
The moderating effect of gamification on the relationship between customer engagement and new service development process involvement

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Abstract: Service sectors generate more than two-thirds of gross domestic product (GDP) globally. Within this highly competitive environment, service innovation is dramatically gaining more attention since innovativeness can create a long-term sustainable growth for organisations. The purpose of this study is to identify the influence of gamification on the level of customer involvement in the new service development (NSD) process. A quasi-experimental design was used where treatment and control groups participated in pre-test/post-test activities under gamified and none gamified environments. To analyse the results, structural equation modelling (SEM) was used to test the proposed theoretical framework. This study provides a first step towards further investigations of the role of gamification as moderator variable strengthening the relationship between customer engagement and new service development process involvement. Implications for theory and practice are discussed, and directions for future research provided.

Keywords: gamification; customer engagement; new service development; NSD; process.

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1 Introduction

According to the Organization for Economic Co-operation and Development (OECD), service sectors have generated more than two-thirds of gross domestic product (GDP) globally. Services establish a major part of the total economic activity and employment (De Jong et al., 2003). However, their developments still lack practical implementation and serious consideration. According to Legrand and LaJoie (2013), organisations regard service as an intangible product that does not affect profit directly unlike the tangible products. Also, the implementation of service development is a more complex process than product development.

To create strong services, customers are a significant resource as they possess tacit knowledge about their real needs. A service is different from a tangible product and relies

more on customer experience. However, customer involvement is still limited to traditional and restricted methods, such as focus groups or one-on-one interviews. These traditional methods remain slow and conventional, making it hard for organisations to come up with novel services to actively compete in the marketplace.

With regard to the aforementioned matters, the use of gamification techniques may be a way forward to further involve customers in the new service development (NSD) process, and to increase motivation and interaction between customers and organisations. The principal goal of gamification is to heighten the engagement level of users through game-like techniques (Flatla et al., 2011), making gamification participants gain more sense of ownership, and better understand the purpose when engaging with tasks in the gamified environment (Pavlus, 2010). In contrast with previous research, this study focuses on the impact of gamification on people behaviours, with regards to the customer intention to be involved in NSD processes.

Customer engagement is a factor that can become a powerful competitive differentiator, making it vital for organisations to engender customer loyalty. Loyal customers are competitive assets for any business (Shu-Ching, 2015). To get customer loyalty, businesses must pay close attention and focus on consumer engagement programs which play an important role in fostering interactions that encourage repeat purchases (Cooperstein, 2013). Customer engagement can create improved opportunities and can promote a bigger market share.

In general, there are two types of customers, namely active and passive customers. To create strong customer engagement, an organisation needs to also address passive customers. Active customers are precious resources. They are ready to provide their information to companies while simultaneously searching for data from others to make deliberate and conscious decisions (Roos and Gustafsson, 2011). The proportion of passive customers that move to other companies is higher than active customers (Roos and Gustafsson, 2007). Passive customers are unable to come up with convincing reasons to keep the current relationship when competitors tempt them to switch over. Nonetheless, they are still a significant asset for an organisation. Passive customers are satisfied with the products and services of an organisation, but they are not passionate about them. Infiltrating the group of passive customers and changing their mindsets presents a great growth opportunity. The difficulty is, however, to completely understand customer needs, which often is a costly and imprecise process. Even when consumers know exactly what they want, they cannot often transfer that information clearly or complete it effectively (Oke, 2007). As mentioned previously, gamification is a tool that can increase motivation and interaction between customers and organisations.

2 Purpose of research

The purpose of this research study was to identify the influence of gamification on increasing the level of involvement in NSD process and customer engagement. This research study attempted to demonstrate that gamification acts as a moderating factor that can ultimately help increase the success rate of service innovation. This research study attempted to answer the following questions:

- Does gamification moderate the relationship between intention to be involved in NSD process and NSD process involvement, and to what extent?

- To what extent does customer engagement influence their intention to be involved in NSD process as well as their involvement?
- To what extent does customer engagement increase after customers have been involved in a gamified NSD process?

3 Literature review

3.1 Customer engagement

Customer engagement leads to consumer loyalty which contributes to repurchasing and higher involvement and interaction with an organisation. Thus, a better understanding of the engagement concept will assist organisations in a better comprehension of their customers which, in turn, will increase their loyalty.

