GAMIFIED INFORMATION SYSTEMS AND USER ENGAGEMENT

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ABSTRACT

Gamification, the use of game design elements in non-game contexts (Deterding, Dixon, Khaled, & Nacke, 2011), is permeating various types of information systems (IS) and becoming an important way of engaging IS users. Despite the potential benefits of gamification, organizations often have difficulty sustaining user engagement with a gamified IS. This paper focuses on how a gamified IS can be designed to engage users and motivate them to continue system use. Drawing on the affordance theory, motivation theory, flow theories, and gamification research in the IS field, a theoretical model is developed to investigate the impacts of gamification on IS user engagement and continuance intention. The model proposes the positive effect of gamification affordances of a gamified IS on users' experience of cognitive absorption, the mediating effect of satisfaction of users' motivation needs on the relationship between gamification affordances and aesthetic experience, and the positive effects of cognitive absorption and aesthetic experience on users' continuance intention to use the gamified IS. By providing an understanding of how various game components improve users' experiences and foster their engagement with an IS, this paper will offer guidelines on how to appropriately design and implement gamification features to engage IS users over time.

Keywords: gamification, motivational needs, cognitive absorption, aesthetic experience, continuance intention

INTRODUCTION

In recent years, the study of gamification, the use of game design elements in nongame contexts to engage users (Deterding, Dixon, Khaled, & Nacke, 2011), has gained much attention in the IS field. Gamification is permeating many different types of information systems for existing business activities to make tasks more engaging for employees and consumers and to improve organizational outcomes (Kumar, 2013; Stanculescu, Bozzon, Sips, & Houben, 2016). For example, companies use points, badges, levels, trophies and virtual goods to reward employees when they reach milestones, take part in challenges, establish new goals, or win competitions in work-related activities, e.g., knowledge sharing, sales performance, idea competition, and training and education (Suh, Cheung, Ahuja, & Wagner, 2017). Customers also receive rewards from companies for sharing on social media, purchasing from partners and engaging in other loyalty activities (Liu, Santhanam, & Webster, 2017).

Gamified information systems (IS) incorporate game design elements into target information systems while retaining the target systems' instrumental functions (Liu et al., 2017). Despite the widespread belief in the potential benefits of gamification, some researchers have pointed out that it is difficult to maintain sustained user engagement with a gamified IS because the effects of game elements are often short-lived (Kankanhalli, Taher, Cavusoglu, & Kim, 2012; Nicholson, 2013;

Suh, 2015; Suh et al., 2017). As the novelty of game elements diminishes over time, many users of gamified IS discontinue their engagement with the system in a few months after their initial system use (Hamari & Koivisto, 2015; Patel, Asch & Volpp, 2015; Suh et al., 2017). Continuous post-adoption IS usage is critical for the long-term viability and eventual success of IS (Karahanna, Straub, & Chervany, 1999; Bhattacherjee, 2001; Thong, Hong, & Tam, 2006). On the one hand, the benefit or value of a gamified IS cannot be achieved without continued usage of the system; and on the other hand, failure to maintain users' continued usage of the gamified IS will lead to unrealized return on companies' investment in gamifying IS and loss of the opportunity to utilize emerging new technologies to engage users (Suh et al., 2017). Hence, it is crucial to understand the underlying mechanisms for successful gamification that promotes user engagement with a gamified IS and encourages user toward continued system use.

User engagement reflects the level of a user's motivational state of mind characterized by specific levels of cognitive, emotional and behavioral investment in certain interactions with an information system (Hollebeek, 2011). Thus, the fulfillment of motivational needs is central to fostering user engagement. Gamified IS that satisfies users' motivational needs not only attracts users but also makes users really want to use the system and cannot live without it (Zhang, 2008). This paper attempts to explore successful gamification characteristics in a gamified IS and their impacts on the fulfillment of IS users' motivational needs, their engagement with and continuance intention to use the system.

