An empirical study of the existence, relatedness, and growth (ERG) theory in consumer’s selection of mobile value-added services

Cheng-Liang Yang1*, Mark Hwang2 and Ya-Chien Chen1

1Department of Information Management, Tatung University, Taipei, 10452, Taiwan.  
2Business Information Systems, Central Michigan University, Mount Pleasant, Michigan, 48859, USA.

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This study utilized Alderfer’s existence, relatedness, and growth (ERG) theory of human needs as the basic framework to investigate consumer satisfaction and desires when choosing mobile value-added services. A web-based survey was conducted to collect data on user characteristics and to validate the ERG theory. Results showed that existing mobile value-added services could be classified into the three need categories of ERG: the need for existence, relatedness, and growth. The results also partially supported the theory, that is, the satisfaction aspect of the ERG theory was validated but not the frustration aspect. Specifically, when users were satisfied with a service, they had a greater desire for services that addressed either the same need or higher order needs. Contrary to the predictions of the ERG theory, frustration with a service did not lead to a greater desire for services that addressed either the same need or lower order needs. Implications for service providers and researchers were discussed.

Key words: ERG theory, Maslow’s theory of needs, consumer needs, marketing strategy, consumer buying behavior, mobile commerce, mobile value-added services.

INTRODUCTION

With the rapid development of mobile telecommunication technology and wireless networks, new technologies and applications are emerging daily. In the meantime, the telecom industry has become a highly competitive market. In Taiwan for instance, telecom carriers are continually releasing 3G mobile services. In addition, the Taiwan government is about to activate the WiMAX services in the near future, which is expected to help bring prosperity to the economy with the new mobile services. Therefore, mobile telecom services are no longer just simple voice message services. Besides improved call quality, users can access internet resources through mobile devices such as smart phones and PDAs. The diversity of applications and services developed has been greatly enriched.

Mobile value-added services are diverse services provided by telecom companies based on traditional telecom networks. The characteristics of these services include ubiquity, accessibility, security, convenience, localization, instant connectivity, personalization and more (Müller-Veerse, 2000). Numerous services such as emergency rescue, mobile banking, multimedia and entertainment, chat, mobile assistant, and e-books are available to fulfill different types of needs of the consumers. Moreover, with the innovation and development of telecom technology and wireless networks, telecom companies are able to provide greater bandwidth to process these services. Therefore, mobile value-added services are expected to become new commercial opportunities for the telecomunication business with tremendous potential. As new services are released, successfully winning the market and creating positive experiences for the consumers in order to effectively increase profits and to sustain growth are the main concerns of the service providers.

Research interest in human needs originated from psychology, in which factors that influence individual behavior are explained. Human need is the driving force for consumer behavior and different types of human needs motivate consumer behavior differently (Maslow,
When certain needs require fulfillment, in order to maintain the balance of all needs, the consumer would strive for the satisfaction of these needs to prevent tension and suffering caused by deficiency. Therefore, when it comes to making a purchase decision, if the deficiency of needs occurred for any reason, the consumer would likely long for the item that could fulfill his or her needs. When the need is important enough, the desire for the item would strengthen and drive the consumer towards making the purchase. Consumer needs refer to the motive in making purchase decisions for certain goods. Via an internal guidance process, it profoundly influences the buying behavior. From the marketing's perspective therefore, the only way to understand consumer buying behavior is to comprehend consumer motivation and consumer needs in order to effectively draw up the marketing strategy (Kotler, 2000).

The model of supply and demand for consumer goods has changed. The consumer has changed from being passively accepting the available goods and services to actively making the demands to fulfill their true desires; hence, consumer-orientation is going to be the key in winning, in the competitive market (Woodruff, 1997). Within the value chain of supply and demand, catering to individuals’ pleasures and achieving satisfaction by fulfilling their needs are of great importance to the long-term success of businesses. Motivation could cause certain behavior, which will persist until the needs are fulfilled. This effect is the focus of this study of mobile value-added services. Specifically, we seek to understand an individual’s choices of different services by looking at his or her needs and desires. In short, this study investigates consumers’ needs and desires for mobile value-added services, based on theories of human needs.

Mobile value-added services evolved from traditional e-commerce applications. With substantial number of industries involved and considerable output values, the market prospect is buoyant (Barnes, 2002). Customer satisfaction is the key toward winning in this competitive market. However, early research on mobile value-added services focused primarily on technology development and applications (Anckar and D’Incau, 2002; Horn et al., 2002; Kuo and Chen, 2006; Sun et al., 2006; Turel, 2006). In recent years, researchers have broadened the scope to include other factors such as confidence (Wong and Hsu, 2008), social influence (Lu et al., 2008), and use context (Mallat et al., 2009). However, most research to date concerns factors affecting the adoption of mobile value-added service by consumers. There is a need to examine usage patterns post adoption (Lee et al., 2009).