Customer engagement can be classified into unidimensional and multidimensional conceptualisation (Yoshida et al., 2014). For unidimensional conceptualisation, customer engagement focuses only on the behavioural perspectives. In contrast, multidimensional conceptualisation discusses customer engagement that comprises several sub-dimensions including cognitive (I think), emotional (I feel), and behavioural (I do) ones (Hollebeck, 2011; Vivek et al., 2012; Brodie et al., 2013). Furthermore, So et al. (2012) decomposed customer engagement into five dimensions which include enthusiasm, attention, absorption, interaction, and identification. These dimensions cover all engagement perspectives. This research study used these five dimensions to measure the degree of customer engagement. These five dimensions are more specific and more detailed than the previous original three dimensions.

Since highly engaged customers are more likely to be involved and interact with an organisation, we hypothesised that they will be more inclined to be willing to be involved in the NSD of the company they are engaged with.

Hypothesis 1 The degree of customer engagement (which is composed of the identification, enthusiasm, attention, absorption and interaction variables) positively affects their intention to be involved in the NSD process.

3.2 New service development and intention to be involved in the NSD process

3.2.1 New service development

Innovations are crucial for an organisation survival and long-term sustainability. Innovations support economic growth, competitiveness, regeneration, and prosperity of organisations (Toivonen and Tuominen, 2009). As the impact of service to economic growth is a significant challenge for organisations, they cannot neglect to put enough emphasis on NSD in their development plan.

Service innovation seems to be overlooked compared to product innovation. Smith (2010) gave a comprehensive and interesting reason why this was the case, proposing that the public had always been concerned about the novelty value of product innovations and inventions, while services were not object that could create eye-catching or touchable moments like products. Though, in terms of profitability, services tend to generate profits

higher than products, and also prevent the boundary between tangible and intangible products from becoming blurred (Stamm, 2003). However, the development of new services cannot be the same as products, as services require more comprehensive and complicated process development than new products. This section explains NSD together with NSD process, and how customers can become involved.

According to Shekar (2007), the NSD process seems to be more people-oriented. Customer satisfaction and reaction are highly significant for this development. With more people-orientation in the service development process, changes can easily be made when compared with product development. Service development is more labour intensive and less investment intensive (De Jong et al., 2003).

Most service development processes are similar and considered as 'generic process'. In contrast, the product development time varies depending on different types of products. NSD models are often based on the new product development framework (Stevens and Dimitriadis, 2005).

3.2.2 Impact of customer's involvement on the new service development process

Involvement in the NSD process should not be only limited to the research and development department or those who work for service development project themselves. Conversely, embracing the idea and knowledge from different individuals and methodologies will consequently enhance the development process. Taking this idea into account, one of the important keys for service development is the customer. Customers are individuals who directly interact with the provided service and, if involved in the process, their experience on provided service will be beneficial to the NSD process.

According to Johnes and Stroezy (1998), there are three groups of people which are valuable for NSD namely the development staffs, the customer-contact staffs, and the customers themselves. Each plays a different role but, still, information from customers is always needed since they interact with the provided service and can identify the quality of a product. To further discuss the development, however, other researchers have introduced more groups of actors that are worth noting. Gottfridsson (2009) presented eight groups of actors related to the service development process. The eight groups were "the strategic creators, the competing actors, the deciding actors, the supporting actors, the prime movers, the suppliers, the service performers, and the users" [Gottfridsson, (2009), p.1]. Gottfridsson grouped users as the internal key function, since they played two roles, i.e., the user and the co-producer. They received information from the service provider, and they also provided feedback.

The impact and benefit of customer involvement and customer interaction on innovation process have been discussed by many researchers, especially in the service sector. Each study mentioned a similar or slightly different point of view on how customers are involved in each innovation process. Since one significant characteristic of service is the inseparability of product and consumption, customer involvement can affect the development process. However, customer involvement seems to be limited to only providing feedback to a company after they receive the final products or services. Various studies have stated that customer involvement has a significant impact in terms of the innovation frequency and increased opportunities of market success (Parthasarthy and Hammond, 2002; Jacob, 2006) which would assist an enterprise to properly respond to the market and customer requirements. Additionally, customers as a part of service and product development can help service/product providers to better understand customer

needs and their expectations, which can bring a long-term sustainable development (Agrawal and Bharti, 2018). Late customer involvement in the innovation process might lead to the failure of many well-established enterprises as they are potentially prone to entering a given market too late (Arnold et al., 2010; Haapasalo et al., 2017).

Customers are also significant in terms of information for the service development process as they are often aware of their immediate needs and pain points. The information from customers can help organisations improving their activities/tasks to better satisfy the customers. Thus, feedback from customers is important since it helps organisations to drive their service and improve their products. Service companies should involve their customers as co-innovators (Alam and Perry, 2002; Edvardsson and Olsson, 2006; Chesbrough, 2011) in order to develop superior and differentiated new services, reduce development cycle time, costs, and uncertainty, improve producer-user relationships, and obtain higher values and profits. As mentioned previously, a faster NSD process is significant for organisations. The customer involvement in the process can create rapid NSD process and also reduce the number of parallel processing stages. The given customers information can reduce the time for researchers to solve or identify real issues.