THEORETICAL BACKGROUND

User Engagement

User engagement combines behavioral, cognitive and affective responses when using information systems (O'Brien & Toms, 2008; Wiebe, Lamb, Hardy, & Sharek, 2014). It is characterized by specific levels of cognitive (Hollebeek, 2011; Laurel, 1993), affective (Hollebeek, 2011; Jacques, 1996; Jacques, Preece, & Carey, 1995; Jones, 1998), and behavioral (Kappelman, 1995; Hollebeek, 2011; Hutchins, Holland, & Norman, 1986) investment in specific interactions with an information system, which makes the user want to be there (Jones, 1998). User engagement occurs progressively from initial "users' assessment of, and interaction with, an information system, followed by deeper absorption with the system and behavioral outcomes" (Oh, Bellur, & Sundar, 2015, p3). Users become totally involved with the system, thereby experiencing a sense of heightened enjoyment, immersive concentration, and time distortion. It has been suggested that engaging interactions involve attention (Webster & Ho, 1997), intrinsic interest (Jacques, 1996; Webster & Ho, 1997), interactivity (Quesenbury, 2003), perceived control and choice (Jacques et al., 1995; Webster & Ho, 1997), functionality (Jacques et al., 1995), and motivation (Makkonen, 1997).

The gamification literature differentiates between deep engagement (Lowry, Gaskin, Twyman, Hammer, & Roberts, 2012; Santhanam, Liu, & Shen, 2016; Suh et al., 2017) and meaningful engagement (Li, Dey, & Forlizzi, 2011; Nicholson, 2013; Suh et al., 2017). Suh et al. (2017) propose the concepts of flow experience and aesthetic experience as ways to respectively conceptualize deep engagement and meaningful engagement with gamified IS. Flow experience (Csikszentmihalyi, 1990), which is referred to as the experience of optimal fulfillment and

engagement, originated from Csikszentmihalyi's work on optimal experience (Csikszentmihalyi, 1990). The flow concept has been widely referenced across a variety of fields, including human computer interaction. Berger, Schlager, Sportt and Hermann (2017) utilize the theory of flow to explain the immersive experience customers feel when participating in a gamified activity characterized by a high level of interactivity and optimal level of challenge.

Flow is a multi-dimensional construct consisting of intense concentration, a sense of being in control, loss of self-consciousness, and altered sense of time (Csikszentmihalyi, 1990). The experience of flow reflects the depth of user engagement (Suh et al., 2017). Extending the flow concept to describe user's holistic flow experience with the technology, Agarwal and Karahanna (2000) introduced the concept of cognitive absorption in IS research. Cognitive absorption is composed of five dimensions of temporal dissociation, focused immersion, heightened enjoyment, control, and curiosity (Agarwal & Karahanna, 2000). Temporal association refers to "the inability to register the passage of time while engaged in interaction"; focused immersion is "the experience of total engagement" in the interaction while ignoring other attentional demands; heightened enjoyment casptures "the pleasurable aspects of the interaction"; control represents "user's perception of being in charge of the interaction"; and curiosity refers to "the extent to which the experience arouses user's sensory and cognitive curiosity" (Agarwal & Karahanna, 2000).

In addition to deep engagement that involves a sense of heightened enjoyment, immersive concentration, and time distortion (Lowry et al., 2012; Santhanam et al., 2016), some researchers argue that a gamified IS should be designed to help users experience a sense of meaning by providing a means for users to explore and reflect on the information obtained from their interactive activities with the system (Li et al., 2011; Nicholson, 2013). The literature on meaning (Little, 1998; Little, Salemla-Aro, & Phillips, 2007; McGregor & Little, 1998) suggests that people derive meaning from the activities that are consistent with the core aspects of the self (e.g., beliefs, values, traits and competences). Activities are perceived to be meaningful when they facilitate progress toward personal goals (McGregor & Little, 1998). Therefore, meaningful engagement arises from the personal connection between a user and his/her IS use (Suh et al., 2017).