Another gap in the literature is the study of the consumer’s selection of mobile value-added services based on theories of human needs. Common theories on human needs include manifest needs theory (Murray, 1938), need hierarchy theory (Maslow, 1954), the ERG theory (Alderfer, 1969), and the three needs theory (McClelland, 1961). The ERG Theory (Alderfer, 1969) is an extension of Maslow’s hierarchy of needs. The proposed categories of needs are similar in both theories; however, Maslow was unable to establish empirical evidence and most of the studies were not able to validate his theory (Hall and Nougaim, 1968; Korman et al., 1997; Lawler and Suttle, 1972; Rauschenberger et al., 1980). Contrarily to Maslow’s need hierarchy theory, the ERG theory does not assume that the satisfaction of lower order needs is required before pursuing higher order needs (Robbins and Judge, 2008). Since Alderfer’s theory covers most of the human needs well (Au et al., 2008), it is used as the theoretical basis of human needs in this study. Most of the prior research studies using the ERG theory are related to job satisfaction and job value (for example, Arnold and Boshoff, 2002; Borg and Braun, 1996; Gibson and Teasley, 1973; Tuzzolino and Armandi, 1981). Our study is a first attempt at explaining human behavior (selection of mobile value-added services), using the ERG theory.

There are numerous types of mobile value-added services; therefore, it is crucial to categorize them and see where they belong in the need categories of the ERG theory. Once the categorization of the services is completed, the existence of hierarchical relationships between the needs and desires for the services can be verified. To summarize, the two objectives of this study are:

1. To categorize, according to the three categories of needs of the ERG theory, various types of value-added services provided by telecom companies.
2. To validate the ERG theory using empirical data of the consumer’s selections of mobile value-added services.

**LITERATURE REVIEW**

**ERG theory**

Maslow proposed the hierarchy of human needs in five levels of basic needs as, physiological needs, safety needs, needs for love, affection and belonging, needs for esteem, and needs for self-actualization. Alderfer (1969) expanded Maslow’s basic needs and refined them into existence needs, relatedness needs, and growth needs. Alderfer proposed the ERG theory based on results of empirical studies to explain the relationship between satisfaction of needs and human desires. His theory was backed by further empirical study (Robbins and Judge, 2008; Schneider and Alderfer, 1973). The three needs of Alderfer, existence needs, relatedness needs, and growth needs are explained further.

**Existence needs**

Existence needs include various forms of safety, physiological and material needs. Safety needs mainly refer to the prevention from fear, anxiety, threat, danger, tension, and so on. Physiological needs refer to an individual’s...
pursuit of satisfaction at the vitality level, such as leisure, exercise, sleep. Material needs refer to resources required for an individual’s living, including food and clothing.

**Relatedness needs**

Relatedness needs include senses of security, belonging, and respect. Sense of security involves the mutual trust of humanity. Sense of belonging refers to prevention from all forms of suffering, such as isolation, loneliness and distance. People normally wish to be accepted and become members of a group. The needs for belongingness include love given to others or caring accepted from others. Sense of respect simply means feeling of respect from others, such as popularity, social status, superiority, importance and compliment. Such form of need gives people value to their existence.

**Growth needs**

Growth needs involve needs for self esteem and self actualization. The need for self esteem refers to self-productive effects such as the ability to pursue, to seek knowledge, to achieve, to control, to build confidence, to be independent and to feel competent. Self actualization refers to self accomplishments including achieving an individual’s goals and developing his or her personality. The abilities to realize one’s potentials and to support the growth of others are also included.

**Mobile value-added services**

Mobile value-added service, as defined in this study, are “services, excluding voice messaging, commercially provided by telecom carriers via mobile devices to bring valuable services to their users.” Currently, mobile value-added services provided by major telecom companies in Taiwan are the “emome” service of Chunghwa Telecom Co. (CHT), “Catch” of Taiwan Mobile Co. (TWM), “i-mode” of Far Eastone Telecommunications Co. (FET), and “Qma” of Asia Pacific Telecom Co. (APT).

The Institute for Information Industry of Taiwan, in 2006, categorized these services according to their purposes into four groups: “Mobile Telecom Service”, “Mobile Entertainment Service”, “Mobile Information Services”, and “Mobile Commercial Services”.

**Mobile telecom service**: Provide end-user instant messaging services such as SMS, MMS, Instant Message (IM), E-mail, and others.

**Mobile entertainment service**: Provide end-user entertaining applications such as ring-tone, images, multimedia and games.

**Mobile information services**: Provide end-user real-time information such as news, weather, stocks, road-condition, parking inquiry, pocket dictionary and so on.

**Mobile commercial services**: Provide end-user financial and commercial services such as mobile shopping, mobile banking, mobile ticketing, mobile trade, and others.

These and other similar schemes classify mobile value-added services based on their functionality. However, a classification based on human needs will be more useful for understanding consumer behavior. Our scheme based on the ERG theory is presented in further discussion.

**Categorization and hypothesis**

The mobile value-added services in this study are chosen according to categories of needs presented earlier. They are arranged into categories of existence needs, relatedness needs and growth needs. Existence needs include the desire for safety and materials. Thus, this study has arranged the services corresponding to existence needs into two categories: “emergency rescue service” and “transaction/shopping services”. Relatedness needs refer to people's desire to maintain interpersonal relationships, such as the acts of sharing and interaction with others to earn their interest and respect. Therefore, this study has arranged the services corresponding to relatedness needs into two categories: “mobile telecom service” and “mobile entertainment service”. Growth needs refer to the desire for self actualization, such as the ability to grow and to publicize personal achievements. Therefore, this study has arranged the services corresponding to growth needs into the category “mobile information service”. The categories of needs and services are listed in Table 1.