Desouza et al. (2008) stated that the critical part of innovation is knowledge transfer which requires high-level human interaction and high-quality communication. Desouza et al. (2008) categorised the different ways that customers can take part in innovation into three categories, i.e., the customer-driven innovation, the customer-centred innovation, and the customer-focused innovation. In this regard, this research focused on customer-driven innovation which is different from the other two types. This is because the role of customer-centred innovation is to become a communicator, and, for customer focused innovation, the customer takes an innovator role. In contrast, for customer-driven innovation, customer role is dynamic. The interaction between customers and organisation is required. Moreover, Desouza et al. (2008) also stated that customer-driven innovation is impossible to be controlled.

This research proposed that gamification can play an important role in developing and creation of more advanced and controlled interactions and communications between an organisation and its customers. Also, the researchers proposed that the limited tacit knowledge transfer from customers to the organisation might be strengthened through the use of gamification.

3.2.3 Intention to be involved in NSD process

An individual's intention to perform a certain type of behaviour is a critical precursor of the behaviour of interest. According to Cohen et al. (2013), the term 'intention' is usually associated with the term 'goal'. However, intention and goal do have different characteristics. The intention is a representation of planned action. In contrast, the goal is a reflection of the desired outcome of the actions. Cohen and Levesque (1990) referred to Kuhl (1985) with regard to the intention dimensions on subject, relation, context, and object. These dimensions address the action and desired end state. The term 'intention' has been discussed a lot in the literature in terms of customer purchase behaviour which is similar to product involvement (Michaelidou and Dibb, 2008; Choubtarash et al., 2013; Butt, 2014). The intention is normally used as an indicator or forecaster of a customer actual behaviour (Butt, 2014).

In NSD, customer involvement can be split into the breadth and depth levels (Carbonell et al., 2012). Breadth level refers to a wide range of activities or just one activity in a NSD process that involves the customer. In contrast, depth level refers to a phase of activity in which the customer is involved. Involvement can also be divided into three types (Foxall and Goldsmith, 1994; Michaelidou and Dibb, 2008; Choubtarash et al., 2013):

1 Situational involvement

Situational involvement focuses on the individuals' concern on the purchase of a product for the period of the situation. It represents a mental state of the customer without the cognitive state. Foxall and Goldsmith (1994) gave an example that the consumer may continue to purchase something until certain situations arise which, subsequently, causes the level of involvement to decrease as that situation has passed. However, at that time of involvement, the consumer may devote an unusual amount of resources such as thought, time, and money to purchase the right product for the situation.

2 Enduring involvement

This represents the individual's attachment to a product when using a product that reflects its consumer's lifestyle or self-concept. "The reaction produced in consumers by-products may be called 'commitment' to the product because purchase or use (avoidance) of the product expresses closely held values" [Foxall and Goldsmith, (1994), p.86].

3 Response involvement

Response involvement combines both the situational and enduring aspects. "It refers to a behavioral orientation which involves information acquisition and decision processes" [Michaelidou and Dibb, (2008), p.10]. This type of involvement is more complex than the previous type since "it is marked by complex information search, information processing, and decision evaluation" [Foxall and Goldsmith, (1994), p.86].

In this research study, intention to be involved in service development process reflected the degree of customer intention to be involved and participated in the NSD process. The level of intention to be involved will be measured. The measurement tool was adapted from Rizwan et al. (2014). The focus of Rizwan et al. (2014) is about consumers purchase intention. Rizwan conducted the questionnaire by organising the questions into seven categories, which are consumer's purchase intention, brand satisfaction, product knowledge, brand trust, brand attachment, the price of the brand/product (low price) and past experience of the consumer toward the brand. However, in this research, the level of satisfaction and the attachment of customer toward brand will be identified in terms of customer engagement's level section. According to this, the adaptation of measurement tool from Rizwan et al. (2014) in this research will measure the level of intention to be involved in NSD process of customer instead of purchasing activity.

Hypothesis 2 The degree of customer intention to be involved in the NSD process positively affects their involvement in this process.

