M1 model. As shown, perceived usefulness has a strong effect on the tendency to use WhatsApp, and this influence is greater than that of perceived ease of use, which has only a moderate effect. Interestingly, with regard to perceived usefulness, referent network size has a strong effect on the former. This is a more significant effect than that of perceived complementarity, which has only a moderate effect.

6.4. Supplementary Analysis: Comparison of Nested Models

Given that hypothesis 3—that is, the effect of perceived ease of use on perceived usefulness—did not receive full support, the authors decided to perform a supplementary analysis. In this analysis, the initial model (M_1) was compared with an alternative nested model (M_0) in which the path corresponding to hypothesis 3 was eliminated.

The present study acknowledged that when comparing nested models, chi-square (X^2) is the preferred index, in the form of chi-square variation or ΔX^2 (Keith, 2015). On the other hand, given the nonnormality of the data in the current study, it was more appropriate to use the Satorra-Bentler chi-square (S-B X^2).

Table 1*Characteristics of the Samples Used (N = 504)*

Variable	%
Gender	
Women	52.0%
Men	48.0%
Age (years)	
Younger than 25	20.8%
25–34	24.6%
35–44	23.6%
45–54	17.7%
55 and above	13.3%
Per capita monthly household income	
Less than \$150	5.2%
\$150–\$349	48.0%
\$350–\$549	25.2%
\$550–\$749	11.3%
\$750 or more	10.3%
Maximum educational level attained	
Incomplete secondary level or less	6.9%
Complete secondary level	39.9%
Incomplete university level	21.4%
Complete university level	31.7%
Occupation	
Administrative employee/independent Professional/business owner	60.1%
Homemaker, retired, or unemployed	17.3%
Manual worker	12.7%
Student	9.9%

Table 2*Means and Cronbach's Alpha Coefficients of the Scales Used (N = 504)*

	Mean (SD)	Cronbach's alpha
Referent network size (RNS)	4.50 (0.61)	0.73
Perceived complementarity (PC)	3.72 (0.71)	0.75
Perceived usefulness (PU)	4.14 (0.69)	0.79
Perceived ease of use (PEU)	3.90 (0.50)	0.77
Use of WhatsApp (UW)	3.32 (0.79)	0.80

Table 3
Model Fit Indices for the Initial Model (M₁)

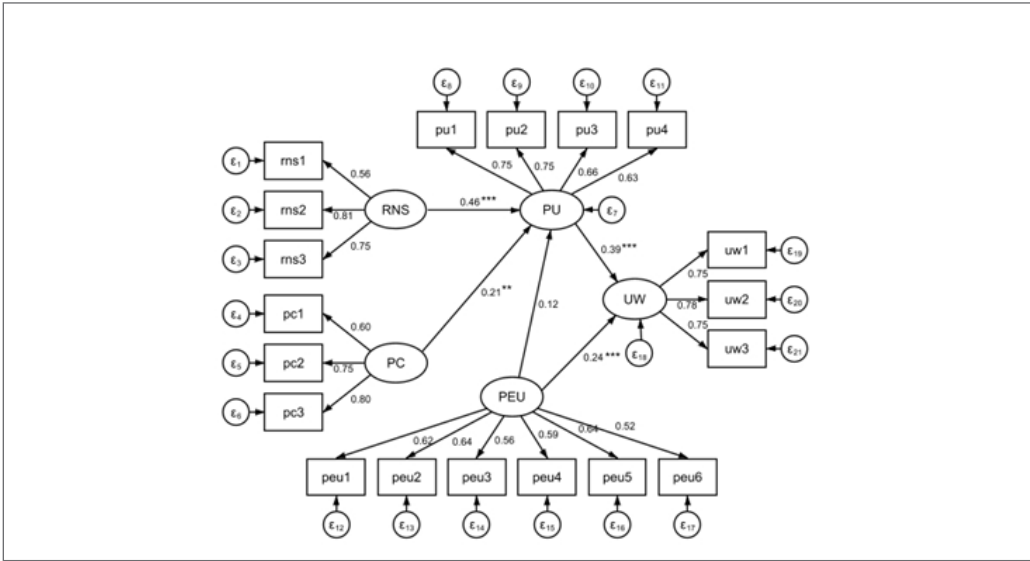
	X ²	df	Sig	CFI	RMSEA
Model values	320.761	147	p < 0.001	0.936	0.048
Satorra-Bentler values	263.910	147	p < 0.001	0.946	0.040