Alderfer (1969) made seven propositions about the relationships between human needs and desires and they are presented thus:

i. The less existence needs are satisfied, the more they will be desired.

ii. The less relatedness needs are satisfied, the more existence needs will be desired.

iii. The more existence needs are satisfied, the more relatedness needs will be desired.

iv. The less relatedness needs are satisfied, the more they will be desired.

v. The less growth needs are satisfied, the more relatedness needs will be desired.

vi. The more relatedness needs are satisfied, the more growth needs will be desired.

vii. The more growth needs are satisfied, the more they will be desired.

These seven propositions can also be shown in a
Table 1. Categorization of mobile value-added services.

<table>
<thead>
<tr>
<th>Categories of needs</th>
<th>Mobile value-added services</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mobile value-added services for existence needs</td>
<td>Emergency rescue service</td>
</tr>
<tr>
<td></td>
<td>Emergency roadside services</td>
</tr>
<tr>
<td></td>
<td>Emergency medical services</td>
</tr>
<tr>
<td></td>
<td>Transaction/shopping services</td>
</tr>
<tr>
<td></td>
<td>Mobile shopping</td>
</tr>
<tr>
<td></td>
<td>Mobile stock trading</td>
</tr>
<tr>
<td></td>
<td>Electronic wallet</td>
</tr>
<tr>
<td></td>
<td>Personal finance/investment</td>
</tr>
<tr>
<td></td>
<td>Mobile banking</td>
</tr>
<tr>
<td></td>
<td>Mobile telecom service</td>
</tr>
<tr>
<td></td>
<td>SMS</td>
</tr>
<tr>
<td></td>
<td>E-mail</td>
</tr>
<tr>
<td></td>
<td>News</td>
</tr>
<tr>
<td>Mobile value-added services for relatedness needs</td>
<td>Meet friends/chat services</td>
</tr>
<tr>
<td></td>
<td>Mobile entertainment service</td>
</tr>
<tr>
<td></td>
<td>Psychological tests</td>
</tr>
<tr>
<td></td>
<td>Online games</td>
</tr>
<tr>
<td></td>
<td>Multimedia</td>
</tr>
<tr>
<td>Mobile value-added services for growth needs</td>
<td>Mobile information service</td>
</tr>
<tr>
<td></td>
<td>Mobile assistant</td>
</tr>
<tr>
<td></td>
<td>Online learning</td>
</tr>
<tr>
<td></td>
<td>Online dictionary</td>
</tr>
<tr>
<td></td>
<td>Job information</td>
</tr>
<tr>
<td></td>
<td>Online translation</td>
</tr>
<tr>
<td></td>
<td>Training information</td>
</tr>
<tr>
<td></td>
<td>E-books</td>
</tr>
</tbody>
</table>

Figure 1. ERG theory in diagrammatic form (Alderfer, 1969).

Any desire can be affected by several types of satisfaction. Any satisfaction in turn, can affect more than one type of desire (Alderfer, 1969). The seven propositions can be
arranged into four categories thus:

**Simple frustration**

This group includes propositions 1 and 4, which specify that satisfaction and desires at the same level are negatively correlated. This happens when an individual is unsatisfied with a certain need and has thus intensified his or her desires for that particular need.

**Satisfaction progression**

Satisfaction progression includes propositions 3 and 6, which specify that satisfaction in lower order needs is positively correlated with higher order desires. In other words, once lower order needs are fulfilled, an individual will tend to progress toward higher order needs, thus intensifying the desire for higher order needs.

**Frustration regression**

This group includes propositions 2 and 5. While the previous two categories can be related to Maslow’s theory of human needs, this category is unique to Alderfer, which indicates that satisfaction in higher order needs is negatively correlated with lower order desires. Therefore, when frustration occurs with higher order needs, an individual would seek to fulfill lower order needs, thus intensifying the desire for lower order needs.

**Satisfaction strengthening**

This group includes only proposition 7, which states that the more growth needs are satisfied, the more they are desired.

Based on the seven propositions of the ERG theory, the following hypotheses are developed and shown in Figure 2 in this research for the selection of mobile value-added services.

H$_1$: When a consumer is choosing mobile value-added services, if existence needs are not satisfied, the more they will be desired.

H$_2$: When a consumer is choosing mobile value-added services, if relatedness needs are not satisfied, the more existence needs will be desired.

H$_3$: When a consumer is choosing mobile value-added services, if existence needs are satisfied, the more relatedness needs will be desired.

H$_4$: When a consumer is choosing mobile value-added services, if relatedness needs are not satisfied, the more they will be desired.
H₅: When a consumer is choosing mobile value-added services, if growth needs are not satisfied, the more relatedness needs will be desired.
H₆: When a consumer is choosing mobile value-added services, if relatedness needs are satisfied, the more growth needs will be desired.
H₇: When a consumer is choosing mobile value-added services, if growth needs are satisfied, the more they will be desired.