3.3 Gamification

The term ‘gamification’ is usually defined “as the use of gameplay mechanics for non-game applications” (Deterding et al., 2011; Grove, 2011), with the intent of injecting fun, play, and passion into tasks and processes (Tambo et al., 2014). The gamification’s main goal is to increase users’ engagement by applying game-like techniques (Flatla et al., 2011) to encourage sense of ownership and purpose when engaging with tasks (Pavlus, 2010). Nick Pelling is a British programmer who coined the term gamification consultancy. He used game elements to develop the product into entertainment platforms based on his vision that every device would soon become a game (Hägglund, 2012). The distinctive point of gamification is that gamification does not turn routine activities into games, but it redesigns work processes by adopting game mechanisms for an enjoyable experience. The most relevant purpose of gamified usage is to increase motivation experience and participants’ (users or customers) involvement (Dominguez et al., 2013). Sailer et al. (2017) also suggested that gamification is always applied to be a tool for goals achievement and has no limitation in the usage field. Gamification can be a driving tool for various areas, such as education (Hyla, 2015; Strmečki et al., 2015), organisational development and employees’ training (Armstrong and Landers, 2018) or employee engagement (Sarangi and Shah, 2015) as well as customer engagement. Regarding service innovation, Patricio and Morozumi (2018) conducted an experimentation to support new employees on boarding in a customer experience cross-border project and new students on boarding in an international service design master course by implement a game element to the workshop. The researchers also found that even participants from different backgrounds or those who received insufficient information at the first stage, were helped by gamification in the generation of the idea and a minimum viable concept proposal. According to this result, gamification does not only create enjoyable environment but also it provides an explorative experience. Several researchers (De Brentani and Cooper, 1992; De Brentani and Ragot, 1996; Alam and Perry, 2002; Edvardsson and Olsson, 2006; Carbonell et al., 2009; Chesbrough, 2011) agreed that customer involvement in the development process is significant. However, the process of involvement remains sporadic. The co-development or co-creation activities between firms and customers regarding new service are still considered traditional such as customer observation, in-depth interview, focus groups or group discussions. These traditional approaches no longer work and are deemed a waste to resources (Roberts and Piller, 2016). Based on these literature gaps, this research studied the potential of gamification, which could be a new tool and mechanism to encourage customers to be more involved in the service development process which, ultimately, is likely to positively impact service innovation efficiency.

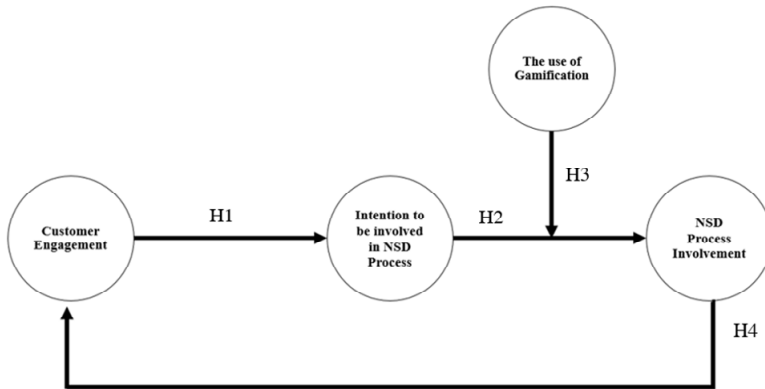
Hypothesis 3 Customers who participate in a gamified environment reflect a stronger relationship between intention to be involved in NSD process and the effectiveness in the process than those who participate in a none gamified environment.

To further investigate the impact of gamification toward customer engagement, this research also studied the increased level of customer engagement of participants after having participated in the gamified environment.

Hypothesis 4 The degree of customer engagement will be increasing after the customers were involved in new gamified service development process.

The four stated hypotheses lead to the following conceptual model.

Figure 1 Conceptual model



3.4 Research model

This research study is built upon three major theories, i.e., theory of customer engagement (So et al., 2012); theory of planned behaviour (Kuhl, 1985); and gamification theory (Wood and Reiners, 2015).

From the theories described in the literature review, one could not find any research which presents how gamification can boost up NSD process as well as the statistical results that show how gamified experience helps increase customer engagement together with intention to be involved in the innovation process. Furthermore, there is still a lack of empirical research study that compared participants' behaviour in collaborative and cooperative gamified environment. As presented previously, several researchers (De Brentani and Cooper, 1992; De Brentani and Ragot, 1996; Alam and Perry, 2002; Edvardsson and Olsson, 2006; Möller et al., 2008; Carbonell et al., 2009; Chesbrough, 2011) agreed that customer involvement in the development process is significant. However, the process of involvement remains sporadic. The co-development or co-creation activities between firms and customers, regarding new service, are still considered traditional such as customer observation, in-depth interview, or group discussions. These traditional approaches no longer work and are deemed a waste of resources (Roberts and Piller, 2016). Based on these literature gaps, this research studied the potential of gamification, which can be a new tool and mechanism to encourage customers to become more involved in the service development process which, consequently, is likely to impact service innovation efficiency.