Table 4
Estimated Path Coefficients for the Initial Model (M₁)

Hypotheses	Path	Unstandardized coefficient (S-B SE)	Support for the hypothesis
H1	RNS → PU	0.62(0.10)***	Yes
H2	PC → PU	0.23(0.07)**	Yes
H3	PEU → PU	0.15(0.09)	No
H4	PEU → UW	0.36(0.07)***	Yes
H5	PU → UW	0.45(0.07)***	Yes

Note: *p < 0.05, ** p < 0.01, *** p < 0.001
S-B SE= Satorra-Bentler standard error; RNS= Referent network size; PC= Perceived complementarity; PU= Perceived usefulness; PEU= Perceived ease of use; UW= Use of WhatsApp

Figure 4
Standardized Results for the Initial Model (M₁)



Note: * p < 0.05, ** p < 0.01, *** p < 0.001
RNS= Referent network size; PC= Perceived complementarity; PU= Perceived usefulness; PEU= Perceived ease of use; UW= Use of WhatsApp

Table 5*Comparison of Model Fit Regarding WhatsApp Use*

	Initial model (M1)	Nested model (M_o) (without path PEU \rightarrow PU)
Chi-square value (T)	320.761	325.566
Satorra-Bentler chi-square value (\bar{T})	263.910	267.417
Degrees of freedom (r)	147	148

However, the Satorra-Bentler chi-square variation ($\Delta S-B X^2$) does not have a chi-square distribution (Satorra & Bentler, 2010). Therefore, the current study used the procedure suggested by Satorra and Bentler (2010) to calculate a Satorra-Bentler scaled chi-square difference test (\bar{T}_d) applied to nested models. Table 5 presents the necessary data for this calculation using the symbology employed by these authors.

Applying the procedure of the aforementioned authors, first, the values of scaling correction (\hat{c}) were estimated based on equation 1 for the nested model (M_o) (model without the path PEU \rightarrow PU) and on equation 2 for the initial model or M_i :

$$\hat{c}_0 = T_0 / \bar{T}_0 \quad (1)$$

$$\hat{c}_1 = T_1 / \bar{T}_1 \quad (1)$$

and $\hat{c}_0 = 325.566 / 267.417 = 1.217$ and $\hat{c}_1 = 320.761 / 263.910 = 1.215$ were obtained.

Then, the scaling factor (\hat{c}_d) was calculated with equation 3:

$$\hat{c}_d = (r_0 \hat{c}_0 - r_1 \hat{c}_1) / (r_0 - r_1) \quad (3)$$

obtaining that $\hat{c}_d = [148(1.217) - 147(1.215)] / (148 - 147) = 1.511$.

Finally, the statistical Satorra-Bentler scaled chi-square difference test (\bar{T}_d) was calculated with equation 4:

$$\bar{T}_d = (T_0 - T_1) / \hat{c}_d \quad (4)$$

In this way, $\bar{T}_d = (325.566 - 320.761) / 1.511 = 3.180$ was obtained.

This value of 3.180 with one degree of freedom (the difference in the degrees of freedom of the two models) in a X^2 distribution was not significant ($p = 0.075$). That is, no significant difference in the fit of the two models was found, so the initial model M_i (less parsimonious) had to be rejected in favor of the nested model M_o , which is more parsimonious (the model that does not include the path PEU \rightarrow PU). Table 6 presents the fit indices for the M_o model, and based on these values, the model fits very well. Table 7 shows that all the model paths were significant and in the expected direction. Additionally, Figure 5 displays the standardized results of the M_o model, revealing only small changes in the values of the path coefficients relative to the values obtained in the M_i model.