**METHODOLOGY**

The research subjects are those who have ever experienced the mobile value-added services. Because the subjects are unreach-able, and obtaining a sample through other means is impractical, we adopted a convenience sampling with internet survey (Zikmund et al., 2010). A web-based questionnaire (Appendix) was developed to survey end-users of mobile value-added services. Those who have no experiences of using these services will skip to the end of the questionnaire (Appendix Part 1, item 1). Links to questionnaire were placed at handheld information websites (SOGI: http://www.sogi.com.tw/) and BBS board (PTT/handheld related discussion boards). The questionnaire was designed such that all the questions must be answered. If unanswered questions were to occur, the system would remind the respondents and only fully completed surveys were sent back to the database. A program at the survey website would record the IP locations of computers used to complete the questionnaire to lower the chances of a respondent repeatedly filling out multiple surveys. Before the official questionnaire was released, 35 respondents were selected for a pre-test to ensure that the questions were well understood by the respondents and to make sure that mistakes such as vague wording and phrases or redundant questions were corrected.

Besides personal background information and usage data, respondents were asked to rate how desirable they would find a value-added service if another value-added service could (or could not) fulfill their need. Using a five point Likert scale, the responses were graded from 1 to 5 with 1 being “Very Low” and 5 being “Very High”. The mean response was compared with the mid-scale value of 3. If the differences were significant based on a t test, the value-added service was considered desirable and the hypothesis was supported.

SPSS 12.0 and LISREL 8.71 were used as the data analysis tool. The reliability of the questionnaire was measured using Cronbach's α. An α greater than 0.7 means the reliability measure of internal consistency is high between all items (Nunnally, 1978). The validity of the questionnaire was measured by confirmatory factor analysis (CFA). A two-index presentation strategy that includes SRMR and CFI is proposed to evaluate model fit (Hu and Bentler, 1999). As suggested by Hu and Bentler, if SRMR is equal to or less than 0.09, and CFI is equal to or greater than 0.95, it means that the model fit is acceptable. Convergent validity can be assessed by examining the factor loadings. A loading over 0.5 is considered significant (Hair et al., 1992).

**RESULTS**

Two hundred and fifty four internet users participated in the survey. Eighteen of these users had no experience with mobile value-added services and 24 users turned in invalid responses, leaving a valid sample of 212 users. Responses from these 212 users were used in subsequent analysis.

**Analysis of reliability and validity**

Reliability is an indicator of a measure’s internal consistency. A measure is reliable when different attempts at measuring something converge on the same result (Zikmund et al., 2010). Cronbach’s α coefficient indicates the degree of internal consistency or homogeneity among the items within the measurement. In the present study, the Cronbach’s α coefficient are above 0.73 for all factors, indicating a good reliability (Table 2). Validity is the accuracy of a measure or the extent to which a score truthfully represents a concept (Zikmund et al., 2010). Two indices, CFI and SRMR, are used for validity analysis. As shown in Table 2, except existence need frustration and growth need strengthening, all factors have high CFI values that are very close to or over the threshold value of 0.95. At the same time, their SRMR values are low and are very close to or below the threshold value of 0.09. Convergent validity is determined when different items are used to measure the same factor. Therefore, it was performed to make auxiliary assessment of the model’s validity. From Table 3, we can see that all items have a factor loading greater than or close

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**Table 2. Reliability and fit indices of each factor.**

<table>
<thead>
<tr>
<th>Category</th>
<th>Factor</th>
<th>Cronbach’s α</th>
<th>CFI</th>
<th>SRMR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Satisfaction progression</td>
<td>Existence need progression</td>
<td>0.807</td>
<td>0.94</td>
<td>0.060</td>
</tr>
<tr>
<td></td>
<td>Relatedness need progression</td>
<td>0.731</td>
<td>0.96</td>
<td>0.047</td>
</tr>
<tr>
<td>Frustration regression</td>
<td>Relatedness need progression</td>
<td>0.774</td>
<td>0.97</td>
<td>0.044</td>
</tr>
<tr>
<td></td>
<td>Growth need regression</td>
<td>0.840</td>
<td>0.98</td>
<td>0.037</td>
</tr>
<tr>
<td>Simple frustration</td>
<td>Existence need frustration</td>
<td>0.789</td>
<td>0.87</td>
<td>0.093</td>
</tr>
<tr>
<td></td>
<td>Relatedness need frustration</td>
<td>0.796</td>
<td>0.98</td>
<td>0.035</td>
</tr>
<tr>
<td>Satisfaction strengthening</td>
<td>Growth need strengthening</td>
<td>0.774</td>
<td>0.84</td>
<td>0.11</td>
</tr>
</tbody>
</table>
Table 3. Convergent validity of each factor.

