Para-Social Relationships and continuous use of mobile devices

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Abstract: Comprehending factors that affect customer satisfaction and continued usage of mobile devices become more important as their prevalence and turnover increase. In this study, socio-relational forces such as Para-Social Relationships (PSRs) are examined in an effort to explain behaviours of users of mobile systems. The results indicated that traditional success factors must be complemented by socio-relational forces such as PSR. Very strong associations were identified between social bonds, user attitudes and usage continuance. The user interface design of a mobile device was shown to shape the relational attitudes of users. Understanding behaviours of users of portable devices requires a perspective different from those applied in traditional enterprise-level information systems (ISs) settings.

Keywords: mobile devices; para-social relationship theory; continuance use; user satisfaction; relationship theory; mobile communication.

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1 Introduction

The global adoption of mobile devices, especially cellular phones, has increased dramatically. In addition to their conventional functions such as voice communication, short messaging services, and information displays, more sophisticated features and attractive user interfaces have become available, especially with the advent of smart cell phones such as iPhones and Android phones in the marketplace. At the same time, the influx of these devices is turning both the product market and the carrier service market into a place of hyper-competition. Accordingly, customer satisfaction with a mobile device and its continued and repeated usage has become one of the critical business success factors to device manufacturers and voice/data service providers.

Traditional theories such as the expectation–confirmation theory (Oliver, 1980) and many empirical studies (Baek et al., 2011) tie user behaviour such as usage (or usage intention) of a product/service to user satisfaction. Most studies attempt to measure user satisfaction through examination of cognitive and task-oriented factors such as system quality, information quality, ease of use and usefulness (Hau et al., 2012). However, user satisfaction with information technology (IT) can be relational by nature (Udo et al., 2010); this may be especially true with mobile devices. In recent years, stories of abnormal mobile device addiction have abounded. Studies have shown that human–computer interactions through software agents and avatars can result in relationship development (Schroeder, 2002; Von der Putten et al., 2010; Liu et al., 2011). Their results imply that usage behaviour in relation to mobile devices cannot be fully explained by analysis of traditional cognitive and task-oriented factors. Rather, relational or social aspects must be considered. To the best of our knowledge, however, few researchers have examined post-adoption usage behaviour of users of mobile devices from the perspective of the social relationship between the user and the device. Thus, this study was conducted.

The objective of this study was to determine if and how users gain a sense of social relationship with their mobile devices, and how that relationship affects user satisfaction and usage intention. This research was grounded on the theory of PSRs, which states that relationships develop between people (as viewers) and media characters (Turner, 1993). Mobile devices have become a formidable channel through which media are delivered; thus, PSR theory may be extended to the context of human–mobile device interactions. Along with the media, the user interface of a mobile device affects human perceptions

because its visual or anthropomorphic characteristics lead people to expect a degree of sociability and credibility (Nowak and Rauh, 2008) and a sense of friendship (Kenny et al., 1992). The relationships people develop with their mobile devices can be characterised as PSR. This kind of relationship may affect users' commitment to and satisfaction with their mobile devices, as implied by conventional PSR theory (Levy, 1979; Kanazawa, 2002). This empirical study was conducted based on the hypothesis that psychological formation of PSR with a mobile device has positive effects on user satisfaction and prolongs device usage.

The remainder of this paper is organised as follows: PSR theory is described in Section 2. In Section 3, a research model is presented and corresponding hypotheses are derived. For the proposed study, three variables (i.e., task attraction, social presence and perceived advertisement exposure) that are presumed to be especially salient in cultivating PSR are incorporated into the research model as key antecedents of PSR. Research methods, including survey design and data gathering, and the results of the data analysis are described in Sections 4 and 5, respectively. Major findings, their theoretical and practical implications and future research issues are discussed in Section 6. Section 7 concludes the paper.

2 Theory

The DeLone and McLean (2003) model explained IT success in terms of system quality, information quality and service quality. System quality is measured by the desired characteristics of IT, which may include usability, availability, reliability and adaptability. Information quality includes the quality of the content offered by IT, represented by such traits as personalisation, completeness, accuracy, relevance, ease of understanding and security. Service quality refers to the level and quality of support delivered by the IT department or IT service provider, rather than the IT *per se*.

While DeLone and McLean's model and many other related studies have proposed various types of quality as a prerequisite for user satisfaction, we argue that the perception of relationship can be another source of IT satisfaction (Lin and Lu, 2000). In this study, relationships are purposive social spaces in which people add and structure the meaning of their various experiences (e.g., during meetings in which they share observations and have conversations regarding their personal lives) (Berscheid, 1983). The commitment to a relationship affects and is affected by the psychological, socio-cultural and relational contexts in which it is embedded (Fournier, 1998). This commitment is also positively associated with customer retention (Vatanasombut et al., 2008). The context of a relationship can be formed not only by humans, but also by products or brands. The relationship between products and humans may be understood in the context of psychology, socio-culture and customer relationship management.