Suh et al. (2017) introduce the concept of aesthetic experience to capture the extent of meaningful engagement a user experience while interacting with a gamified IS. Aesthetic experience reflects a user's state of mind in which he or she understands the meaning of his or her interactions with an IS (Kaptelinin & Nardi, 2009; McCarthy & Wright, 2004). Aesthetic experience complements flow experience and enriches our understanding of user engagement with an IS. While flow experience is manifested by a temporary immersion at a specific moment, aesthetic experience involves a continuing process of experience development and a sense of fulfillment that lasts beyond the end of the experience (Suh et al., 2017).

Drawing on the existing literature on aesthetic experience, Suh at el. (2017) identify three dimensions of aesthetic experience that capture the extent to which a user feels that he or she is meaningfully engaged with a gamified IS: meaning, self-expansion, and active discovery. The dimension of meaning refers to the extent to which an individual comes to understand the meaning of an activity (Bronowski, 1978; Dewey, 1934; McCarthy & Wright, 2004). The dimension of self-expansion is related to self-growth (Beardsley, 1970; Berlyne, 1971; McCarthy & Wright, 2004). It is the extent to which one's sense of self has expanded by knowing things or broadening one's perspective (Bronowski, 1978; Dewey, 1934; Jennings, 2000). The dimension of active

discovery refers to the extent to which an individual feels he or she is actively seeking answers or resolutions to cognitive challenges in order to achieve his or her personal goals (Suh et al., 2017). Suh et al. (2017) argue that these three dimensions combine to create the overall extent to which a user feels aesthetic experience while interacting with a gamified IS, and that the absence of any one of these three dimensions will reduce, but not completely eliminate, the overall extent of aesthetic experience a user feels.

Motivational Needs

User engagement is founded on motivations (Hollebeek, 2011a, 2011b). Motivation is defined as "an inner state of arousal that provides energy needed to achieve goals" (Higgins & Scholer, 2009) or as "the reasons underlying behavior" (Guay, Talbot, Belleau, & Lawler, 2010). The design of gamification features in an IS may affect users' motivations, which in turn influences their investment of resources in the interaction with the system (i.e., IS user engagement). People engage in activities based on intrinsic motivation and extrinsic motivation (Deci & Ryan, 2002).

Intrinsic motivation refers to the internal motivational drive to perform a certain activity for the sake of the activity itself and the inherent pleasure and satisfaction derived from the activity (Deci, Koestner & Ryan, 1999). In contrast, extrinsic motivation refers to the state in which an individual performs an activity to gain external benefits (e.g., money, rewards, and etc.) rather than participating in the activity for its own sake (Deci & Ryan 2002). While the impact of extrinsic motivations on people's engagement in the activity can be quick and intense, they are conditional on the continuous provision of incentives (Deci & Ryan, 2002). By contrast, intrinsically motivated individuals continually experience enjoyment, energized focus and involvement by partaking in the activity regardless of external incentive contingencies (Chandler & Chen, 2015; Ryan, Rigby, & Przybylski, 2006). Therefore, intrinsic motivations have a long-term influence on individuals' engagement behaviors. For example, some companies invite their customers who receive points or badges for engaging with their websites (e.g., logging-in, commenting, sharing, uploading photos, entering sweepstakes, and etc.) to participate in competitions, where the customers accumulating the highest number of points or badges are rewarded with prizes. Since intrinsically motivated individuals enjoy the processes of competing against and socializing with each other rather than the receipt of prizes, whether winning or losing the contests will have little impact on their future engagement. On the contrary, individuals with extrinsic motives focus on winning the contests rather than the social process of competition. As a result, their future participation is dependent on the continuous receipt of prizes. Some researchers argue that engagement is driven by intrinsic motivations directed toward a particular object (Jacques et al., 1995; Rigby, 2015). Utilizing gamification merely as a mechanism for extrinsic rewards will adversely affect the long-term effect of intrinsic motivation on user engagement (Rigby, 2015). Receiving extrinsic rewards through a gamification process has been shown to weaken users' intrinsic motivation (Kim and Ahn, 2017). If the goal is to foster long-term user engagement, a solely reward-based gamification system that attempts to stimulate extrinsic motivations might be less effective, due to the risk of replacing long-lasting intrinsic rewards with unsustainable and ever-increasing needs for extrinsic incentives (Hamari, Koivisto, & Sarsa, 2014). Therefore, gamification should maintain a focus on fulfilling intrinsic motivations to engage users (Hofacker, Ruyter, Lurie, Manchanda, & Donaldson, 2016).