<table>
<thead>
<tr>
<th>Category</th>
<th>Factor</th>
<th>Item</th>
<th>Factor loading</th>
</tr>
</thead>
<tbody>
<tr>
<td>Satisfaction</td>
<td>progression</td>
<td>2-1_1</td>
<td>0.53</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2-1_2</td>
<td>0.60</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2-1_3</td>
<td>0.57</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2-1_4</td>
<td>0.48</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2-1_5</td>
<td>0.59</td>
</tr>
<tr>
<td>Relatedness need</td>
<td>progression</td>
<td>2-2_1</td>
<td>0.41</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2-2_2</td>
<td>0.65</td>
</tr>
<tr>
<td>Frustration</td>
<td>regression</td>
<td>3-1_1</td>
<td>0.52</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3-1_2</td>
<td>0.73</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3-1_3</td>
<td>0.65</td>
</tr>
<tr>
<td>Relatedness need</td>
<td>regression</td>
<td>3-1_4</td>
<td>0.62</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3-1_5</td>
<td>0.69</td>
</tr>
<tr>
<td>Growth need</td>
<td>regression</td>
<td>3-2_1</td>
<td>0.69</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3-2_2</td>
<td>0.76</td>
</tr>
<tr>
<td>Existence need</td>
<td>frustration</td>
<td>4-1_1</td>
<td>0.49</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4-1_2</td>
<td>0.83</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4-1_3</td>
<td>0.54</td>
</tr>
<tr>
<td>Simple frustration</td>
<td></td>
<td>4-1_4</td>
<td>0.80</td>
</tr>
<tr>
<td>Relatedness need</td>
<td>frustration</td>
<td>4-1_5</td>
<td>0.54</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4-2_1</td>
<td>0.67</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4-2_2</td>
<td>0.74</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4-2_3</td>
<td>0.72</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4-2_4</td>
<td>0.52</td>
</tr>
<tr>
<td>Satisfaction</td>
<td>strengthening</td>
<td>5-1_1</td>
<td>0.88</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5-1_2</td>
<td>0.80</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5-1_3</td>
<td>0.47</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5-1_4</td>
<td>0.50</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5-1_5</td>
<td>0.42</td>
</tr>
</tbody>
</table>

to 0.5. Meanwhile, the t-tests for all factor loadings are strongly significant (all $p < 0.000$). Therefore, the goodness of fit for each model is well established, and the factors are also well measured by their corresponding items. In other words, the items in the questionnaire can be used as indicators to measure our seven factors relative to our seven hypotheses. A full description of the items in Table 3 is shown in Appendix.

**Descriptive statistic analysis: Respondents’ personal information**

Of the sample, 58% of the respondents were males and
Table 4. Mean and standard deviation of each aspect.

<table>
<thead>
<tr>
<th>Category</th>
<th>Factor (Corresponding Hypotheses)</th>
<th>Mean</th>
<th>Standard deviation</th>
<th>Coefficient of variation (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Satisfaction progression</td>
<td>Existence need progression (H₃)</td>
<td>3.25</td>
<td>0.65</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Relatedness need progression (H₆)</td>
<td>3.26</td>
<td>0.67</td>
<td>20.5</td>
</tr>
<tr>
<td>Frustration regression</td>
<td>Relatedness need regression (H₂)</td>
<td>2.95</td>
<td>0.75</td>
<td>25.4</td>
</tr>
<tr>
<td></td>
<td>Growth need regression (H₅)</td>
<td>2.98</td>
<td>0.80</td>
<td>27.6</td>
</tr>
<tr>
<td>Simple frustration</td>
<td>Existence need frustration (H₁)</td>
<td>2.97</td>
<td>0.79</td>
<td>26.6</td>
</tr>
<tr>
<td></td>
<td>Relatedness need frustration (H₄)</td>
<td>2.92</td>
<td>0.80</td>
<td>27.4</td>
</tr>
<tr>
<td>Satisfaction strengthening</td>
<td>Growth need strengthening (H₇)</td>
<td>3.43</td>
<td>0.67</td>
<td>19.5</td>
</tr>
</tbody>
</table>

42% were females. This shows that there are a moderately lower percentage of female users than male users in the mobile value-added services population. As for age, 82.1% of the sample was between 21 and 30 years old and only 0.9% was above 51. This reveals that most users of mobile value-added services are young adults. As for education background, 65.6% were at university levels and 30.7% were at graduate school level or above. This shows that over 90% of mobile value-added service users have education background at university level or above. As for occupation, 64.2% were students. This reveals that students constitute the most dominant group using mobile value-added services.

Descriptive statistic analysis: Usage of mobile value-added services

Within the sample, 57.1% of the respondents were using mobile value-added services from “emome” of CHT. As for years of usage, 31.1% of the sample fell between one and two years. The least portion of the sample with only 8.5% had been users from two to three years. As for frequency of using the services, 36% of the sample used the services once per month and 4.2% of the sample used the services every day. As for length of time per usage, 39% of the sample spent five to fifteen minutes per usage and only 0.9% of the sample spent from an hour to two hours per usage. As for fees, 53% of the sample spent under 100 NT dollars per month and 2.4% of the sample spent between 401 and 500 NT dollars or over 500 NT dollars per month.

Hypothesis examination

Table 4 displays the mean and standard deviation of each factor. As can be seen from Table 4, three of the seven factors had a mean over three and a small deviation (around one fifth of the mean), indicating a heightened desire for a particular need. Specifically, in the satisfaction progression category, when users are satisfied with an existence need, their desire for relatedness needs tend to increase. A similar progression can be observed when users are satisfied with a relatedness need. Finally, a satisfied growth need will tend to beget greater desire for more growth needs. T test results for these three factors are all strongly significant (p < 0.001), supporting the hypotheses (Table 5). The results for the other four factors are all non-significant.