Relationship theory may partially explain user perceptions and behaviours (e.g., satisfaction and intention to continue usage) towards IT products. Among various relationship theories, PSR theory is particularly relevant. PSR theory states that a tightly formed emotional affinity resembling a face-to-face relationship may exist between people and media characters (Horton and Wohl, 1956). People feel intimacy with these

characters, regarding them with the same affection as people in their primary circle such as family members or friends. They may even attribute personality traits to the media characters to whom they relate (Horton and Wohl, 1956) or be influenced by a character's public personality (Alperstein, 1991). This emotional attachment may become stronger when a person is continuously exposed to the media character with whom they have formed a relationship.

The notion of PSR has been utilised to explain the emotional bond between humans and computers. The human-like computer interface enables a user to personify the computing machinery, attributing to it personality traits (Sproull et al., 1996). Different types of closeness to the technology may characterise human–computer relationships: cognitive and emotional affinity, physical proximity and intimacy (Bell et al., 2003). Early applications of PSR theory in this context clearly implied that human–mobile device relationships may be rooted in emotional attachment rather than based on rational and utility-driven factors (e.g., system and information quality). Some researchers have depicted computing devices as social actors that interact with human beings, delivering information via text, images, sound and motions, just as people communicate with each other using their five senses.

In some cases, computers may now behave as actors who conduct social interactions. For example, Bickmore and Picard (2005) developed the relational agent, a computing entity that can form relationships and interact with humans in a face-to-face manner. In addition, computers have progressed in emotional intelligence; knowledge and learnability can now be found in hardware, software and information networks. These same technologies have remarkably improved the computer's relational ability. In sum, these efforts to build relationships between computers and humans increase familiarity and intimacy with IT, facilitating development of PSR with other computing devices in people's minds.

The potential for developing PSR with mobile devices, mainly cell phones and smart phones, is especially interesting. Already, plenty of evidence is available to prove that people have feelings of friendship and bonding with their intelligent, small and function-rich mobile devices. Comments like, "My cell phone is like a friend because it is always nearby", "I repurchased the same kind of cell phone because the missed one was my best friend", or "I love my cell phone more than my boyfriend" are not uncommon in the online space. This phenomenon cannot be fully explained by traditional cognitive and utility-based theories and their factors, such as perceived usefulness and ease of use. We posit that some people develop affinity with their mobile devices because of their emotional attachment to them (Vincent, 2004). PSR theory is useful and appropriate to explain why people develop social relationships with impersonal objects like mobile devices. Psychological attachment with IT has been demonstrated in previous studies of information systems (IS) (Jarvenpaa and Lang, 2005; Kopomaa, 2000; Rheingold, 2002; Lyytinen and Yoo, 2002). The development of social bonding may become an important source of satisfaction with usage of a particular mobile device (Lin and Lu, 2000) and may subsequently lead to continued usage or repurchase of the same model if it has to be replaced.

3 Research model and hypotheses

3.1 Research model

This study focused on the role of emotional ties in shaping the usage behaviour of users of mobile devices. The following variables were identified that seemed particularly germane to the formation of PSR with a mobile device: task attraction, social presence and exposure to advertisement. *Task attraction* refers to a person's perception that a mobile device is able to perform certain tasks for its owner. This concept closely reflects the sense of the usefulness and perceived utility value of the mobile device. The task attraction variable, therefore, may not necessarily play a role in the development of strong emotional connections (e.g., "my phone is like a human being to me" and "I feel like my phone is my friend") with a mobile device, but it is still the most fundamental reason for usage of the device. The second variable in this research context, *social presence*, is the ability of a mobile device to project itself socially through its interface like real people do (Garrison and Anderson, 2003). In addition to these two variables unique to mobile devices, *exposure to advertisement* has been shown to grow PSR and increase satisfaction (Stevens, 2008). Hence, *exposure to advertisement* is employed in our model as a competitive factor in explaining the growth of PSR.

The research questions addressed in this study are as follows:

- Do people develop PSR with mobile devices?
- If they do, what are the relative roles of task attraction, social presence and advertisement exposure in growing PSR?
- Do PSR and its three antecedent variables (task attraction, social presence and advertisement exposure) affect user satisfaction and the duration of mobile device usage?