4 Research methodology

This research applied a deductive approach on hypothesis testing by combining a questionnaire survey and a quasi-experimental research design in order to test the conceptual model under controlled circumstances. As Sørensen et al. (2010, p.313) stated “experiment as a research method has been given too small a role in innovation research and that the method may present an important avenue for attaining knowledge complementary to that which is provided by the traditionally applied methods in innovation research, i.e., survey methods and (to a certain degree) case studies.” That is one of the reasons that motivated us to use a quasi-experimental research approach to collect our data. A quantitative method was used to collect data for this study. In this regard, a pilot study was first conducted to test the instruments. Questionnaires were available in English and Thai languages which welcomed participants of different nationalities. To ensure an appropriateness of the translation, a double translation was conducted. Furthermore, participants’ understanding on questions in the questionnaire was also verified to prevent erroneous feedback. To complete this quantitative research, open-ended questions were used to obtain more in-depth feedbacks from the participants.

4.1 Research design

This study was interested in studying the influence of gamified and none gamified activities on the NSD.

4.2 Experimentation

This study adopted a quasi-experimental non-equivalent control group design. The experimental group was set in a gamified environment while the control group had to develop a new service process in a none gamified environment. The reason why this study adopted a quasi-experimental research design was that a quasi-experimental design has to take existing groups rather than drawing on random samples (Gray, 2014). Using a quasi-experimental method helped create an environment that assisted researchers to involve participants in the experimentation along the NSD process, which is a situation difficult to control in real life since all participants must be involved all along each step of the NSD without dropping out during the process. The pre-test and post-test were designed and treated as assessments to identify the difference between both groups (treatment and control group) before and after encountering the action intervention. In term of the new service design, the researchers wanted to make sure that all participants were already familiar with the service. Consequently, two services were selected. First, Facebook was used in this study since it is renowned for being an extremely huge popular online service platform which offers a wide range of services. On the other hand, in pursuit of an opportunity to study a different service context, the researchers selected the design of a new university service in the context of a Thai private university based in Bangkok (since all participants were students of this university). Unlike services provided through an IT platform, universities are expected to provide their students with novel educational and support services. For the experimentation process, the study focused on three phases of NSD, which covered strategic planning, idea generation, and idea screening phases. Six rounds of experimentation were conducted (over five days) which involved bachelor and master degree students at the Thai Private University in Bangkok.

The experimentation took place between October 2016 and February 2017 (five months). For the experimentation four experiments were conducted using a gamified environment and two in a none gamified environment, since the researcher wanted to ensure that the proportion of participants for both experimentations contexts was the same. The number of participants who were involved in the Facebook new service design context was 162 (control group = 95 and treatment group = 67). The number of participants who were involved in the new university services design context was 71 (control group = 33 and treatment group = 38).

Table 1 Quasi-experimental design and survey

<i>Pre-and posttest design</i> → <i>Time</i>				
<i>Select</i>	<i>Control group</i>	<i>Pretest</i> CE + Intention to be involved in NSD process	<i>No treatment</i>	<i>Posttest</i> CE + Intention to be involved in NSD process
	<i>Experimental group</i>	<i>Pretest</i> CE + Intention to be involved in NSD process	<i>Experimental treatment (Gamification)</i>	<i>Posttest</i> CE + Intention to be involved in NSD process

4.3 Experimentation stages

The experimentation process was comprised of both individual and group activities and was divided into three phases of the NSD process which were strategic planning, idea generation, and idea screening phase. Before and after the experimentation, participants were asked to take the pre-test and post-test respectively. This included questionnaires about customer engagement and intention to be involved in NSD process.

During the experimentation, the first author divided the participants into groups of approximately five to six people, since during the idea generation and screening processes participants needed to collaborate. A larger number of participants per group would have created difficulties for participants to discuss with each other. For the strategic planning phase, participants needed to identify, from their personal experience and opinion, issues/problems/pain points that they are currently facing with the proposed service (Facebook or university service). For the idea generation phase, participants used the identified issues/problems from the strategic planning stage to find/propose a new service solution. For both, strategic planning and idea generation phases, participants received points individually for their contribution. The more problems and ideas participants could come up with, the higher score participants earned from these two phases. For the last phase, i.e., the idea screening phase, participants needed to screen and vote for the best proposed service ideas based on six criteria such as novelty, attractiveness, feasibility, relevance, thoroughness and financial. For this phase, members of each group chose their representative (one to two people) to present their problems and solutions. Once all teams presented, each team representative was invited to vote for the service idea they liked the most based on the six criteria (team representatives were not allowed to vote for their own team’s ideas). After the voting was completed, researchers

summarised the results to everyone and ended the activities before moving to the post-survey process.