The self-determination theory suggests three basic intrinsic psychological needs of human being: the need for competence, the need for autonomy, and the need for social relatedness (Deci & Ryan, 1985; Ryan & Deci, 2002; Ryan, 1995). The need for competence refers to the desire to achieve efficiency and success while interacting with the environment (Rigby & Ryan, 2011; Vansteenkiste & Ryan, 2013; White, 1959). It is assumed that every human strives to feel competent, for example, to acquire the skills necessary to perform a task efficiently. The need for autonomy refers to the feeling of psychological freedom and the need to make self-determined choice in the initiation, regulation and performance of behavior on the basis of one's own values and interests without external pressure or enforcement (Deci & Ryan, 2012; Ryan & Deci, 2002; van den Broeck, Vansteenkiste, Witte, Soenens, & Lens, 2010; Vansteenkiste, Niemiec, & Soenens, 2010; Vansteenkiste, Williams, & Resnicow, 2012). The need for social relatedness refers to one's need to engage in interpersonal relationships and establish close emotional bonds, belonging and attachments with other people. It represents the basic desire of the individual to be emotionally connected and interpersonally integrated with the social environment (Baumeister & Leary, 1995; Deci & Ryan, 1985, 2000; Deci & Vansteenkiste, 2004).

Applying the rich intrinsic motivation concept from social psychology to the IS context, Li, Hsieh and Rai (2013) propose a comprehensive conceptualization of intrinsic motivational needs to explain IS usage behaviors in the IS post-adoption stage. They suggest that intrinsic motivation for IS usage consists of three core aspects: the motivational need for accomplishment, the motivational need to know, and the motivational need to experience stimulation (Vallerand, Blais, Briere, & Pelletier, 1989; Vallerand, Fortier, & Guay, 1997; Vallerand, Pelletier, Blais, Briere, Senecal, & Vallieres, 1992; 1993). Specifically, the motivational need for accomplishment is concerned with the pleasure and satisfaction individuals experience when trying to solve problems or accomplish something in IS usage (Li, Hsieh, & Rai, 2013; Nicholls, 1984; White, 1959). Although it is directed toward accomplishing certain end results, its focus is on the process of overcoming difficulties and achieving accomplishments when using IS (Vallerand, 1997). The motivational need to know relates to the enjoyment experienced when individuals are learning or exploring new things in IS usage (Berlyne, 1971; Brophy, 1987; Li, Hsieh, & Rai, 2013). The motivational need to experience stimulation pertains to the intense feeling of pleasure associated with IS usage (e.g., Csikszentmihalyi, 1978; Li, Hsieh, & Rai, 2013; Zuckerman, 1979). These three types of intrinsic motivational needs for IS usage are driven by individuals' innate intrinsic needs for competence, relatedness, and autonomy (Deci & Ryan, 2002; Li, Hsieh, & Rai, 2013; Vallerand, 1997). For instance, the motivational need for accomplishment arises from individuals' need to prove their competence in using IS and interact effectively and proficiently with IS (Kowal & Fortier, 2000). The motivational need to know is stimulated when individuals feel that learning or trying to understand new things in IS usage involves interpersonal relationships and interactions with others (e.g., coworkers, IS specialists, and etc.), providing them with a sense of belongingness and satisfying their need for social relatedness (Lee, Cheung, & Chen, 2005; Wegner, McDermott, & Snyder, 2002). The motivational need to experience stimulation is driven by individuals' need for autonomy, which enables them to freely explore and search for information and enjoy a variety of choices and experiences when interacting with IS (DeCharms, 1968; Steenkamp & Burgess, 2002).