6. Discussion, Implications, and Limitations

The current mixed method study generated two fundamental models. One of them was qualitative, and

Table 6*Model Fit Indices for the Nested Model (M_o)*

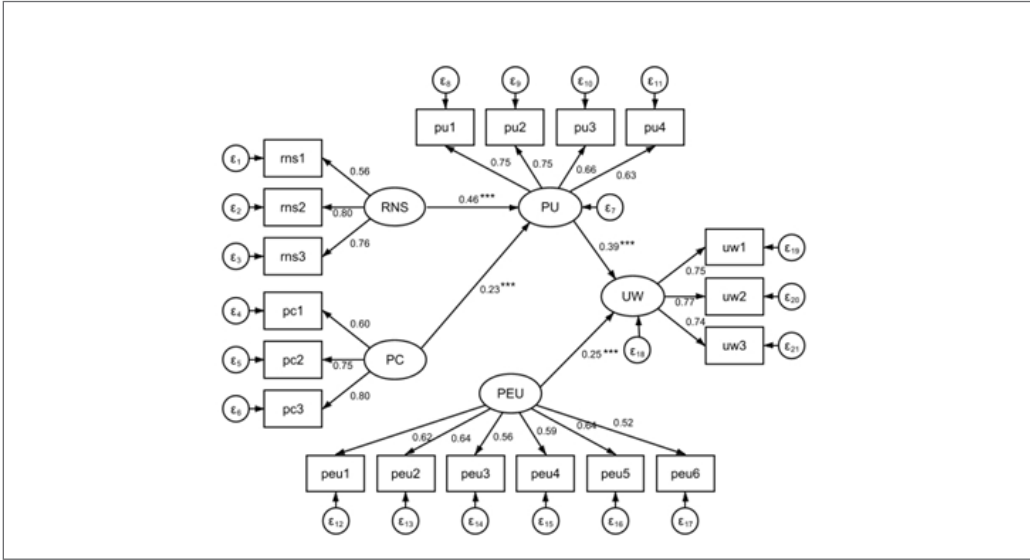
	X^2	df	Sig	CFI	RMSEA
Model values	325.566	148	$p < 0.001$	0.935	0.049
Satorra-Bentler values	267.417	148	$p < 0.001$	0.945	0.040

Table 7
Estimated Path Coefficients for the Nested Model of WhatsApp Use (M_9)

Path	Unstandardized coefficient (S-B SE)
RNS → PU	0.63(0.10)***
PC → PU	0.26(0.07)***
PEU → PU	0.38(0.07)***
PEU → UW	0.45(0.07)***
PU → UW	0.45(0.07)***

Note: *p < 0.05, ** p < 0.01, *** p < 0.001
S-B SE= Satorra-Bentler standard error; RNS= Referent network size; PC= Perceived complementarity; PU= Perceived usefulness; PEU= Perceived ease of use; UW= Use of WhatsApp

Figure 5
Standardized Results for the Nested Model (M_9)



Note: *p < 0.05, ** p < 0.01, *** p < 0.001
RNS= Referent network size; PC= Perceived complementarity; PU= Perceived usefulness; PEU= Perceived ease of use; UW= Use of WhatsApp

the central category that made it possible to unravel the use of WhatsApp was the perception of the utility of WhatsApp. Three categories contributed to this perception: having many known users (on WhatsApp), having many tools (on WhatsApp), and being easy to use. In turn, the perceived utility of WhatsApp led the interviewees to use it. The quantitative phase of the current study confirmed, by means of SEM, a model derived from the qualitative phase and a literature review. In this model, perceived usefulness and perceived ease of use were the two factors with a positive effect on (drivers of) the tendency to use WhatsApp. Additionally, two exogenous variables, referent network size and perceived complementarity, influenced perceived usefulness positively.

