Effects of Brand Image in the University Mobile Application to the User's Behavioral Response

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Abstract: This study is to investigate the effects of brands and content in a university mobile application (UAPP) on the cognitive, emotional, and behavioral responses of university students. The user's behavioral response framework is used to test the information and brand functions of UAPPs and develop a model for users' cognitions, emotions, and behaviors. The recipients were the first-year, second-year, and third-year students of University. A total of 457 valid samples are collected. Correlation analysis and regression analysis are adopted as the statistical analysis methods. Findings showed that, among the UAPP samples, (1) university students had the highest preference for those that provided heuristic information. By comparison, text-intensive applications or those that overly emphasize content and functions were more likely to prompt impatience and negative emotions. (2) Higher-ranking UAPPs afforded better interactive benefits, while lower-ranking UAPPs attracted university students and promoted positive emotions and affinity through content and function diversity. (3) Different UAPPs were examined to elucidate the effects of information level and brand image on university students. For UAPPs and information promotion, we recommend that universities identify different user needs and design content that reflects their brand image in order to enhance the existing value of universities.

Key words: university, mobile applications, cognitions, emotions, behaviors

1. Introduction

With the growing popularity of mobile applications, a team at Modo Labs conducts an annual survey to rank university mobile applications (UAPP) around the world. UAPPs are then screened and recommended based on seven major categories, including best recruiting and admissions, best student engagement, and most innovative for communication. In addition to functionality, the team also takes into account users' participatory willingness and the delivery effectiveness of information (Modo Labs Team, 2017). Besides Modo Lab's professional surveys, an increasing number of information studies have also contributed to research into mobile applications (Rai et al., 2006; Rust, 2004; Vargo & Lusch, 2004).

Some studies have examined information services (IS) to elucidate the effects of information technologies on user emotions (Hsu et al., 2004; Rettie, 2001; Zhou et al., 2010). Others examined whether the entertainment function of information services could enhance user immersion and enjoyment (Lu et al., 2009; Lusch et al., 2007). Amidst the rapid development of mobile communications technologies, mobile applications should accurately

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communicate with users' needs and provide useful and effective ISs. This study highlights the importance of understanding users' perceptions and appropriately applying these perceptions in creating satisfactory experiences. In other words, mobile applications must be carefully planned and designed to provide satisfactory user experiences and prompt users' continuous usage. This is particularly true for information delivery-oriented UAPPs.

Universities have attached increasing value to the development of mobile applications in recent years. They seem to be competing to launch specialized mobile applications in response to the growing popularity of mobile carriers. In this study, these applications are referred to as UAPPs. Different UAPPs were examined to elucidate university students' cognitive, emotional, and behavioral responses to UAPPs. The user's behavioral response framework was used to test the information and university brand of the UAPPs and develop a relational model for users' cognitions, emotions, and behaviors.

Existing studies on mobile applications have centered primarily on human-machine interfaces or user behavior (Jiang et al., 2010a; Parboteeah et al., 2009a). Few studies have focused on the effects of the information elements of mobile applications on user behavior, and even fewer have compared the brand images of different UAPPs. Therefore, three universities with different rankings were selected in this study to elucidate university students' perceptions of their universities' brand images and information elements. Moreover, the behaviors of the university students were analyzed to determine the performance of the universities' effects and students' perceptions of and attitudes towards the mobile application launched at their university (home UAPPs) or other universities (other UAPPs). The user's behavioral response framework was adopted for hypothesis testing and to differentiate the values of cognition, emotion, and behavior to UAPPs. Three new approaches were explored. First, the home university of the research subjects as well as the universities one rank higher and one rank lower than the home university were selected to compare their UAPPs and determine whether the students produced different cognitive, emotional, and behavioral responses to different university brands. Second, the model was used to connect the UAPPs. The simplest model framework was created to investigate the effects of different information elements of UAPPs on users' cognitions, emotions, and behaviors. Although existing studies have expanded our understanding of user behaviors (Kohler et al., 2011; Nambisan & Baron, 2007), mobile applications are constantly evolving. This study aimed to conduct a multilateral investigation of mobile applications and overcome the current limitations of UAPPs by examining the complementary relationships between information, cognition, emotion, and behavior. Third, we analyzed university students' mobile applications content demands and experiences to encourage student involvement, improve university promotion and interaction, and enhance the content planning and information presentation effectiveness of UAPPs. The proposed framework can be applied by educational institutions.

The complementation of information and user's behavioral response theories are briefly discussed in Section 2. The research assertions and hypotheses are introduced in Section 3. They were applied to evaluate UAPP brand images and information elements and university students' cognitions, emotions, and behaviors. The research process is explained in Section 4. Data analysis results are proposed in Section 5. The conclusion is presented in Section 6 along with specifications on applying the proposed model.