Gamification Affordance

Many IS researchers suggest that a gamified IS should be designed in such a way that its technological features create certain affordances that can engage users, thereby leading to IS continuance. The theory of affordance provides an analytical link between gamification features and user experiences (Van Vugt, Hoorn, Konijn, & de Bie Dimitriadou, 2006; Suh et al., 2017). An affordance is a combination of actual and perceived properties of a thing, primarily those that determine how the thing can be used (Norman, 1998). The gamification affordance refers to the set of actionable properties between gamification and users (Gibson, 1977; Suh et al., 2017). The central tenet of affordance theory is that specific technological functions or features alone do not determine technological capabilities, which instead exist as part of the relationships between users and technological artifacts in specific situations (Leonardi, 2011). In other words, the usability of technological features lies in what a technology affords and whether the affordances allow individuals to perform specific actions that may satisfy certain needs (Norman, 1998).

Some commonly implemented gamification components in an IS include points, levels, leaderboards, badges, and trophies. According to affordance theory, different users can use a technological feature of an IS in different ways; and an individual may achieve the same objective using different IS features (Suh et al., 2017). One person may consider achieving a higher level as a challenge to accomplish increasingly difficult tasks, thereby stimulating a sense of progress and achievement. However, another individual may regard levels as a kind of reward for his/her activities. Leaderboards illustrate game results by displaying participants' names in a descending order based on the number of points obtained by each participant. Some users may regard leaderboards as an opportunity to compete with others, whereas others may use leaderboards for goal setting or progress tracking. Hence, the gamification components provide ways to implement certain affordances within a gamified IS.
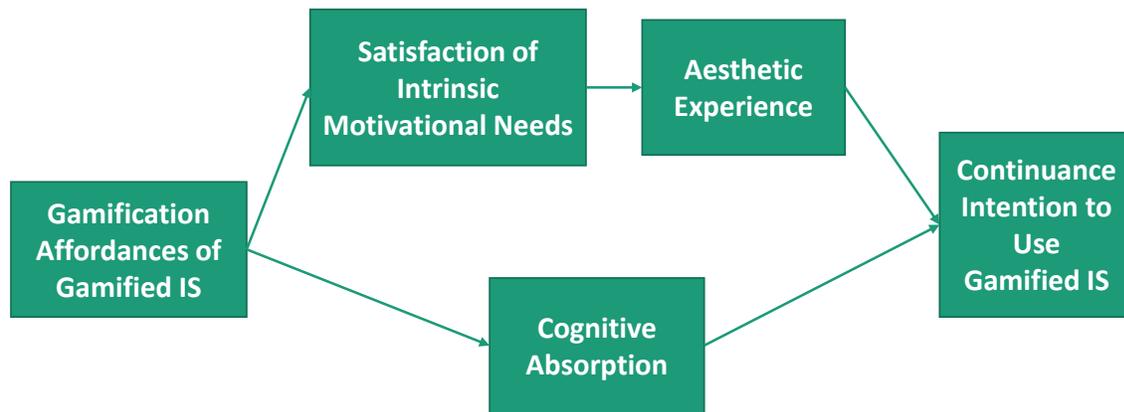
A gamified IS generally provide the following gamification affordances: feedback, education, challenges, rewards, competition, status, self-expression and cooperation (Suh et al., 2017; Weiser, Bucher, Cellina, & De Luca, 2015). Feedback includes the information on a user's current state, such as the currently performed behavior, within a gamified IS. Education provides users with the knowledge to achieve the intended target behaviors within a gamified IS. A challenge is something (e.g., a task or problem) difficult to achieve within a gamified IS. Rewards are things given to users as a payoff because of what they have achieved within a gamified IS. Competition involves comparing one's performance with those of others within a gamified IS. Status allows users to improve their standing by achieving predefined goals or reaching specific milestones within a gamified IS. Self-expression enables users to create unique identities of themselves within a gamified IS. Cooperation is the collaborative process whereby several parties work together to achieve something (e.g., the solution of a problem) within a gamified IS (Weiser et al., 2015).