DISCUSSION

This study finds that there are slightly more male users of mobile value-added services than female users. In addition, most of the users are university or graduate students with ages ranging from 21 to 30. This is expected as young people are more receptive to new technology and this could bring significant momentum to the growth of mobile value-added services in Taiwan. This finding is supported by a survey of digital divide in Taiwan conducted by the government, which showed that 51.6% of the age between 21 and 30, used mobile devices while surfing the web, making this age group the highest in this regard (Research, Development, and Evaluation Commission, Executive Yuan, Taiwan, 2009). Currently, the big three telecommunication carriers, CHT, TWM and FET, own the largest market share. However, the potential for both existing players and newcomers is great, given the immaturity of the market, as evidenced by the short history of usage, and the infrequent and short duration usage pattern found in our survey.

Three of the seven hypotheses were supported by our data. Even though the seven propositions of Alderfer (1969) can be classified into four categories (Table 4), they can also be put into just two groups: need satisfaction and need frustration. The first group concerns what
<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>t value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>$H_1$: When a consumer is choosing mobile value-added services, if existence needs are not satisfied, the more they will be desired</td>
<td>-0.486</td>
<td>0.627</td>
</tr>
<tr>
<td>$H_2$: When a consumer is choosing mobile value-added services, if relatedness needs are not satisfied, the more existence needs will be desired</td>
<td>-0.914</td>
<td>0.362</td>
</tr>
<tr>
<td>$H_3$: When a consumer is choosing mobile value-added services, if existence needs are satisfied, the more relatedness needs will be desired</td>
<td>5.781</td>
<td>0.000</td>
</tr>
<tr>
<td>$H_4$: When a consumer is choosing mobile value-added services, if relatedness needs are not satisfied, the more they will be desired</td>
<td>-1.309</td>
<td>0.192</td>
</tr>
<tr>
<td>$H_5$: When a consumer is choosing mobile value-added services, if growth needs are not satisfied, the more relatedness needs will be desired</td>
<td>-0.274</td>
<td>0.784</td>
</tr>
<tr>
<td>$H_6$: When a consumer is choosing mobile value-added services, if relatedness needs are satisfied, the more growth needs will be desired</td>
<td>5.659</td>
<td>0.000</td>
</tr>
<tr>
<td>$H_7$: When a consumer is choosing mobile value-added services, if growth needs are satisfied, the more they will be desired</td>
<td>9.283</td>
<td>0.000</td>
</tr>
</tbody>
</table>

what happens when a particular type of needs are satisfied. This group includes propositions 3, 6, and 7, which are validated in our survey of users of mobile value-added services. Specifically, when these users are satisfied with a service that addresses an existence need, they will tend to progress toward a service that addresses relatedness needs. A similar progression from a service that addresses a relatedness need to one that addresses a growth need is also observed. Since growth needs are the highest order needs, no progression is possible; instead, satisfaction only begets more desire for services that address growth needs. In short, user behavior is consistent with the predictions of the ERG theory when the need of the user is satisfied.

The support for $H_3$, $H_6$, and $H_7$ suggests that satisfied needs can motivate behavior toward a higher order need. According to Alderfer (1969), the three types of needs differ in concreteness; with existence needs being the most concrete and growth needs being the least concrete. Thus, in support of $H_3$, as an individual fulfills his or her existence needs (for example, mobile shopping), the desire for those needs will decrease and less energy will be spent to search for products or services that satisfy the same need. Consequently, more energy becomes available that will push the individual to pursue interpersonal issues or relatedness needs (for example, chat services). Similarly, in support of $H_6$, when an individual no longer lacks social support, he or she will have the energy to chase the ability of growing (for example, online learning). In support of $H_7$, growth needs are intrinsically satisfying; the more a person grows, the more he wants to grow (Alderfer, 1969). An individual will search for different channels such as e-books or online learning to continue to grow.

The second group of propositions concern what happens when the need of the user is unsatisfied. According to Alderfer (1969), the user will either regress toward a lower order need (propositions 2 and 5) or desire more of the same type of needs (propositions 1 and 4). When the user is unsatisfied or frustrated, he or she will move from a need that is less concrete to one that is more concrete, hence the regression from growth to relatedness and from relatedness to existence. Additionally, according to Alderfer (1969), needs at the same level are interchangeable. Thus, frustration with one need may simply cause greater desire for the same type of needs. These patterns of the ERG theory were not borne out in our data. While unexpected, these results are not totally surprising. First, after putting the ERG theory to the first empirical test, Alderfer (1969) observed that “simple frustration hypothesis (propositions 1 and 4) alone is not adequate to account for the relationship between satisfaction and desire”. In other words, while satisfaction with a product or service can cause the user to desire more of the same; frustration with the product or service can have the opposite effect. Second, frustration regression is a major tenant of the ERG theory and a key deviation from Maslow’s hierarchical theory. However, Alderfer’s (1969) own test shows that not all frustration regression hypotheses were supported. Frustration regression has also been questioned by other researchers (Rauschenberger et al., 1980; Scherf, 1974; 1976).

The nonsupport of the hypotheses of simple frustration
and frustration regression seems to indicate that needs at the same level (or at different levels) are not interchangeable. This is contradictory to Alderfer’s theory. It may be that each mobile value-added service is unique and therefore, one cannot really replace another. For example, an unsatisfied relatedness need caused by frustration with “chat service” cannot be compensated by using “mobile stock trading” to satisfy an existence need. The validity of the ERG theory in different product or service contexts may worth more study in the future.