2. Theoretical Background

2.1 Complementation of Information

The purpose of this study was to elucidate the brand and information elements of UAPPs and determine

whether these structures influence the perceptions of their use by university students. In addition to users' cognition (Lee & Tedder, 2003), this study also aimed to determine whether users' emotional and behavioral involvement changed with the type of information provided. They feel anger, frustration, satisfaction, or excitement and quit using the app. Campbell et al. (2013) mentioned that enhancing information presentation inevitably affects users' evaluation of brand reputation. Hilligoss and Rieh (2008) explained that the creation of brand reputation relies primarily on three levels of information handling and evaluation, specifically, the construction elements, heuristic elements, and interaction elements. The construction element of information refers to the element of honesty, reasonability, and specificity of the content. The heuristic element of information is the ability to inspire user perceptions and assist them in noticing or ignoring information. For example, sporting brands often focus on enhancing their reputation or professional image and reinforcing positive user perceptions. The interaction element of information indicates user interactions, whether behaviors are unilateral, and whether the expected user connections have been established (Sotiriadis & van Zyl, 2013). The three levels cannot be independently discussed or separated. However, their mutual influences can be compared to analyze how user groups engage in multilateral cognitive processing and develop judgment. For example, interactions can be interconnected with inspiration, and differences in brand image can cause users to produce different judgments on brand reputation. Therefore, UAPP information was analyzed at the construction, heuristic, and interaction elements to determine information elements.

When users are presented with information, such as trustworthy, professional, or reasonable information to be easy to process, users' efforts in determining the attributes of the information and enterprises' efforts in improving information presentation to change users' attitudes and opinions become key factors for adjusting information. Therefore, users who draw on their personal experiences to determine their need for information undoubtedly require a high level of involvement and understanding to validate the reliability of the information and reduce risk (Ayeh et al., 2013). Furthermore, an analysis of the complementation of information was conducted from the perspectives of the user. Previous scholars asserted that the complementation of information is a key factor influencing behavior (Koukova et al., 2012; Simonin & Ruth, 1995). Behavioral building improves the complementation of information, enhancing information functionality and usefulness, and attracting and retaining user attention (Hitt & Chen, 2005). Moreover, behavior also influences users' attitudes and impressions. Enterprises that voluntarily offer additional, unrelated content are more likely to prompt users' purchase intentions (Harlam et al., 1995; Hitt & Chen, 2005).

In summary, the theory of the complementation of information resolves problems relating to users' use intentions and behavioral responses. These studies adopted the concepts of complementation of information to explain how users process different types of information, such as filtering context to locate the most readable or comprehensible portions of a passage. Users may also perform a multilateral evaluation of the attributes and features of products or services during selection. They then identify their demand from the evaluation. If the information at the current level cannot satisfy them, then they are inclined to seek information at a higher level and form a complementation mechanism for content selection (Van Trijp et al., 1996).

2.2 User's Behavioral Response

Kohler et al. explained the motivation of users to participate in information creation. Combined with the interactive advantages of the virtual environment, users gain cognitive benefits, community integration benefits, and personal integration benefits, and also enjoy these benefits. Kohler et al. also validated the importance of

pragmatic experience, social experience, and pleasant experience, and explained that the level of pleasure included mental stimulation, recreation, and a pleasant experience (Kohler et al., 2011). The interaction of users in media may thus generate a pleasant or exciting experience.

Behavioral responses of users also take into account the available features of the mobile applications. Kohler et al. (2011) formed a framework for the practical, social, and hedonic aspects of community media. The practical level refers to the user's feedback in the process of receiving the message. In the process of judging information, users may receive brand-related knowledge, such as potential brand culture, brand strategy, marketing practices, and professional techniques, all of which are relevant to the user's awareness of the brand. Nambisan and Baron explained that, in the observation of the community brand, users gained the value of interaction with the community (Nambisan & Baron, 2009). Mobile applications represent a relationship between companies and users (Kohler et al., 2011) because content is the basic element that affects community participation. Therefore, socializing builds and enhances user participation, community identity, and community ownership (Nambisan & Baron, 2009).

Using the user's behavioral response model as a theoretical background is suitable for this study for two main reasons. First, the model has been used in consumer behavior studies (Eroglu et al., 2003; Parboteeah et al., 2009a). Parboteeah et al. used the model to study emotional clues in a website and to explore the impact of consumer's perception, emotion, experience, and other factors on online shopping behaviors (Parboteeah et al., 2009a). Animesh et al. used the model to understand the impact of a user's virtual experience on their purchasing behavior (Animesh et al., 2011a). Second, considering the impact of the technological environment and virtual experience on a user's behavior in the mobile applications, the model provides a simple and structured verification method that is in line with environmental verificationfor the simple stimulation of user experience. It can be used to instantly understand the causal relationships between interaction and sharing.