THEORETICAL FRAMEWORK AND PROPOSITIONS

Drawing on the motivation theory, flow theories, affordance theory, and gamification research in the IS field, this paper proposes a theoretical framework of gamification affordances, user engagement and continuance intention of gamified IS (Figure 1). The framework employs the concepts of aesthetic experience and cognitive absorption to conceptualize user engagement and

highlights the mediating role of satisfying motivational needs in the relationship between gamification affordances and aesthetic experience, which reflects meaningful engagement.

Figure 1. Theoretical Framework of Gamification Affordances, User Engagement and Continuance Intention of Gamified IS

Gamification affordances (e.g., feedback, education, challenges, rewards, competition, status, self-expression and cooperation) provide a gameful experience that fosters the five dimensions of cognitive absorption — temporal dissociation, focused immersion, heightened enjoyment, control, and curiosity (Hammedi, Thomas, & Poncin, 2019). IT users are likely to experience cognitive absorption when they have clear goals, the technology is stimulating and responsive, and the task challenges and users' skills are both high (Csikszentmihalyi, 1997; Agarwal & Karahanna, 2000). Prompt feedbacks, clear rewards and goals, and challenges posed by competitors enable users to focus on the essentials of an activity (Przybylski, Rigby, & Ryan, 2010), leading to focused immersion in IS usage. The abilities to express a unique self and to cooperate with others increase the levels of perceived copresence with other participants (Suh et al., 2017), which in turn leads to an immersed focus on the given tasks and heightened enjoyment while using an IS (Kim, Suh, & Lee, 2013). Additionally, the self-expression affordance fosters a sense of freedom that encourages curiosity and time distortion (Malone, 1981). While the challenge affordance presents different levels of challenges to users, user education can offer advice on concrete tasks users should perform to meet the challenges and provide users with a sense of control over the situation that they encounter while using an IS. And the status affordance allows users to improve their levels by adjusting their skills to the levels of the given challenges (Suh et al., 2017). Accordingly, the following proposition is formulated.

Proposition 1: The gamification affordances of a gamified IS will positively influence users' experience of cognitive absorption.

Previous IS studies have provided evidence that the experience of cognitive absorption with an IS reflects a state of total immersion, deep absorption and heightened enjoyment, which in turn leads to users' continuance intention with the system (Agarwal & Karahanna, 2000; Deng, Turner, Gehling, & Prince, 2010). In line with the evidence indicating the importance of cognitive absorption for IS continuance, gamification researchers suggest that flow experience (i.e., cognitive absorption) is an important psychological state in which a user is deeply engaged and

involved with a gamified IS, which increases a user's continuance intention (Hamari & Koivisto, 2015; Hamari, Shernoff, Rowe, Coller, Asbell-Clarke, & Edwards, 2016). Hence, the following proposition can be suggested.

> Proposition 2: The experience of cognitive absorption with a gamified IS will positively influence users' continuance intention to use the system.