Contribution of this study

This study provides valuable empirical data on the usage of mobile value-added services in Taiwan. According to our survey, most users are young people with slightly more males than females. They have not used the services for long and have not become heavy users yet. This represents great opportunities for the existing big three carriers as well as other companies eyeing this budding market. With deployment of expanded mobile networks and development of new applications, the market potential is huge. The challenge for the service providers is to have a good grasp of user behavior so that they are in a better position to cater to the needs of consumers. Our research is a first attempt at understanding consumers’ selections of mobile value-added services based on their needs and desires. Using the ERG theory, we were able to classify all services into categories that satisfy the consumer’s needs for existence, relatedness, or growth. This classification should help service providers better understand and position their offerings. For example, conventional classification schemes do not include a group for growth needs. However, as shown in this research, many of the existing services actually address the need for growth of the users. By understanding the underlying need addressed by each service, a service provider can better differentiate its offerings.

Another contribution of this research is the empirical test of the ERG theory in the context of mobile value-added services. The results partially support the theory. As predicted by the theory, satisfaction with a service leads to greater desire for services that address either the same need or higher order needs. This is valuable information to marketers looking to cross-promote their offerings. Contrary to the predictions of the ERG theory, frustration with a service does not lead to greater desire for services that address either the same need or lower order needs. This finding suggests that mobile value-added services are not interchangeable, and therefore, the service providers should plan the introduction of every service very carefully. A shotgun approach is not a good strategy because services are not interchangeable and thus a frustrating service can turn off the consumer very quickly. Freedom from deficiencies is the meaning of quality (Juran and Gryan, 1988). As competition in the industry heats up, quality should be emphasized in every service to meet customers’ needs (Parasuraman et al., 1988; Chiu and Lin, 2004). A service provider is advised to cultivate positive consumer experiences and avoid negative experiences at all costs. While this is probably true of consumers of all products and services, users of mobile value-added services are likely more tech savvy than the general population. Online customers often seek out information on products or companies and share their knowledge, experiences and opinions, both positive and negative (Hennig-Thurau et al., 2004), using electronic word-of-mouth or eWOM (Gelb and Sundaram, 2002). The possible moderating effect of eWOM on the need of mobile value-added service users warrants further investigation.

SUGGESTIONS FOR FUTURE RESEARCH

Mobile value-added services are highly personal services. Therefore, during the development of the services, one must focus not only on the technology, but also the consumer’s needs. The development must start with the consumer’s needs and then design services to fulfill those needs. The ERG theory provides a basic framework of reference, but how does one design a service to address each type of needs? What makes a service “better” than others in the same category? These are important questions worthy of further investigation.

Although our survey found that young people are the majority of mobile value-added services users, the results may not be representative of the whole population of the mobile services users because of the haphazard manner by which many of the respondents arrived at the survey website or because of self-selection bias. Nonetheless, this study can be viewed as an exploratory study. More precise survey may be conducted in the future with cooperation from telecommunication carriers.

The ERG theory proposes three basic need categories. As shown in this research however, not all services in the same need category are equal. For example, for existence needs, we further divided services into emergency rescue services and property management services. A similar division of services addressing relatedness needs was made. This by no means is the final classification. As more services become available, more sub-categories may emerge. It will be interesting to see if our results can be replicated when more services are offered. Another research stream can focus on subcategories of needs. One emergency rescue service is more likely interchangeable with another emergency rescue service than with a property management service, even though all of them presumably can satisfy existence needs. If that is the case, some of the need frustration propositions of the ERG theory may be valid.

It is also possible that some services can fall into more
than one category. Popular social networking websites such as Facebook and LinkedIn apparently serve the need for relatedness. However, they can also be used for career advancement purposes, and hence, satisfying the need for growth. It is conceivable that some mobile value-added services can also satisfy more than one need. More research on this type of services that span multiple categories is needed.

A related question is what factors impact user experience with mobile value-added services. Our results show that positive experience with a service, regardless of the need that it satisfies, leads to a greater desire for more services. But what causes a positive experience? Are there personal or contextual factors involved? We analyzed our data based on gender and education level but did not find any differences. Researchers have begun to address personal and social factors involved in the adoption of mobile commerce applications (Lu et al., 2008; Wong and Hsu, 2008). More research along this line will shed light on this important user experience question.

Further study can also be performed in different areas of APAC, such as Japan and Korea, where mobile value-added services are more developed. Results from cross-country comparison studies will benefit other areas as they roll out their own mobile value-added services. Finally, the ERG theory can be similarly applied to study consumer behavior for other products and services.

Conclusion

Advances in computing and communications technologies have led to the tremendous growth of mobile value-added services in the last decade, whose demand has been further fueled by the introduction of smart phones and tablet computers. As more services become available, a better framework is needed to classify them and to understand the factors that drive consumers’ decisions in their selection of particular services. This research represents a first step in developing such a framework that is based on a common theory of human needs. More research is needed to provide guidelines that will serve both the service providers and consumers more effectively.

REFERENCES


Scherf GW (1976). Interaction of relatedness need satisfaction and strengths of economic desires at different levels of education and

APPENDIX

Mobile value-added service questionnaire

**Part 1: Usage**

1. Have you ever used mobile value-added services before?
   - □ Yes □ No
   
   If you answered "No", please skip to the end!