3. Research Model and Hypotheses

3.1 UAPP Information Elements and Users' Cognitions, Emotions, and Behaviors

The literature review in the previous section argued that information can satisfy individual preferences and needs (Komiak & Benbasat, 2006) and serves as a suitable media (Tam & Ho, 2006). Information can prompt users to form perceptions through learning (Zhang, 2013) and directly stimulate emotions and values. The acute effects of visual cues highlight the importance of suitable information design in enhancing brand satisfaction and acceptance by users (Liu et al., 2013). When enterprises provide unsuitable content, users may directly refuse to receive any further information from the enterprise (Liu & Goodhue, 2012). Therefore, information can be presented to manipulate emotions and enhance delivery effects. The process may even encourage users to act or interact in certain ways (Figure 1). Therefore, enterprises should focus on how their content can enhance users' perceived pleasure and value when presenting information (Wang et al., 2007) and encourage users to engage in sharing and purchasing behaviors (Nambisan & Baron, 2009).

For example, Mehrabian and Russell (1974b) developed a user's behavioral response model to validate the effects of information on users' emotions. Studies employing user's behavioral response models for e-commerce found that information positively influenced users' sense of enjoyment and pleasure (Parboteeah et al., 2009a). Diverse information satisfies users' brand curiosity at multiple levels, thereby enhancing the enjoyment of their experiences (Muniz Jr. & O'Guinn, 2001). Naturally, the probability of success of specific tasks and the intensity

of users' corresponding emotional responses increase concurrently with the relevance of the information (Nambisan & Baron, 2009). Animesh et al. (2009) validated that information facilitates the creation of entertainment value, maintaining that the likeliness of producing enjoyable experiences increases concurrently with the clarity of the information. In summary, UAPP information is able to trigger different emotional and perceptual responses and promote behaviors and involvement (Heijden et al., 2003; Parboteeah et al., 2009a). The following hypotheses were formulated:

H1a: The information elements of UAPPs are correlated to the cognitive response dimension of university students.

H1b: The information elements of UAPPs are correlated to the emotional response dimension of university students.

H1c: The information elements of UAPPs are correlated to the behavioral response dimension of university students.
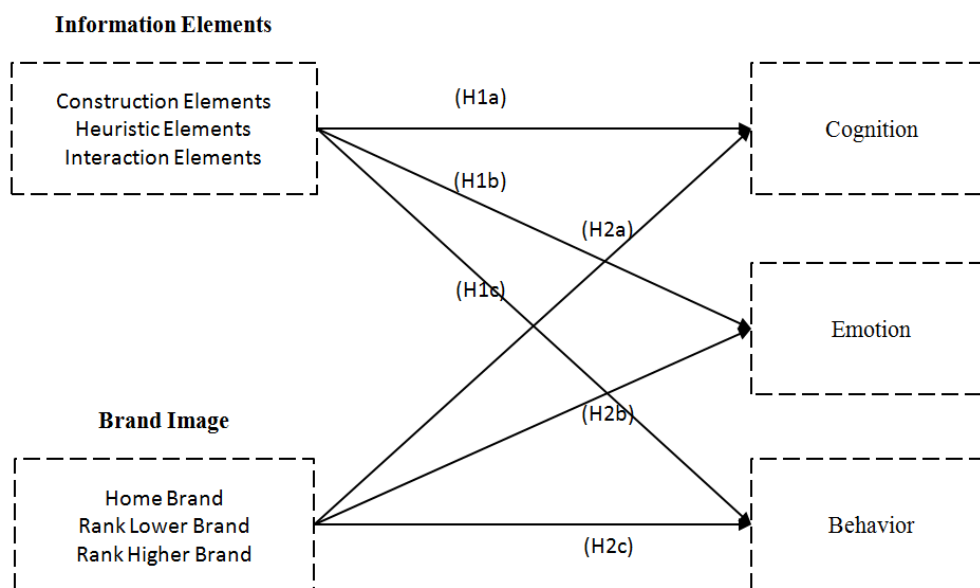