With the results presented, this study supports some previous study findings (Lin & Bhattacharjee, 2008; Zhou & Lu, 2011) indicating that referent network size and perceived complementarity are key benefits for MIM users. However, the present study also refines the prediction model for the use of WhatsApp (and MIM) by eliminating the redundancy of constructs that systematize the benefits of the application and by including its perceived ease of use as a key factor. The importance of perceived ease of use was detected in the qualitative phase of the current study. With the inclusion of this construct, the model obtained reflects, to a large extent, the structure of the TAM (Davis, 1989), and therefore, the model proposed in the current study is demonstrated as a specific TAM for MIM environments.

It is striking that the path from perceived ease of use to perceived usefulness has not been significant. However, given that it has been marginally significant, this result must be analyzed with caution. Because the country/culture is considered a moderator of the relationships of the TAM (e.g., Blut et al., 2016; McCoy, Galletta, & King, 2007; Schepers & Wetzels, 2007), future studies could verify the proposed model in other cultures, particularly the stability of the mentioned path.

Notably, in the present case, the benefits-linked construct (perceived usefulness) exerted a more important effect on the tendency to use WhatsApp than that linked to perceived ease of use. This hierarchy of importance was originally raised by Davis (1989) for the TAM. However, observing the great differ-

ence in the effects, one may consider the existence of the effect of the country's culture¹. Ecuador has a particularly high score on the collectivism dimension, which is related to the construction of solid ties and the importance of group membership. Although culture does not have important direct effects on the use of MIM (Cruz-Cárdenas et al., 2019b), it could show substantial moderating effects. Therefore, the incorporation of cultural dimensions such as collectivism in a moderating role would be recommended for future studies that develop models for MIM use.

Along the same lines of recommendations for future studies and regarding the incorporation of additional variables, along with culture, consumer satisfaction with MIM shows great potential. Previous studies show the strong relationship between consumer satisfaction with the use of services and with consumer loyalty (Khudhair et al., 2019). Therefore, customer satisfaction should be included as a predictor with a direct influence.

The results of this study also have implications for the practices of MIM-related companies and organizations and for developers. The results of the quantitative phase established that the main determinant of consumers' tendency to use MIM is its perceived usefulness. Furthermore, determinants of this perceived usefulness were the user network (referent network size) and the available tools and services (perceived complementarity). Therefore, these two determinants should be an area of focus for companies interested in increasing MIM adoption and use. For the construction of a user network, particularly for new MIM applications, the logic to follow is similar to that recommended for the dissemination of innovations and consists of identifying opinion leaders (not only on a large scale but also on a local scale) and then expanding through them (Schiffman & Wisenblit, 2015). To expand the benefits available, the continuous development of new tools and resources (e.g., emojis, gifts, stickers) is clearly necessary. However, it also becomes essential to encourage consumers to cocreate value (Anker et al., 2015) by creating MIM resources (stickers, gifs, screenshots, etc.) and sharing these resources and MIM practices with others.

According to the results of the present investigation, the ease of use of MIM is also an important predictor of the tendency of consumers to use MIM.

Hence, it must be recognized that a disorganized increase in MIM tools and resources to increase perceived usefulness can harm its ease of use (Cruz-Cárdenas et al., 2019a). Therefore, a hierarchy of MIM tools is important and can be achieved in two ways. One is through consumer self-management, in which a consumer organizes his or her MIM tools and resources. Another way (less developed in MIM than in other applications) would involve the use of artificial intelligence (predictive algorithms) that suggests to users the tools/resources they should use based on what they usually use in similar conditions.

A model such as that proposed in the current study has good opportunities to be extended to other environments for use with technologies and applications that are intensive in the generation of network externalities, such as social networks in the style of the professional network LinkedIn. Therefore, future research could examine the tendency of individuals to use these social networks. However, the application of the concept of perceived usefulness would be different. In contrast with MIM users, people on LinkedIn seek to increase their exposure and extend their network of contacts beyond their initial referent network size.

Although the current study presents a very important strength with its mixed method approach, it also has limitations. One is common to other studies conducted in a single country. As mentioned above, the country/cultural setting of the study of behaviors regarding technology use has been identified as moderating the relationships researched, underestimating them in some cases and overestimating them in others (McCoy et al., 2007; Schepers & Wetzels, 2007).