While cognitive absorption reflects deep engagement, meaningful engagement is also required to establish meaningful connections between users' own needs and IS use (Nicholson, 2015). Gamification affordances may initially increase the depth of user engagement with and continuance intention to use a gamified IS. However, users may not continually use the system unless they feel that the system meaningfully engage them (Suh et al., 2017). In the context of IS usage, meaning refers to the personal connection between a user and the IS usage (Suh et al., 2017). Aesthetic experience characterizes a user's meaningful engagement with a gamified IS (Suh et al., 2017). It reflects a user's state of mind in which the user understands the meaning of his or her interactions with an IS (Bronowski, 1978; Dewey, 1934; McCarthy & Wright, 2004), experiences self-growth by knowing new things or broadening his or her perspective (self-expansion) in IS usage (Bronowski, 1978; Dewey, 1934; Jennings, 2000), and actively seeks resolutions to achieve his/her personal goals (actively discovery) in IS usage (Suh et al., 2017). Being an intrinsically motivated concept (Jacques et al., 1995; Rigby, 2015), meaningful user engagement with a gamified IS is founded on the fulfilment of intrinsic motivational needs for IS use, i.e., the motivational need for accomplishment, the motivational need to know, and the motivational need to experience stimulation. Accordingly, satisfying these motivational needs can lead to more meaningful user engagement by enabling users to feel a strong sense of accomplishment, greater self-fulfillment and self-expansion, and establish meaningful connection with IS use through active learning and exploration. Therefore, gamification affordances (i.e., feedback, education, challenges, competition, status, self-expression, cooperation, and rewards) can contribute to meaningful user engagement (i.e., aesthetic experience) with a gamified IS by satisfying users' intrinsic motivational needs, such as the motivational need for accomplishment, the motivational need to know, and the motivational need to experience stimulation.

Feedback can help develop user ability by providing suggestions on improvements and thus appeal to our need for accomplishment. Education provides knowledge or guides users through the process of acquiring new skills. Thus, education fulfills the need to know and the need for accomplishment. Challenges can stimulate achievements and act as a benchmark for evaluating individuals' performance. Thus, challenges appeal to our need for accomplishment. Competitions fulfill our need to know and need for accomplishment, because it enables users to learn from themselves and peers by comparing their performances with those of others and stimulate them to higher performance (Suh et al., 2017). The status affordance allows users to improve their standing or level by reaching certain milestones or achieving preset goals within a gamified IS (Stanculescu et al., 2015). It encourages users to set new goals and challenge harder tasks through which users feels the pleasure associated with achieving accomplishments (Suh et al., 2017), thus fulfilling our motivational need for accomplishment. The self-expression affordance allows users to create unique identities within a gamified IS (Suh et al., 2017). It enables users to enjoy the autonomy to shape their own identities and various choices to express their self that is distinct from that of others. Therefore, it appeals to our motivational need for stimulation. Cooperation is the

collaborative process during which several parties work together to achieve something (e.g., the solution of a problem) within a gamified IS (Weiser et al., 2015). Cooperation facilitates the fulfillment of our motivational need to know, because joint efforts of multiple parties toward a goal involves sharing information/knowledge and learning from each other. Rewards are anything given to users as a payoff when they complete predesigned tasks (Hamari et al., 2014). Although rewards may invoke a feeling of achievement and competence, people who experience pleasure from receiving rewards will over time need larger rewards to trigger the same amount of satisfaction (Frederick & Loewenstein, 1999). However, certain environments/contexts can lead people to internalize extrinsic rewards to boost their intrinsic motivation to perform tasks (Ryan & Deci, 2000a; 2000b). Previous motivation studies have shown that providing supports for autonomy, competence and relatedness promotes the internalization and integration of rewards (Ryan & Deci, 2000a; 2000b). In this sense, in order for the rewards affordance to appeal to our intrinsic motivational need for accomplishment, it must be combined with other gamification affordances that allow users to make choices (self-expression affordance), encourage strong relationship and collaboration (cooperation affordance), and provide positive feedbacks (feedback affordance) on good performance, promoting feelings of autonomy, relatedness and competence and encouraging the internalization of rewards for self-determined/intrinsic motivation.