Figure 1   Research Model

3.2 Brand Differences and Users' Cognitions, Emotions, and Behaviors of UAPPs

People are often form user experiences from information (Pine & Gilmore, 1999b). Therefore, the development of experiences can represent users' needs and interests. Enterprises should strive to not only provide quality products and services but also offer enriching experiences to garner brand trust (Pine & Gilmore, 1999b) and promote user involvement and interaction through information (Nambisan & Baron, 2009). Virk (2011) found that strong user-brand relations can be established through interaction and that consensus was more likely to be achieved. In this study, we speculated that information quality could be used as a measure of brand management accuracy and suitability. The emotional and behavioral satisfaction gained from information can be adopted as a standard for measuring user satisfaction. Moreover, information quality represents the attitude of a brand in enhancing information efficiency and satisfying users. Information also prompts experiences and emotions, such as happiness and the sense of well-being (Csikszentmihalyi, 1997), immersing users in specific atmospheres in which they can focus on receiving information and block external interference (Koufaris, 2002; Novak et al., 2000;

Trevino & Webster, 1992; Webster et al., 1993). Therefore, identifying user responses (Mehrabian & Russell, 1974c); analyzing user interests and emotions; and encouraging users to explore, imagine, and learn content to satisfy their curiosity, complete specific tasks, and provide better feedback (Shernoff et al., 2003) are effective brand tools for enhancing information delivery quality.

Moreover, information can enhance the hedonic value that enterprise aims to construct, such as interest or enjoyable experiences (Wang et al., 2007). Sirgy et al. (1991) asserted that coherent functions enhance users' brand impressions and satisfy their function and information needs. When impressions are consistent with users' assessment standards, consistent impressions can be converted into their brand attitude and views. This process not only reinforces users' brand faith and establishes brand excellence but also enhances brand recognition and trust (Huber et al., 2010). Zhang (2013) found that brands were able to trigger emotional responses in users and that interaction directly drove emotional cognition and evaluation. An analysis of the mobile applications launched by different enterprises clearly shows that emotional elements are frequently applied to garner users' emotional support and reinforce enterprises' information presentation (Schau et al., 2009). Common emotional elements include support, experience, concern, and comprehension (Liang et al., 2011). In this study, we agree that brands affect users' perceptions and behaviors (Liang & Turban, 2011; Ren et al., 2012). The following hypotheses were formulated:

H2a: The brand differences of UAPPs are correlated to the cognitive response dimension of university students.

H2b: The brand differences of UAPPs are correlated to the emotional response dimension of university students.

H2c: The brand differences of UAPPs are correlated to the behavioral response dimension of university students.

4. Research Methodology

To guarantee content validity, the brand difference, information level, user cognition, user emotion, and user behavior were directly adopted as the measurement variables. The user's behavioral response framework was adopted as the research framework and previous studies on information perception (Mehrabian & Russell, 1974a; Nambisan & Nambisan, 2008; Kohler et al., 2011) were referenced to measure the university students' UAPP complementation of Information, behavioral involvement, and emotional responses (Nambisan & Baron, 2009; Campbell et al., 2013; Hilligoss & Rieh, 2008) and consolidate and review the relevant research theories.

An online survey was conducted between 5 June 2017 and 9 June 2017. The recipients were the first-year, second-year, and third-year students of Tamkang University. The survey focused on the UAPPs developed by Private Tamkang University (TKU I Life), National Chengchi University (mobile NCCU) and Private Aletheia University (Aletheia APP). Six interfaces were selected from the three UAPPs. Among the interfaces, two comprised constructive information ("constructive" means helpful, productive, and adding to knowledge and skill), two comprised heuristic information, ("heuristic" describes a method that is practical or quick, but not necessarily optimal or accurate) and two comprised interactive information. Six examples were provided for each university. A total of 470 questionnaires were administered, and 457 valid questionnaires were recovered. Among the valid samples, 38% were men, and 62% were women. Furthermore, 212 were first-year students, 169 were second-year students, and 76 were third-year students. The differences in the recipients' perceptions, emotions, and behaviors

concerning the UAPP of their home university and those of the other universities were examined.

5. Data Analyses and Results

5.1 Reliability and Validity

Factor analysis was performed to assess the reliability and validity of the evaluation data. The Cronbach's αvalues for the cognitive, emotional, and behavioral factors were 0.910, 0.913, and 0.913, respectively. The factor load is close to or higher than 0.7, indicating good convergence and discriminant validity (Chin, 1998). First, simple correlation analysis can show the degree of correlation between variables. The value is mainly related to the Pearson correlation coefficient. A variance inflation factor (VIF) exceeding 10 indicates multiple collinearity problems. In this study, the value of VIF is exclusively lower than 10, indicating that there was no multicollinearity.

5.2 Hypothesis Testing

The outcomesof H1 (the information elements of the UAPPs are correlated to the cognitive, emotional, and behavioral response dimensions of university students) indicated an absolute correlation between information elements and cognitive responses (H1a), an absolute correlation between information elements and emotional responses (H1b), and a moderate correlation between information elements and behavioral responses (H1c). The outcomes of H2 (the brand differences of UAPPs are correlated to the cognitive, emotional, and behavioral response dimensions of university students) indicated a moderate correlation between brand differences and cognitive responses (H2a), an absolute correlation between brand differences and emotional responses (H2b), and a moderate correlation between brand differences and behavioral responses (H2c).