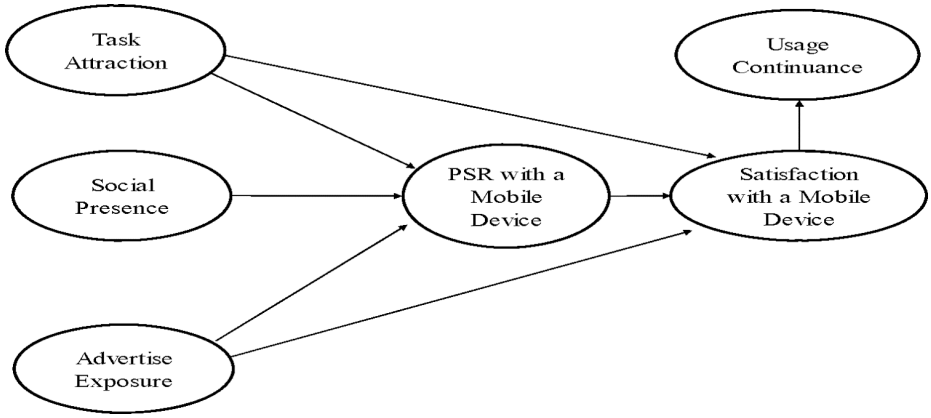
To answer these questions, a research model was developed to define the relationships among the study variables (Figure 1). This model depicts the three antecedent variables facilitating the formation of PSR.

3.2 Task attraction

Task attraction originally referred to an employee's perception of "how easy or worthwhile working with someone would be" (McCroskey and McCain, 1974, p.261). In this study, task attraction was operationalised as a person's perception that a mobile device is able to perform certain tasks. Task attraction represents the perceived ability to work with a mobile device within its usage context. It is a more relevant source of influence than social or physical attraction, according to Wheeless and Reichel (1990). Besides mobility, mobile devices offer unique value in their ability to undertake various tasks, including ubiquitous services and access, *accessibility* and *instant connectivity* to information, context-driven service customisation and personalisation (e.g., location) and *timeliness* in rendering services (Lee et al., 2009). When a person perceives that he or she can trust or rely on a mobile device when a situation arises (e.g., an emergency), task attraction may increase the sense of PSR with the device. Task attraction has been shown to affect PSR with television actors significantly (Rubin and McHugh, 1987).

We postulate that an analogous phenomenon may exist in the context of mobile device usage.

Figure 1 Research model



The positive relationship between task attraction and user satisfaction has been supported by studies grounded in IS and communication theory. System quality (e.g., accessibility, navigation, flexibility, response time, reliability and ease of use) and information quality (e.g., relevance, timeliness, reliability and scope) are directly associated with the attractiveness of a mobile device in its ability to undertake user tasks. The importance of both system and information quality in determining user satisfaction (or dissatisfaction) leads us to suggest that the task attraction of a mobile device influences its user satisfaction (Lee et al., 2009; Zhou, 2013). In the communication theory field, Brandt (1979) proved that task attraction affects communicative effectiveness, which is related to satisfaction during communication. When a person perceives that tasks related and unrelated to communication can be performed better with a mobile device, he or she is expected to feel more satisfied with it. Hence, we hypothesised that:

Hypothesis 1: Task attraction felt by the user of a mobile device is positively associated with his or her PSR with the device.

Hypothesis 2: Task attraction felt by the user of a mobile device is positively associated with his or her satisfaction with the device.

3.3 Social presence

Social presence refers to a subjective recognition or awareness of the other person in an interaction. In other words, social presence is the degree of salience of the other person in the interaction and the consequent salience of the interpersonal relationship (Short et al., 1976; Yoo and Alavi, 2001). Social presence has also been considered in research in the IS field. Qui and Benbasat (2009) highlighted the importance of interface design from the social relationship perspective. By comparing the personified software agent with the plain text-based agent in a recommender setting, they examined the effect of user interface design on usefulness, trust and ease of use. Their results indicated that the software agent with a higher social presence related more positively to users'

perceptions of usefulness, trust and ease of use. Similarly, Bickmore (2003) found that people tend to have stronger relationships with software agents that express feelings and adapt to contextual changes than those without these capabilities. Hence, social presence, which arises from personification of the user interface or media displayed on mobile devices, is expected to grow PSR. We, therefore, hypothesised that:

Hypothesis 3: Social presence felt by the user in the interface of a mobile device is positively associated with his or her PSR with the device.

3.4 Perceived advertisement exposure

The advertisement exposure variable was included in the proposed research model for comparison purposes. The direct impact of advertisement exposure on user satisfaction was compared with that on PSR. Greater exposure to an interface or medium contributes to development of PSR (Rubin and McHugh, 1987; Levy, 1979; Park and Lennon, 2004). Thus, exposure to the advertisement of a mobile device may strengthen the PSR between the device and the user. Repeated opportunities to observe the device indirectly or experience it from the viewpoint of others through advertisements can positively affect PSR with a mobile device.