5 Model testing and data analysis

233 participants were involved in this experimentation. Table 2 presents the demographic profile of participants including gender, age and context of experiment.

Table 2 Demographic characteristics of participants

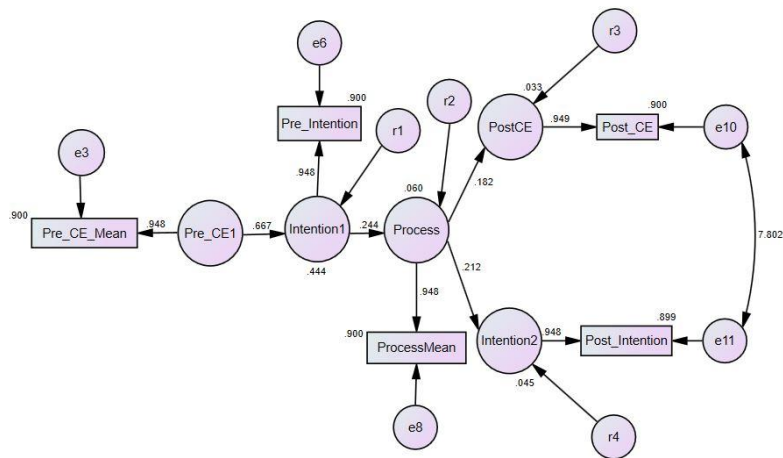
<i>Characteristics</i>	<i>n (frequency)</i>	<i>Percentage</i>
Gender		
Female	122	52.4%
Male	111	47.6%
Age-group		
17–20	113	48.5%
21–24	75	32.2%
25–28	35	15.0%
29–32	6	2.6%
33–36	3	1.3%
37–40	1	0.4%
Context of experimentation		
<i>Facebook services</i>		
Control group	95	40.8%
Treatment group	67	28.7%
<i>University services</i>		
Control group	33	14.2%
Treatment group	38	16.3%

Table 3 Descriptive statistics of main variables ($n = 233$) – measurement Likert scale range (1–5)

<i>Main variable</i>	<i>Mean</i>	<i>Std dev.</i>
Pre-test customer engagement	2.79	0.61
Pre-test intention to be involved	3.02	0.67
New service development phase 1: identify problem stage	3.17	4.06
New service development phase 2: idea generation stage	1.55	2.32
New service development phase 3: idea screening stage	1.04	1.33
Post-test customer engagement	3.33	0.69
Post-test intention to be involved	3.36	0.76

To test our proposed conceptual model, we used structural equation modelling (SEM) using AMOS 21.0 to test the hypothesised relationships among our main variables. SEM allows to simultaneously estimate the multiple regression equations in a single framework, and to examine the interrelated relationship, both directly and indirectly, between several latent constructs in the same decision context (Hair et al., 2010). The measurement model indices revealed that the proposed model was generally fit and parsimonious; Chi-square = 14.195, df = 5, Chi-square/df = 2.839, P-value = .014, RMR = .044, GFI = .977, RMSEA = .089, CFI = .976, TLI = .952, AGFI = .931, HOELTER = 181.000.

Figure 2 Main model including both gamified and none gamified environments (see online version for colours)



Note: Chi-square = 14.195, df = 5, chi-square/df = 2.839, P-value = .014, RMR = .044, GFI = .977, RMSEA = .089, CFI = .976, TLI = .952, AFGI = .931, HOELTER = 181.000.

Hypothesis 1 The degree of customer engagement (which is composed of the identification, enthusiasm, attention, absorption and interaction variables) positively affects their intention to be involved in the NSD process.

For hypothesis 1, the results in Figure 2 show that customer engagement has a significant positive effect on each participant's intention to be involved in NSD process (standardised coefficient = 0.667).

Hypothesis 2 The degree of customer's intention to be involved in the NSD process has a positive effect on their involvement in this process.

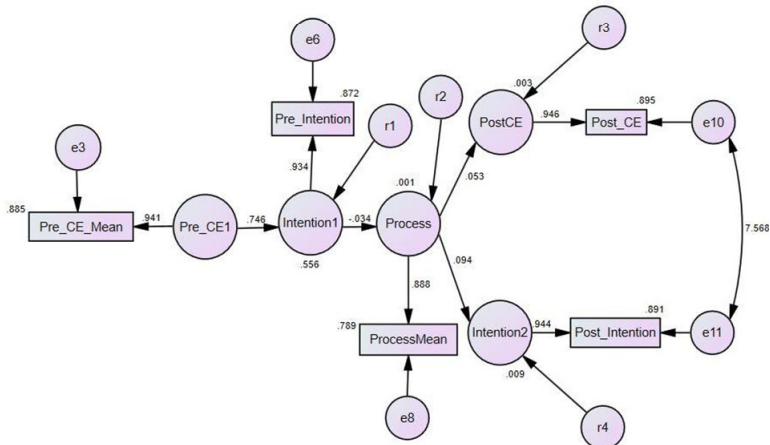
The results in Figure 2 show that intention to be involved in NSD process has a significant positive effect on each participant's NSD process involvement (standardised coefficient = 0.244).