6. Discussions and Implications

6.1 Discussion of Findings

Interestingly, the findings of this study revealed that the information and brand image of UAPPs significantly affected the cognitive, emotional, and behavioral involvement of university students. First, hypothesis test results showed that the information elements of UAPPs were correlated to the cognitive, emotional, and behavioral response dimensions of the university students. The correlations between the construction elements, heuristic elements, and interaction elements of the UAPPs and the cognitive responsedimension of the university students were Construction ($\beta = -0.252$, $p < 0.001$), Heuristic ($\beta = 0.196$, $p < 0.001$), and Interaction ($\beta = 0.051$, $p < 0.005$), respectively. All three values achieved statistical significance (H1a). The correlations between the construction elements, heuristic elements, and interaction elements of the UAPPs and the emotional response dimension of the university students were Construction ($\beta = -0.084$, $p < 0.001$), Heuristic ($\beta = 0.132$, $p < 0.001$), and Interaction ($\beta = -0.052$, $p < 0.005$) respectively. All three values achieved statistical significance (H1b). The correlations between the construction elements, heuristic elements, and interaction elements of the UAPPs and the behavioral response dimension of the university students were Construction ($\beta = 0.034$), Heuristic ($\beta = 0.065$, $p < 0.001$), and Interaction ($\beta = -0.100$, $p < 0.001$) respectively. heuristic elements and interaction elements achieved statistical significance (H1c). Statistical analysis results showed that all the UAPPs affected cognition and emotion. However, the effects of the UAPPs on behavior were more evident at a heuristic element (Figure 2).

Second, the hypothesis test results showed that the brand differences of the UAPPs were correlated to the cognitive, emotional, and behavioral response dimensions of the university students. The correlations between the home UAPP, higher-ranking UAPP, and lower-ranking UAPP and the cognitive response dimension of the university students were Home Brand ($\beta = -0.090$, $p < 0.001$), Rank Lower ($\beta = 0.064$, $p < 0.001$), and Rank Higher ($\beta = 0.010$) respectively. The home brand and lower-ranking brand achieved statistical significance (H2a). The correlations between the home UAPP, higher-ranking UAPP, and lower-ranking UAPP and the emotional response dimension of the university students were Home Brand ($\beta = -0.111$, $p < 0.001$), Rank Lower ($\beta = 0.049$, $p < 0.01$), and Rank Higher ($\beta = -0.279$, $p < 0.001$) respectively. The values achieved statistical significance (H2b). The correlations between the home UAPP, higher-ranking UAPP, and lower-ranking UAPP and the behavioral response dimension of the university students were Home Brand ($\beta = -0.144$, $p < 0.001$), Rank Lower ($\beta = -0.022$), and Rank Higher ($\beta = 0.110$, $p < 0.001$) respectively. The home brand and higher-ranking brand achieved statistical significance (H2c). Statistical analysis results showed that the lower-ranking UAPP affected users' cognition. However, the effects on behavior and involvement were more evident in the higher-ranking UAPP.
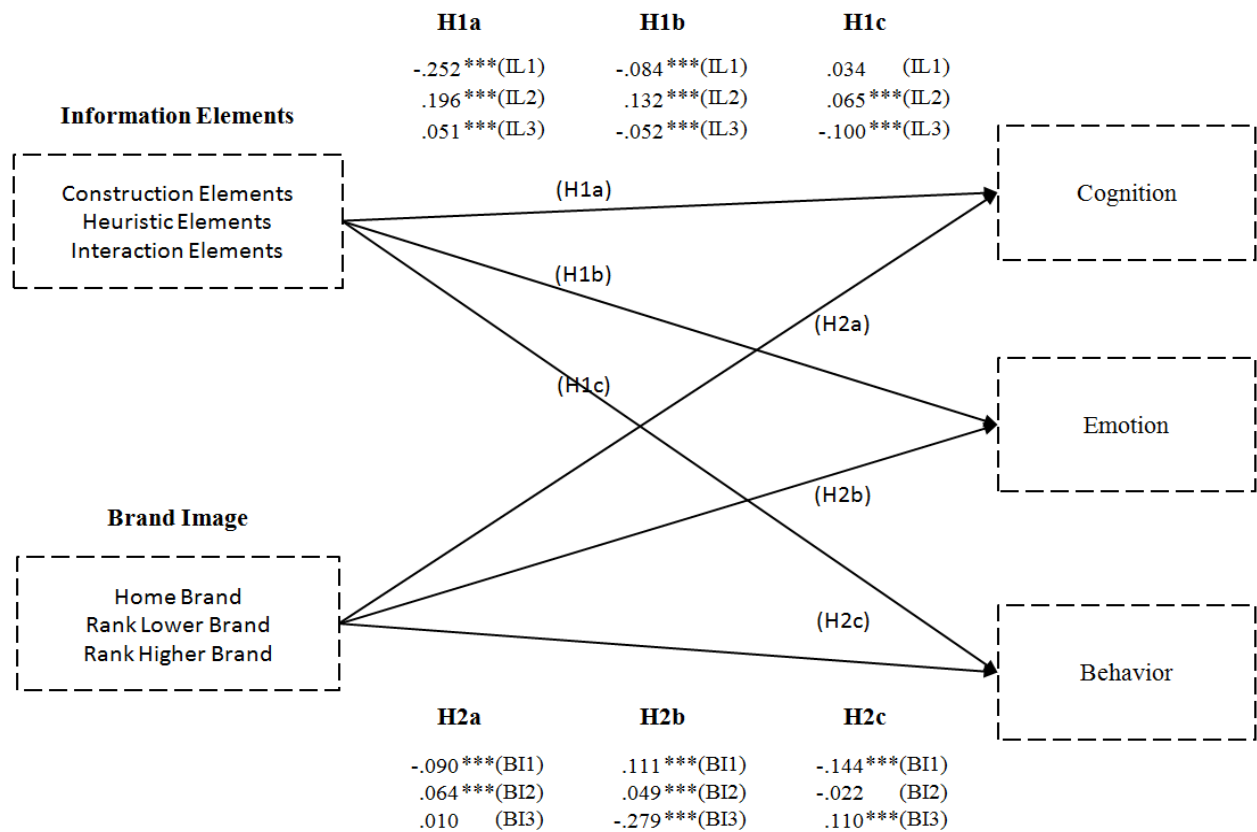