7. Conclusion

MIM is one of the most influential areas of technology and application use in people's lives. The authors of the current study, through a mixed method approach, sought to understand and establish the factors that determine the tendency to use the leading MIM application, WhatsApp, in a developing country. The mixed method approach allowed the phenomenon studied to be understood both deeply and broadly. The final model obtained for the tendency to use WhatsApp contains perceived usefulness and perceived ease of use as central constructs and is thus similar to the TAM

Footnotes

¹The topic of the possible effect of culture was suggested by one of the reviewers of this article. The authors are grateful for this suggestion.

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Appendices

1. Appendix 1

Guide to Individual In-Depth Interviews

1.1. Introduction

Welcome the interviewee. Explain to the interviewee the nature of the research project, the rules of the interview, and their rights, and if they agree, ask them to sign the informed consent form.

1.2. General Approach

Ask the interviewee to talk about himself or herself, his or her family and social environment, his or her physical environment (home), his or her occupation, and his or her hobbies.

1.3. First Theme: Digital Behavior of the Interviewee

Ask the interviewee about the role that he or she thinks technology plays in people's lives. Then, ask him or her about his or her digital behavior on a typical day.

1.4. Second Theme: Mobile Instant Messaging (WhatsApp) Usage Behavior

Ask the interviewee for his or her general opinion of WhatsApp. Ask him or her to describe how he or she started using WhatsApp. Delve into the way he or she uses WhatsApp (ask him or her to check his or her smartphone). Ask him or her for the main reasons he or she uses WhatsApp. Delve into the benefits experienced.

1.5. Concluding the Interview

Ask the interviewee to take general stock of what was said in the interview and ask if he or she has any additional ideas or thoughts that have not been talked about. Provide the interviewee with the reward, thank him or her for the valuable contribution, and wish him or her a good day.

2. Appendix 2

2.1. Scales Used

Referent network size (adapted from Lin & Bhattacharjee, 2008 and Zhou & Lu, 2011) (1 = strongly disagree to 5 = strongly agree).

rns1: Most of my family and relatives are already using WhatsApp.

rns2: Most of my friends are already using WhatsApp.

rns3: Most of my coworkers/study partners are already using WhatsApp.

Perceived complementarity (adapted from Lin & Bhattacharjee, 2008 and Zhou & Lu, 2011) (1 = strongly disagree to 5 = strongly agree).

pc1: A wide range of tools and functions are available in WhatsApp.

pc2: A wide range of emojis, gifts, etc. are available in WhatsApp.

pc3: A wide range of support tools like those to attach files and documents, share images and videos, share locations, etc. are available in WhatsApp.

Perceived usefulness (adapted from Venkatesh & Davis, 1996) (1 = strongly disagree to 5 = strongly agree).

pu1: Using WhatsApp makes me more efficient when I have to communicate with other people.

pu2: Using WhatsApp helps me to communicate immediately with other people.

pu3: Using WhatsApp allows me to have clearer and more direct communication with other people.

pu4: I find WhatsApp very useful in my daily life.

Perceived ease of use (adapted from Davis, 1989) (1 = strongly disagree to 5 = strongly agree).

peu1: Learning to operate WhatsApp was easy for me.

peu2: I find it easy to get WhatsApp to do what I want it to do.

peu3: My interaction with WhatsApp is clear and understandable.

peu4: I find WhatsApp to be flexible to interact with.

peu5: It would be easy for me to become skilled at using WhatsApp.

peu6: I find WhatsApp easy to use.

Tendency to use WhatsApp (adapted from Cruz-Cárdenas, Zabelina, 2019) (1 = strongly disagree to 5 = strongly agree).

uw1: Communicating by WhatsApp consumes a large amount of my time.

uw2: If I have to choose how to communicate with someone, WhatsApp is always my first choice.

uw3: If I calculate the time I dedicate to each of the activities I do on a typical day, WhatsApp takes up a good part of that time.