Exposure to advertisement has been widely regarded as a determinant of positive identification with a product. Hence, advertisement indirectly affects a person's intention to purchase the product (Allenby, 1999). Advertisement is a useful means for customers to gain knowledge about products and services, to identify their merits and to take note of possible demerits (Bei and Widdows, 1999). Exposure to advertisements about a mobile device may, therefore, enhance user satisfaction with the device. Thus, we hypothesised that:

Hypothesis 4: A person's exposure to advertisement about a mobile device is positively associated with his or her PSR with the device.

Hypothesis 5: A person's exposure to advertisement about a mobile device is positively associated with his or her satisfaction with the device.

3.5 Para-Social Relationship (PSR)

A perceived PSR has been referred to as a 'quasi-friendship', which is more than just an acquaintance (Koenig and Lessan, 1985). Originally, the notion of PSR was related to mass media characters such as television actors. Compared with actual human relationships, PSR is less intense. It is described as having a sense of friendship with virtual characters who are on display in some media setting. PSRs are one-way and device-mediated relationships. Since the advent of this concept, the IT world has witnessed two major changes: vast improvement in software intelligence and device diversification.

Improved software intelligence has made user interfaces more realistic and smart. Stimulating communication between users and mobile devices is possible via software agents or avatars. Software agents may take action on the user's behalf in the form of information gathering, notifications and recommendations. Some agents are even capable of interaction with users through voice synthesis and natural language processing. Avatars are depicted as humans or other living characters favourable to users. Avatars are

often combined with software agents to offer the illusion of higher intelligence to device users. Communication with human-like software programs is one of the most obvious trends towards improved experiences with mobile devices.

The second big change in the IT world is device diversification. Communications mediated by software agent technologies are increasingly populated by a variety of devices, including mobile devices. PSR with mobile devices seems natural, as they have become more intelligent than conventional media devices such as televisions.

User satisfaction with a mobile device may be triggered by cognitive, affective, or hybrid factors. Affective satisfaction with a mobile device is expressed in emotional language such as 'delightful' and 'pleased' (Spreng et al., 1996). PSR is closely related to a user's emotional condition. Previous research has indicated that the intensity of PSR can have a positive effect on product sales (Park and Lennon, 2004). Theories of user satisfaction have also implied a positive relationship between PSR and user satisfaction (Park and Lennon, 2004). Consequently, PSR with a mobile device may lead to higher user satisfaction with that device. On the basis of this, we hypothesised that:

Hypothesis 6: A person's PSR with a mobile device is positively associated with his or her satisfaction with that device.

3.6 User satisfaction

According to the theories of expectancy disconfirmation, equity and needs, user satisfaction is a function of IT performance, IT performance expectations, equitable work performance fulfilment, equitable relatedness fulfilment and equitable self-development fulfilment (Au et al., 2008). Expectation–confirmation theory suggests that user satisfaction with a product or service is the primary motivation for its continuance (Oliver, 1980). Strong empirical support has been provided for a positive relationship between user satisfaction and actual IT use (Athanassopoulos et al., 2001; Iivari, 2005). The satisfaction of end-users is strongly related to a positive estimate of IT performance and a key indicator of IS success (DeLone and McLean, 1992; Susarla et al., 2003). User satisfaction with IT is more relevant to post-adoption than pre-adoption because of its experiential nature. This finding is supported by the evidence that user satisfaction results in continuance intention (Wu et al., 2007), repurchase intention (Anderson and Sullivan, 1993) and higher customer retention (Bolton, 1998; Rust et al., 1995). On the basis of these results, we expect that:

Hypothesis 7: A person's satisfaction with a mobile device is positively associated with its usage continuance.

4 Research method

4.1 Survey questionnaire

The purpose of the current research was to elucidate the role of key social factors that enhance PSR with a mobile device and their influences on consumer satisfaction and subsequent usage continuance. To this end, a survey questionnaire was developed

and pretested with 60 graduate students from a university. The students were asked to complete the questionnaire and provide feedback about the clarity of its statements. The survey items were modified based on their suggestions. Finally, to ensure the readability and logical flow of the questionnaire, three domain experts were asked to peruse a copy. Their comments and suggestions were incorporated into the final version of the questionnaire. In addition to the studied variables, the questionnaire also collected demographic information from participants including age, gender, occupation and the type of mobile device currently in use.