2. Which value-added services have you used? (Multiple selections)
   - □ Chunghwa Telecom "emome"
   - □ Taiwan Mobile "catch"
   - □ Far EastTone Telecommunications "i-mode"
   - □ Asia Pacific Telecom "Qma"
   - □ Other, please specify:_______________

3. How long have you used value-added services?
   - □ < six months, □ six months to < 1 year □ 1 year to < 2 years
   - □ 2 years to < 3 years □ 3 years and above

4. How frequent do you use value-added services?
   - □ once in over a month □ once per month □ once per week □ once every 2 to 3 days □ every day

5. How long do you use mobile value-added services per usage?
   - □ < 5 min. □ 5 min. to < 15 min. □ 15 min. to < 30 min. □ 30 min. to < 1 h □ 1 h to < 2 h □ 2 h and over

6. What is your average spending per month on value-added services?
   - □ < 100 NTD □ 101 to 200 NTD □ 201 NTD to 300 NTD □ 301 NTD to 400 NTD □ 401 to 500 NTD □ 501 NTD and above

**Part 2: Satisfaction progression**

Existence needs progression factor:

1. If "Electronic Wallet" could fulfill your needs, how desirable would you find "Meet Friends/Chat Services"?
2. If "Emergency Roadside Services" could fulfill your needs, how desirable would you find "News"?
3. If "Mobile Banking" could fulfill your needs, how desirable would you find "Online Games"?
4. If "Mobile Shopping" could fulfill your needs, how desirable would you find "Mobile Assistant"?
5. If "Mobile Stock Trading" could fulfill your needs, how desirable would you find "Multimedia"?

Relatedness needs progression factor:

1. If "Meet Friends/Chat Services" could fulfill your needs, how desirable would you find "Online Dictionary"?
2. If "E-mail" could fulfill your needs, how desirable would you find "Online Learning"?
3. If "Multimedia" could fulfill your needs, how desirable would you find "Job Information"?
4. If "Psychological Tests" could fulfill your needs, how desirable would you find "E-Newspapers"?
5. If "News" could fulfill your needs, how desirable would you find "Mobile Assistant"?

**Part 3: Frustration regression**

Relatedness needs regression factor:

1. If "E-mail" could not fulfill your needs, how desirable would you find "Emergency Medical Services"?
2. If "SMS" could not fulfill your needs, how desirable would you find "Mobile Shopping"?
3. If "Meet Friends/Chat Services" could not fulfill your needs, how desirable would you find "Mobile Stock Trading"?
4. If "Psychological Tests" could not fulfill your needs, how desirable would you find "Investment Banking"?
5. If "Online Games" could not fulfill your needs, how desirable would you find "Electronic Wallet"?

Growth needs regression factor:

1. If "Mobile Assistant" could not fulfill your needs, how desirable would you find "Multimedia"?
2. If "Training Information" could not fulfill your needs, how desirable would you find "News"?
3. If "Online Translation" could not fulfill your needs, how desirable would you find "E-mail"?
4. If "Job Information" could not fulfill your needs, how desirable would you find "Psychological Tests"?
5. If "Online Learning" could not fulfill your needs, how desirable would you find "News"?

**Part 4: Simple frustration**

Existence needs frustration factor:

1. If "Emergency Medical Services" could not fulfill your needs, how desirable would you find "Mobile Assistant"?
2. If "Mobile Assistant" could not fulfill your needs, how desirable would you find "Mobile Stock Trading"?
3. If "Mobile Shopping" could not fulfill your needs, how desirable would you find "Online Games"?
4. If "Mobile Stock Trading" could not fulfill your needs, how desirable would you find "Electronic Wallet"?
3. If "Investment Banking" could not fulfill your needs, how desirable would you find "Mobile Banking"?
4. If "Mobile Banking" could not fulfill your needs, how desirable would you find "Emergency Medical Services"?
5. If "Mobile Shopping" could not fulfill your needs, how desirable would you find "Investment Banking"?

Relatedness needs frustration factor:

1. If "E-mail" could not fulfill your needs, how desirable would you find "Multimedia"?
2. If "Online Games" could not fulfill your needs, how desirable would you find "Multimedia"?
3. If "SMS" could not fulfill your needs, how desirable would you find "Meet Friends/Chat Services"?
4. If "Meet Friends/Chat Services" could not fulfill your needs, how desirable would you find "Psychological Tests"?
5. If "News" could not fulfill your needs, how desirable would you find "Online Games"?

Part 5: Satisfaction strengthening

Part 5-1: Growth needs strengthening factor

1. If "Online Translation" could fulfill your needs, how desirable would you find "Training Information"?
2. If "Mobile Secretary" could fulfill your needs, how desirable would you find "Training Information"?
3. If "Job Information" could fulfill your needs, how desirable would you find "Online Translation"?

4. If "Online Learning" could fulfill your needs, how desirable would you find "E-Newspapers"?
5. If "E-Newspapers" could fulfill your needs, how desirable would you find "Online Dictionary"?

Part 6: Respondent personal information

1. Gender:
   □ Male □ Female

2. Age:
   □ 20 and younger □ 21 to 30 □ 31 to 40 □ 41 to 50 □ 51 and older

3. Education:
   □ Junior high and below □ High school/vocational school □ University □ Graduate school

4. Occupation
   □ Finance □ Information Technology □ Engineering □ Manufacturing □ Education □ Government □ Student □ Other, please specify:__________________