Figure 2   Framework Validation: *p < 0.05, **p < 0.01, and ***p < 0.001

Table 1   Results of Hypothesis Testing

	R	R²	adj. R²	Change Statistics				Durbin-Watson	Unstandardized coefficient		Standardized coefficient	t-Value	Sig.	Multicollinearity statistics	
				ΔR²	ΔF	df1	Sig. F Change		B	Standard error b	Beta			Tolerance	VIF
Format all															
Cognition	.177ᵃ	.031	.031	.031	99.269	1	.000	1.768	.220	.022	.177	9.963	**.000**	1.000	1.000
Behavior	.078ᵃ	.006	.006	.006	18.939	1	.000	1.657	-.097	.022	-.078	-4.352	**.000**	1.000	1.000
Emotion	.019ᵃ	.000	.000	.000	1.089	1	.297	1.358	.023	.022	.019	1.043	.297	1.000	1.000
Construction															
Cognition	.252ᵃ	.064	.063	.064	208.928	1	.000	1.829	-.540	.037	-.252	-14.454	**.000**	1.000	1.000
Behavior	.034ᵃ	.001	.001	.001	3.529	1	.060	1.649	.072	.039	.034	1.878	.060	1.000	1.000
Emotion	.084ᵃ	.007	.007	.007	21.796	1	.000	1.367	-.179	.038	-.084	-4.669	**.000**	1.000	1.000
Heuristic															
Cognition	.196ᵃ	.038	.038	.038	122.649	1	.000	1.782	.204	.018	.196	11.075	**.000**	1.000	1.000
Behavior	.065ᵃ	.004	.004	.004	13.045	1	.000	1.654	.068	.019	.065	3.612	**.000**	1.000	1.000
Emotion	.132ᵃ	.017	.017	.017	54.646	1	.000	1.382	.138	.019	.132	7.392	**.000**	1.000	1.000
Interaction															
Cognition	.051ᵃ	.003	.002	.003	8.157	1	.004	1.718	.037	.013	.051	2.856	**.004**	1.000	1.000
Behavior	.100ᵃ	.010	.010	.010	31.372	1	.000	1.663	-.072	.013	-.100	-5.601	**.000**	1.000	1.000
Emotion	.052ᵃ	.003	.002	.003	8.205	1	.004	1.362	-.037	.013	-.052	-2.864	**.004**	1.000	1.000
Brand all															
Cognition	.021ᵃ	.000	.000	.000	1.343	1	.247	1.714	.016	.014	.021	1.159	.247	1.000	1.000
Behavior	.092ᵃ	.008	.008	.008	26.173	1	.000	1.662	.072	.014	.092	5.116	**.000**	1.000	1.000
Emotion	.045ᵃ	.002	.002	.002	6.237	1	.013	1.361	-.035	.014	-.045	-2.497	.013	1.000	1.000
Home Brand															
Cognition	.090ᵃ	.008	.008	.008	25.239	1	.000	1.728	-.254	.051	-.090	-5.024	**.000**	1.000	1.000
Behavior	.144ᵃ	.021	.020	.021	65.215	1	.000	1.682	-.406	.050	-.144	-8.076	**.000**	1.000	1.000
Emotion	.111ᵃ	.012	.012	.012	38.205	1	.000	1.375	.312	.050	.111	6.181	**.000**	1.000	1.000
Rank Lower															
Cognition	.064ᵃ	.004	.004	.004	12.841	1	.000	1.721	.071	.020	.064	3.583	**.000**	1.000	1.000
Behavior	.022ᵃ	.000	.000	.000	1.523	1	.217	1.648	-.024	.020	-.022	-1.234	.217	1.000	1.000
Emotion	.049ᵃ	.002	.002	.002	7.348	1	.007	1.361	.053	.020	.049	2.711	**.007**	1.000	1.000
Rank Higher															
Cognition	.010ᵃ	.000	.000	.000	.298	1	.585	1.714	.008	.015	.010	.545	.585	1.000	1.000
Behavior	.110ᵃ	.012	.012	.012	37.864	1	.000	1.667	.090	.015	.110	6.153	**.000**	1.000	1.000
Emotion	.279ᵃ	.078	.078	.078	259.709	1	.000	1.470	-.229	.014	-.279	-16.115	**.000**	1.000	1.000