The measures used in this paper were mainly adapted from relevant prior studies. The items for task attraction were borrowed from McCroskey and McCain (1974). Social presence, which refers to the extent a mobile device is recognised as a human-like social being, was measured using items from the study of Gefen and Straub (2004). PSR with a mobile device was measured by modifying the survey items of Schiappa et al. (2006) from the context of television to the mobile device setting. To measure the extent of advertisement exposure, researchers generally use objective indicators such as average audience rating or exposure time (Stevens, 2008). However, given the practical difficulties in measuring individual exposure time to a mobile device using an objective metric, this study relied on respondents' estimations of advertisement exposure by viewing frequency. Because the goal was to predict continued usage of a currently owned device (or repurchase of the same model), the user's post-adoption satisfaction with his or her mobile device was measured. Thus, the questionnaire items of Spreng et al. (1996) were adopted to assess overall satisfaction with the mobile device. Appendix A lists the survey items.

4.2 Subjects

The survey was conducted by commission through a specialised survey organisation with experience in procuring and managing pools of subjects. Prior to data gathering, the main purpose of this study was explained and the meaning of PSR, the core construct of this study, was elaborated. Then, the following operational details were established. First, for improved generalisability, a random sampling was conducted with a similar ratio between males and females. In addition, the target population group consisted of adults with the economic ability to purchase cell phones and subscribe to cell phone services. This precluded the economic ability factor from complicating the data analysis by controlling for the effect of product/service costs on usage continuance.

Survey responses were based on the 7-point Likert scale and obtained through the online survey. The survey firm e-mailed the questionnaire to a randomly selected group of 1050 people. Since the institution was independent from the mobile phone industry, no sampling bias was believed to be present. In total, 507 responses were returned (response rate: 48%). Two responses were excluded owing to incompleteness, leaving 505 responses available for statistical analysis. The sample consisted of slightly more male respondents (51.9%) than females. Most were in their 20s (29.5%) and 30s (39.6%), and most were company employees (68.5%). All respondents used ordinary cell phones (43.9%) or smart phones (56.0%) as mobile devices. The descriptive statistics relating to the subjects included in this study are summarised in Table 1.

Table 1 Characteristics of subjects

Categories		*Number*	*Percentage*
Gender	Male	262	51.88
	Female	243	48.12
Age	<20	37	7.33
	20s	149	29.50
	30s	200	39.60
	40s	103	20.40
	≥50	16	3.17
Occupation	Employee	346	68.51
	Student	69	13.66
	Household	31	6.14
	Misc.	59	11.68
Mobile device	Cell phone	222	43.96
	Smart phone	283	56.04

4.3 Validity testing

To explore the discriminant and convergent validity of the sample data set, the constructs were tested using exploratory factor analysis. To determine a fixed scale, one loading was set as equal to 1 in each factor. Following Hair et al.'s (1998) recommendation, factor loadings >0.60 were considered to be significant. The factor analysis confirmed both the discriminant and the convergent validity of the studied constructs (see Appendix B). Next, the internal consistency of each construct was tested using Cronbach's alpha and Average Variance Extracted (AVE). If Cronbach's alpha was >0.7 and AVE exceeded 0.5, the construct was presumed to be reliable. As summarised in Table 2, Cronbach's alpha of all variables was >0.7 (0.899~1.000). AVE also exceeded 0.5 in all cases (0.713~1.000).

Table 2 The results of construct reliability and AVE testing

Research variable	*Cronbach's alpha*	*AVE*
Task attraction	0.899	0.713
Social presence	0.945	0.820
Perceived ad exposure	0.917	0.802
PSR with mobile device	0.930	0.789
User satisfaction	0.920	0.757
Usage continuance	1.000	1.000

5 Results

The full model of hypothesised relationships was tested using partial least squares analysis. The standardised path coefficients for the research model are shown in Figure 2

and those with statistical significance at the $p = 0.01$ level are marked. Consistent with H2 and H5, task attraction and perceived advertisement exposure were positively associated with user satisfaction ($t = 8.250$, $p < 0.01$; $t = 7.047$, $p < 0.01$, respectively). Supporting H3 and H4, social presence and advertisement exposure were significantly associated with PSR ($t = 21.689$, $p < 0.01$; $t = 4.640$, $p < 0.01$, respectively). Unlike hypothesis H1, task attraction had no significant bearing on growing PSR with a mobile device, although it was positively related to user satisfaction. Hypothesis 6, in which PSR with a mobile device was positively related to user satisfaction ($t = 5.325$, $p < 0.01$), was supported. Lastly, a strong causality from user satisfaction to usage continuance was observed, supporting H7 ($t = 7.612$, $p < 0.01$).

The results of hypothesis testing are summarised in Table 3.