Hypothesis 3 Customers who participated in the gamified environment have a stronger relationship between intention to be involved in NDS process and NDS process than customers who participated in a none gamified environment

The aim of this research hypothesis was to find the impact of gamification toward the relationship between intention to be involved in NSD process and NSD process involvement. Researchers propose that if intention to be involved in NSD processes and NSD processes are already interrelated due to participants not having the intention to be involved in the process, it is very unlikely that the NSD process will occur. However, with gamification, the relationship between intention to be involved in NSD processes and NSD processes could be strengthened, with gamification acting as a moderator variable.

To analyse the moderating effect of gamification, this research conducted the moderating variable analysis following Zainudin (2012) AMOS instructions. First the data was split into two groups based on the moderator variable test, in this case, the data from gamified environment and none gamified environment were separated. Then the data was processed using AMOS.

Figure 3 None gamified environment (see online version for colours)

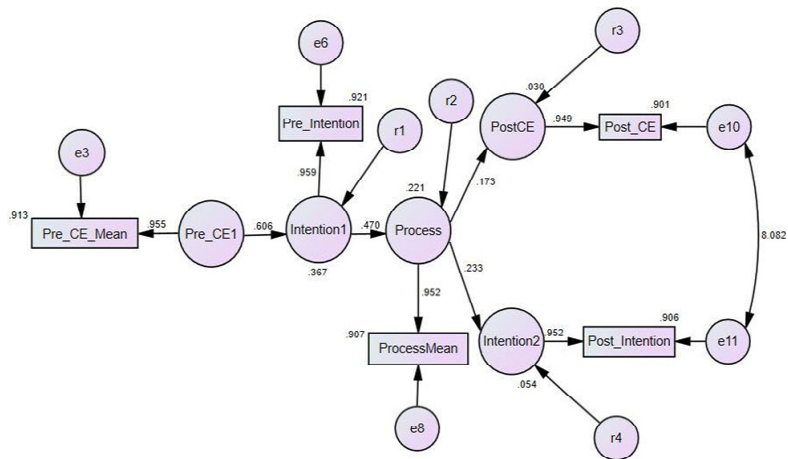


Note: Chi-square = 32.704, df = 15, chi-square/df = 2.180, P-value = .005, RMR = .046, GFI = .974, RMSEA = .050, CFI = .977, TLI = .954, AFGI = .911, HOELTER = 356.000.

To identify if gamification was a moderator or not, the researchers compared the chi-square of the main model (Figure 2), the data of participants in the main model containing both gamified environment and none gamified environment. Then the researchers ran the analysis of none gamified environment and gamified environment separately and compared the chi-square of the three models. The results show that the chi-square of gamified and none gamified environment ($\chi^2 = 32.704$) are higher than the main model ($\chi^2 = 14.195$). Therefore, the model for gamified and none gamified

environments (separate environments) is significant. Other than that, according to the structural model, the results show that the standardised coefficient score between intention to be involved in NSD process to NSD process involvement in the gamified environment is higher than in the none gamified environment (standardised coefficient score of gamified environment = 0.470, none gamified environment = -0.34).

Figure 4 Gamified environment (see online version for colours)



chi-square=32.704, df=15, chi-square/df=2.180, P-value=.005, RMR=.046, GFI=.974, RMSEA=.050, CFI=.977, TLI=.954, AFGI=.921, HOELTER=356.000

Note: Chi-square = 32.704, df = 15, chi-square/df = 2.180, P-value = .005, RMR = .046, GFI = .974, RMSEA = .050, CFI = .977, TLI = .954, AFGI = .921, HOELTER = 356.000.