Fulfilling users' intrinsic motivational needs for accomplishment, to know, and to experience stimulation enables users to experience the pleasure and satisfaction from accomplishment and learning when interacting with a gamified IS, feel a strong sense of self-progress and self-growth, and derive a meaning of their interactions with the system. These experiences create a form of meaningful engagement (i.e., aesthetic experience) with the gamified IS. Therefore, the following propositions are formulated.

> Proposition 3: The positive effects of gamification affordances on aesthetic experience with a gamified IS are mediated by the satisfaction of users' intrinsic motivational needs.

> Proposition 3a: The gamification affordances of a gamified IS will positively influence the satisfaction of users' intrinsic motivational needs.

> Proposition 3b: The satisfaction of users' intrinsic motivational needs will positively influence aesthetic experience with a gamified IS.

According to the theory of aesthetic experience (Dewey, 1934), people in a state of aesthetic experience with an activity or object tend to continuously engage with the activity or object because they feel their needs for self-growth or self-expansion are fulfilled (Jennings, 2000). Accordingly, Nardi (2010) suggests that aesthetic experience drives users to continuously engage with a technology. Therefore, it's reasonable to argue that aesthetic experience with a gamified IS serves as an antecedent of continuance intention to use the system, and the following proposition is formulated:

> Proposition 4: Aesthetic experience with a gamified IS will positively influence user's continuance intention to use the system.

CONCLUSIONS

This research proposes a theoretical framework of the impacts of gamification affordances on gamified IS user engagement and continuance intention. Drawing on the motivation theory, flow theories, affordance theory, and gamification research in the IS field, the framework adopts the concepts of cognitive absorption and aesthetic experience to represent deep and meaningful user engagement with a gamified IS. It posits the positive effect of gamification affordances on users' experience of cognitive absorption, the mediating effect of satisfaction of users' motivation needs on the relationship between gamification affordances and aesthetic experience, as well as the positive effects of cognitive absorption and aesthetic experience on continuance intention to use a gamified IS. Previous gamification research indicates the difficulty of maintaining user engagement with a gamified IS over time (Kankanhalli et al., 2012; Nicholson, 2013; Suh, 2015; Suh et al., 2017). This research contributes to the understanding of effective mechanism for successful gamification that stimulates and sustains user engagement with a gamified IS. While a gamified IS can initially engage users by invoking the experience of cognitive absorption (deep engagement), it however may not continually engage users unless users feel they are meaningfully engaged by the system that fulfills their intrinsic motivational needs and provides a sense of meaning, self-expansion, and active discovery (meaningful engagement). Therefore, to maintain a long-lasting user engagement with a gamified IS, the design of gamification features should favor such affordances that engage users through satisfying their intrinsic motivations. For example, the rewards affordance may initially attract individuals to use a gamified IS by facilitating focused immersion and heightened enjoyment and increasing the depth of their engagement with the system. However, in the meanwhile, extrinsically based rewards undermine users' intrinsic motives and merely promote short-lived user engagement that will diminish over time without continuous provision of ever-increasing rewards. Thus, designing and implementing rewards affordance to motivate and maintain long-term user engagement with a gamified IS requires combining the rewards affordance with other gamification affordances (such as the self-expression, feedback and cooperation affordances) that support users' intrinsic needs for autonomy, competence and relatedness, thus making rewards affordance intrinsically motivating through the internalization and integration of rewards. Stimulating users' intrinsic motivations also requires adapting gamification features to the distinct motivational needs of different users and ensuring goal congruence with all IS users. Hence, this paper also highlights the importance of adapting gamification affordances to IS users' motivation structures and provides guidance on how to design gamification elements to engage IS users taking into consideration of users' motivational and psychological needs.

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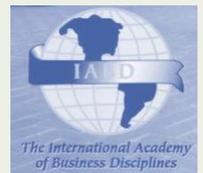White, R. W. (1959). Motivation reconsidered: The concept of competence. *Psychological review*, *66*(5), 297-333.

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