Figure 2 Path coefficients of the research model

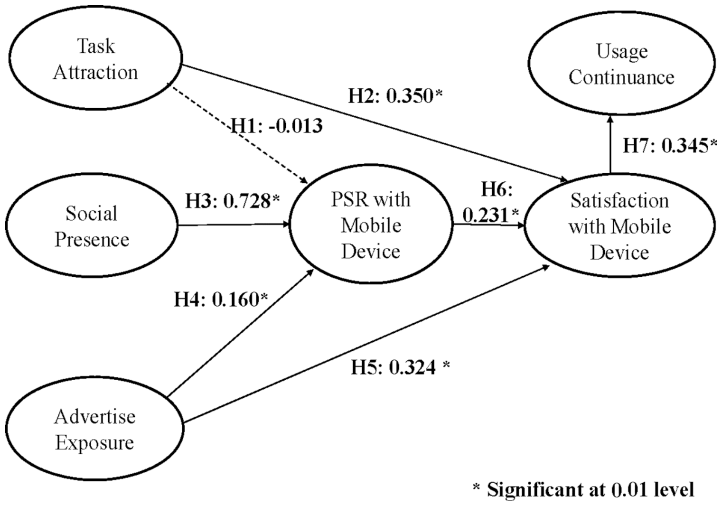


Table 3 Summary of hypothesis testing

Hyp.		*Path*		*Coef.*	*SD*	*t-value*	*Result*
H1	Task attraction	→	PSR	–0.014	0.031	0.440	Not supported
H2	Task attraction	→	User satisfaction	0.350	0.042	8.250*	Supported
H3	Social presence	→	PSR	0.728	0.034	21.689*	Supported
H4	Advertisement exposure	→	PSR	0.160	0.035	4.640*	Supported
H5	Advertisement exposure	→	User satisfaction	0.324	0.046	7.047*	Supported
H6	PSR	→	User satisfaction	0.231	0.043	5.325*	Supported
H7	User satisfaction	→	Usage continuance	0.345	0.045	7.612*	Supported

*$p < 0.01$.

Moreover, the *t*-test was conducted to compare smart phones and ordinary cell phones. We assumed that smart phones enabled a better user interface owing to their sensors and multiple applications. As a result, users scored smart phones significantly higher than

ordinary phones in terms of all constructs including PSR and continuance intention as shown in Table 4. This implies that smart phone applications provided a better interface that facilitated formation of PSR.

Table 4 Mean scores for the research variables

Research variable	*Smart phone users* (*n = 283*)	*Ordinary cell phone users* (*n = 222*)	*t-value* (*two-tailed*)
PSR with mobile device	3.491	3.104	3.082*
	(1.426)	(1.365)	
Task attraction	5.067	4.644	3.722*
	(0.995)	(1.445)	
Perceived ad exposure	4.389	3.603	6.033*
	(1.404)	(1.515)	
Social presence	3.538	3.169	2.919*
	(1.498)	(1.339)	
User satisfaction	4.961	4.210	7.009*
	(1.084)	(1.276)	
Usage continuance	5.660	4.880	5.464*
	(1.564)	(1.619)	

*$p < 0.01$.

6 Discussion

6.1 Analysis of findings

Users can develop a PSR with a mobile device. The growth of that PSR is significantly affected by social presence and exposure to commercial advertisement. The very strong tie between social presence and PSR underscores the critical importance of interface design (e.g., personification of media and adaptive reactions to contextual changes), which can build the sense of intimacy. A positive effect was demonstrated of the exposure to product advertisement on the formation of PSR with a mobile device. Studies have shown that advertisement not only enhances a customer's loyalty to a mobile device (Clow et al., 1997), but also plays a role in shaping the image of that device as a relationship partner.

The perceived strength of a mobile device in effectively supporting user tasks (task attraction), however, had no effect on PSR. This result implies that the utility-driven design (e.g., support for individual tasks, convenient navigation and usefulness) of a mobile user interface is distinct from that of other IT products, and that it projects and fosters a sense of relationship. This result may also indicate that if a person's main motivation to use a mobile device is to take advantage of its many functions (i.e., highly utility-oriented), development of a PSR may be limited. On the other hand, people react to product designs differently. Differences in personality and demographics, and usage situations and their effects on PSR will provide the focus for important future research. Furthermore, other variables may be identified that influence the growth of PSR.

All independent variables (i.e., task attraction, social presence, advertisement exposure and PSR) included in the study directly and indirectly promoted satisfaction with mobile devices and subsequently prolonged their usage. From the traditional perspective of the utility value of an IT product, the positive effect on user satisfaction of mobile devices' ability to support user tasks is not surprising (Rubin and Step, 2000). In addition, the significant association between exposure to advertisement about mobile devices and user satisfaction affirms the role of the former in forming a favourable image and expectations of a product in the minds of consumers (Clow et al., 1997).