6.2 Theoretical Implications, Limitations, and Future Research

Previous studies largely focused on the application of various tools and the evaluation of user applications (Deng et al., 2010). These studies proposed various usage behaviors, information perceptions, and theoretical frameworks for satisfaction (Agarwal & Karahanna, 2000). Users' demand for new technologies is constantly increasing amidst the advancement of the functions of mobile services (Ng & Kwahk, 2010), and the relationship

between users and these services are becoming stronger (Alhinai et al., 2007; Kim et al., 2007). A review of existing research has shown that the brand perceptions of mobile applications have been seldom discussed, particularly the information of UAPPs. Therefore, the objective of this study was to determine user behavior by examining university students' usage perceptions, thereby elucidating the demands and opinions of university students concerning UAPPs and identifying extant problems and flaws. The findings of this study can serve as a reference for universities and other educational institutions when designing their UAPPs or adjusting the content of their UAPPs.

First, information impact theory maintains that users' approach to and handling of information are correlated to the type of information (Taute et al., 2011). This study acknowledges the stimulating effects of visual stimuli. Therefore, the appropriateness of information designs and easy access to information are keys to effective information planning. For example, users are more likely to finish an article on a website that is visually pleasing (Liu et al., 2013). By comparison, users may unconsciously reject the information provided on unattractive websites (Liu & Goodhue, 2012). Users' acknowledgment of information significantly influences their interactions with content (Campbell et al., 2013). By testing this argument, we found an interaction between the behaviors of the university students and the information of UAPPs. When the students received a specific level of information, the successful delivery of the information affected their behaviors at either end of the behavioral spectrum

An analysis of the effects of different information presentations on the cognitive, emotional, and behavioral responses of the university students showed that constructive information had a negative impact on the students' emotional and behavioral responses. We speculate that this may have stemmed from the fact that constructive information requires explanations, which are generally text-based. Therefore, such information was less likely to prompt useful perceptions or enjoyment. Heuristic information is presented with images rather than text, which meets the graphical requirements of UAPPs. The university students were more comfortable reading heuristic information. This information significantly and positively influenced students' cognitive, emotional, and behavioral responses, prompting them to deem such information useful and interesting. In terms of interactive information, all three UAPPs tested in this study contained many interactive elements. However, many of the selected UAPPs failed to meet the needs of the students. One of the UAPPs (Aletheia APP) even provided content introducing travel and temple destinations surrounding the university, which had little relevance to students' life or school needs. Blindly diversifying APP content is counterproductive, blurring user needs and reducing their willingness to use the APP. This is a major flaw that developers should take into account during APP design.