The direct role of PSR and the indirect effect of social presence on user satisfaction were comparable with that of task attraction. This result highlights the importance of taking socio-relational factors into account to explain the success of mobile IS.

6.2 Theoretical and practical implications

The findings of this study have both theoretical and practical implications. First of all, the study reveals that, in addition to the traditional critical success factors, social relationship factors must be considered in assessing the potential of mobile technologies in terms of user satisfaction, post-adoption usage and overall success. Traditional metrics of IS quality tend to focus on task-oriented and utility-driven aspects (DeLone and McLean, 1992, 2003). Enterprise-level IS focuses on undertaking business tasks effectively and efficiently. When mobile devices are utilised in the personal context, however, traditional success factors must be complemented by socio-relational forces such as PSR to explain user behaviours and system usage intentions, as indicated by the results of this study.

The study has implications for industry practitioners. First, PSR with a mobile device has a direct effect on user satisfaction with that device, and therefore plays an important role in the duration of its usage. Prolonged usage of a mobile device often results in repurchase of the same device if the current one has to be replaced. The implications of PSR with mobile devices exceed those of brand relationship or brand loyalty. Brand loyalty theory states that brand loyalty is the strength of the connection formed between the customer and the brand. Brand loyalty makes the brand–customer relationship more stable (Fournier, 1998). The concept of brand relationship comes from a different angle: strong brand relationships result in brand richness. Brand relationship is based on the belief that emotional ties caused by the brand–customer relationship make customers more satisfied with the brand. In comparison with the brand relationship and brand loyalty theories, the PSR theory argues that the right personification of a mobile device through its media and user interface is positively related to post-adoption satisfaction and continued usage of a mobile device. Hence, the PSR is a form of personification, and the relationship between mobile devices and their users is, therefore, different from that between brands and their customers (Fournier and Yao, 1997).

In this study, the positive relationship between PSR with a mobile device and social presence underscored the importance of an intimate user interface design. This design must encompass traditional utility dimensions (e.g., convenience and ease of use), but must also encourage a PSR (e.g., personification) and formation of intimacy. Thus, a user agent or human-like display such as an avatar may be more effective in growing PSR than a text or image-based interface. The results of this study reveal that projecting a social presence on a mobile device is crucial to form a social affinity between the device and its user.

The influence of advertisement in growing PSR emphasises the importance of customer experience management as a marketing tool in business practice. As Berry et al. (2002) pointed out, customer experience management is based on the philosophy that "companies must manage the emotional component of experiences with the same rigour they bring to the management of product and service functionality (p.87)". Customer experience management is more than just customer relationship management; it involves maximisation of customers' emotional experiences through advertisement. The findings of this study that PSR is affected by perceived advertisement exposure also support the notion.

The results of this empirical study show that the smart phone is superior to ordinary phones in terms of PSR, user satisfaction and continuance intention. Thus, mobile device developers can benefit from adopting user interface technology that encourages PSR. For example, the iPhone's Siri application, which provides a natural language user interface, enables intelligent, emotive and personal contact like a friend or assistant between users and their phones. Highly effective user interfaces must provide more than just messaging; IT developments such as natural language processing or voice recognition systems demonstrate this reality. The interface of mobile devices is becoming intelligent enough to build social relationships with users, which is essential for user satisfaction and continuance intention.

6.3 Limitations and future research

There are limitations to this research. The potential role of user demographics in moderating the effect of the studied constructs was not considered. Relationships may be affected by various contextual factors; thus, user demographics such as gender and age influence the dynamics of all social relationships, including those between users and their mobile devices. Future research should also consider the effect of certain dimensions of information and system quality, including the design aspect of human–device interactions, on users' socio-relational perceptions and development of PSR. Depending on the nature of the study, these aspects of information and system quality may be considered as independent variables or contextual variables that must be controlled. Lastly, PSR theory can be extended to the context of user satisfaction with and continued usage of future intelligent systems such as the highly embedded pervasive IS, which allows us to interact with computing devices through new input modalities and system capabilities (Kourouthanassis et al., 2007).

7 Conclusion

This paper includes socio-relational factors rooted in relationship and communication theories in its analysis of the success of mobile information systems. We successfully demonstrated the existence of PSRs between mobile devices and their users. A very strong association was observed between this social bond and user attitudes (satisfaction) and behaviour (usage continuance). The user interface design of a mobile device was shown to shape the user's relational attitude towards that device. A comparison of the effects of task attraction, social presence and perceived advertisement exposure, which are key antecedent variables of PSR, on user satisfaction and subsequent usage suggested that the success of a mobile system cannot be fully explained by rational and utility

theories. The highly individualised relationship between a mobile device and its user can make a significant difference to user satisfaction and continued usage. These findings demonstrated that understanding user behaviours in relation to portable devices demands a perspective different from those applied to traditional enterprise-level IS.

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Appendix A

Survey items

Constructs	*Items*	*References*
Task Attraction (TA)	TA1: My mobile device helps me when I am doing my task.	McCroskey and McCain (1974)
	TA2: I have confidence that my mobile device is useful for my task.	
	TA3: I would use my mobile device first if something happened to me.	
	TA4: My mobile device is useful for my task.	
Social Presence (SP)	SP1: There is a sense of human contact in the interface of my mobile device.	Gefen and Straub (2004)
	SP2: There is a sense of personalness in the interface of my mobile device.	
	SP3: There is a sense of human warmth in the interface of my mobile device.	
	SP4: There is a sense of sociability in the interface of my mobile device.	
	SP5: There is a sense of human sensitivity in the interface of my mobile device	

Appendix A (continued)

Survey items

Constructs	*Items*	*References*
PSR with mobile device (PSR)	PSR_IN1: I feel like I am seeing my favourite friend when I see the interface of my mobile device.	Schiappa et al. (2006) and Cole and Leets (1999)
	PSR_IN2: I feel intimate with the interface of my mobile device as if it were my friend.	
	PSR_IN3: I would like to meet a person like the interface of my mobile device.	
	PSR_IN4: My mobile device makes me feel comfortable, as if I am with family.	
	PSR_IN5: I like using my mobile device in private space.	
Perceived Advertising Exposure (AE)	AE1: I often saw advertising about the mobile device that I use before I purchased it.	Stevens (2008)
	AE2: I saw the advertising of my mobile device everywhere.	
	AE3: I clearly remember the advertising about the mobile device that I use.	
Satisfaction (SAT)	SAT1: I am very pleased with the mobile device.	Oliver and DeSarbo (1988) and Spreng et al. (1996)
	SAT2: I feel relieved that the mobile device meets my needs.	
	SAT3: I feel delighted with the mobile device.	
	SAT4: Overall, I am very satisfied with mobile device.	
Usage continuance	Will you continue to use the mobile device or choose the same model if it has to be replaced?	

Appendix B

Exploratory factor analysis

		Factor loading				
Research variable	*Measurement item*	*Factor 1*	*Factor 2*	*Factor 3*	*Factor 4*	*Factor 5*
Task Attraction	TA1	0.090	*0.864*	0.192	0.087	0.043
	TA2	0.087	*0.828*	0.289	0.074	0.010
	TA3	0.196	*0.718*	0.290	0.101	-0.068
	TA4	0.294	*0.723*	0.044	0.099	0.213
	TA5	0.164	*0.836*	0.154	0.057	0.212
Social Presence	SP1	*0.834*	0.219	0.104	0.174	0.207
	SP2	*0.844*	0.180	0.156	0.188	0.207
	SP3	*0.867*	0.142	0.124	0.096	0.272
	SP4	*0.765*	0.250	0.180	0.173	0.216
	SP5	*0.806*	0.143	0.154	0.149	0.293

Appendix B (continued)

Exploratory factor analysis

		Factor loading				
Research variable	*Measurement item*	*Factor 1*	*Factor 2*	*Factor 3*	*Factor 4*	*Factor 5*
Perceived Advertisement Exposure	AE1	0.148	0.123	0.208	*0.846*	0.080
	AE2	0.195	0.124	0.185	*0.847*	0.200
	AE3	0.212	0.063	0.218	*0.854*	0.094
	AE4	0.105	0.062	0.242	*0.798*	0.170
PSR with Interface	PSR_IN1	0.574	0.115	0.155	0.166	*0.685*
	PSR_IN2	0.567	0.085	0.153	0.160	*0.701*
	PSR_IN3	0.502	0.057	0.143	0.131	*0.736*
	PSR_IN4	0.538	0.089	0.158	0.186	*0.689*
	PSR_IN5	0.216	0.181	0.314	0.271	*0.600*
Satisfaction	SAT1	0.057	0.297	*0.788*	0.243	0.007
	SAT2	0.095	0.294	*0.801*	0.263	0.099
	SAT3	0.285	0.187	*0.717*	0.182	0.324
	SAT4	0.271	0.175	*0.747*	0.156	0.309
	SAT5	0.118	0.168	*0.823*	0.232	0.098