Previous studies have found that usefulness as perceived by users comprises the benefits or experiences acquired from information (Kohler et al., 2011), as well as brand knowledge, such as brand culture, brand strategy, and marketing tactics (Laroche et al., 2013). These findings highlight the importance of UAPP brand management and establishment. Many brands have already adopted a strategy that actively stimulates users' emotional responses to enhance users' satisfaction and trust, create brand value, and achieve brand promotion (Liu & Goodhue, 2012; Wang et al., 2010; Wells et al., 2011). Therefore, when comparing UAPP brand differences, we found that the students had positive emotional responses and negative cognitive and behavioral responses to their home brand. These findings suggest that, although students acknowledged and accepted their home brand, they neither blindly preferred the home brand nor used the UAPP as a tool for promoting the features of their university. To the students, UAPPs are largely for learning or participating in school affairs. They cannot double as a social or entertainment APP. Therefore, they neither recommended their home UAPP nor were they willing to share the

UAPP despite their acknowledgment of their home brand.

The lower-ranking brand had a superior interface and more content than the other two brands. Therefore, the lower-ranking brand significantly and positively affected students' cognitive and emotional responses. The UAPP successfully enhanced the recipients' perceptions of and curiosity towards the school. The only shortcoming was that the UAPP failed to enhance the students' willingness to use it. Therefore, the UAPP failed to significantly stimulate behavioral responses. The higher-ranking brand was evaluated to have the poorest design and least amount of content. Therefore, the UAPP failed to solicit significant cognitive responses, and the students' emotional response towards the UAPP was largely negative. Furthermore, the overall content of the higher-ranking UAPP was unable to attract the interest of the students. Interestingly, the superior brand reputation of the higher-ranking school attracted the students' curiosity toward the content of that school's UAPP. A consolidation of the aforementioned results indicated that brand image was a greater influencing factor than content diversity. Therefore, UAPP developers that focus on usefulness and functionality should consider the effects of brand image on users' cognition to complement the inability of content and functionality to promote the UAPP and interact with users.

Previous studies on user experiences have identified three common characteristics of user experiences. First, user experiences transcend simple tool orientations; second, user emotions must be taken into account; and third, user experiences and user habits are factors that should be considered together. These observations prompted research into a magnitude of variables, including emotions, experiences, enjoyment, and aesthetics (Hassenzahl & Tractinsky, 2006; Hassenzahl & Roto, 2007; Law et al., 2009). These observations are consistent with the argument proposed in this study that brand identity and emotional behaviors are stimuli. Information not only connects users but also consolidates user needs (Muniz Jr. & O'Guinn, 2001; Nambisan & Baron, 2009). Previous studies repeatedly emphasized the effects of emotions and behaviors in user experiences, such as how to proactively stimulate users' perceptions and emotions and enhance their revisitation and repurchase intentions (Koufaris, 2002; Pullman & Gross, 2004) or how to enhance user loyalty and maintain positive relations (Pine & Gilmore, 1999a; Pullman & Gross, 2004). This study expanded on the aforementioned studies, emphasizing that information elements have a complementation effect on user experiences. Therefore, universities can design their UAPPs to meet different user needs, can set information elements, and can feature content to meet the requirements of the university brand and redefine/simplify the content of their UAPPs, thereby preventing an overload of useless functions and information into a single UAPP. This process not only reduces the likelihood of users generating negative brand perceptions but also slimming the UAPP to minimize the chance of it being uninstalled.

6.3 Research Limitations and Recommendations

The limitation of this study was that the recipients were from a specific group. Survey results may therefore be unable to account for all factors concerning information plans or brand statuses, owing to the differences between the three schools. Therefore, we propose two recommendations for the future of UAPP research. First, scholars can evaluate different types of information to categorize the content of UAPPs in greater detail; elucidate whether different information categories, such as text, images, and video, influence users' cognitions, emotions, and behaviors differently; and adjust content formats based on user habits and needs. Second, school types or international and domestic educational institutions can be adopted as the sampling criteria rather than university ranking. Different user groups can be surveyed using different sampling methods, thereby fully elucidating the

differences in mobile application needs.

Acknowledgments

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Appendix

Measures and Scales

Construct Item	Construct Item	Sources
Cognition	The information is easy to understand.	Complementation of Information
	The purpose of the information is clear.	Campbell et al., 2013
	I am able to find the desired information quickly.	Hilligoss and Rieh, 2008
	The information is useful.	
	The information meets customer needs.	
	The information is easy to read.	
	I understand the theme and features of the UAPP.	
	I am impressed by the UAPP.	
Emotion	This UAPP is creative.	Mehrabian and Russell, 1974a
	This UAPP piqued my curiosity.	Nambisan and Nambisan, 2008
	This UAPP is unique.	Kohler et al., 2011
	This UAPP is interesting.	
Behavior	I like this UAPP.	Mehrabian and Russell, 1974a
	I would like to learn more about this UAPP.	Nambisan and Nambisan, 2008
	I will recommend this UAPP to my friends.	Kohler et al., 2011
	I have a good feeling about its brand.	
	I understand the difference in its brand image.	