Table 4 Comparing default model with group model (gamified and none gamified environment)

Model	Chi-square χ^2	df	Beta
Default model	14.195	5	.244*
Group model	32.704	15	
Gamified environment			.470*
None gamified environment			-0.34
χ^2 difference	18.509		
df difference		10	
Result on moderation	Model difference was significant		

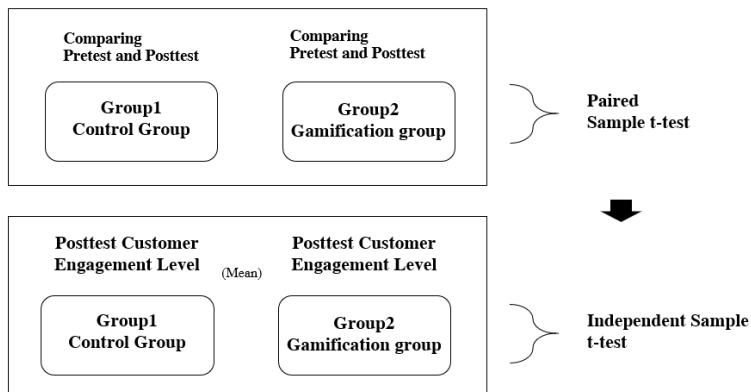
Hypothesis 4 The degree of customer engagement increase after the customers were involved in the new gamified service development.

To identify the difference between the level of customer engagement of each participant before being involved in the NSD process (gamified environment and none gamified

environment) and after being involved in the NSD process, a paired samples t-test was used. The paired samples t-test is used to compare two means at two different moments in time, which are for us the pre-test and post-test. Since we are dealing with two environments, the samples t-test was conducted in two rounds. One round was for the none gamified environment and the second round for the gamified environment.

After the samples t-tests were conducted, to compare the difference between post-test of the two environments, an independent sample t-test was used to measure the difference of mean between post-test of gamified and none gamified environment. The results from both paired samples t-test and independent samples t-test are presented below (Tables 5 to 12).

Figure 5 Process of paired sample t-test and independent sample t-test



5.1 Comparing none gamified environment and gamified environment with paired sample t-test

5.1.1 None gamified environment

The paired samples correlation table shows that the level of customer engagement result between pre-test and post-test in none gamified environment are significantly positively correlated ($r = 0.30, p = .00$).

Table 5 Paired samples statistics result for none gamified environment

<i>Paired samples statistics</i>					
		<i>Mean</i>	<i>n</i>	<i>Std. deviation</i>	<i>Std. error mean</i>
Pair 1	Pre-test	2.77	128	0.57	0.05
	Post-test	3.24	128	0.68	0.06

The results from the paired samples test show that in none gamified environment, pre-test and post-test were correlated and there was a significant average difference between pre-test and post-test score [$t(127) = -7.25, p < 0.001$]. On average, post-test score was 0.48 higher than pre-test score (95% CI [-0.61, -0.35]).

Table 6 Paired samples correlation result for none gamified environment

<i>Paired samples correlations</i>				
		<i>n</i>	<i>Correlation</i>	<i>Sig.</i>
Pair 1	Pre-test and post-test	128	0.30	0.00

Table 7 Level of customer engagement results between pre-test and post-test in none gamified environment

<i>Paired samples test</i>									
<i>Paired differences</i>									
		<i>Mean</i>	<i>Std. deviation</i>	<i>Std. error mean</i>	<i>95% confidence interval of the difference</i>		<i>t</i>	<i>df</i>	<i>Sig. (2-tailed)</i>
					<i>Lower</i>	<i>Upper</i>			
Pair 1	Pre-test – post-test	-0.48	0.74	0.07	-0.61	-0.35	-7.25	127	0.00

Table 8 Paired samples statistics result for gamified environment

<i>Paired samples statistics</i>					
		<i>Mean</i>	<i>n</i>	<i>Std. deviation</i>	<i>Std. error mean</i>
Pair 1	Pre-test	2.81	105	0.66	0.06
	Post-test	3.43	105	0.70	0.07

Table 9 Paired samples correlation result for gamified environment

<i>Paired samples correlations</i>				
		<i>n</i>	<i>Correlation</i>	<i>Sig.</i>
Pair 1	Pre-test and post-test	105	0.19	0.05

Table 10 Level of customer engagement results between pretest and posttest in gamified environment

<i>Paired samples test</i>									
<i>Paired differences</i>									
		<i>Mean</i>	<i>Std. deviation</i>	<i>Std. error mean</i>	<i>95% confidence interval of the difference</i>		<i>t</i>	<i>df</i>	<i>Sig. (2-tailed)</i>
					<i>Lower</i>	<i>Upper</i>			
Pair 1	Pre-test – post-test	-0.62	0.86	0.08	-0.79	-0.45	-7.37	104	0.00

Table 11 Descriptive statistics per group (Gamified and none gamified environment)

<i>Group statistics</i>					
		<i>n</i>	<i>Mean</i>	<i>Std. deviation</i>	<i>Std. error mean</i>
Posttest customer engagement	Gamified	105	3.43	0.70	0.07
	None gamified	128	3.24	0.68	0.06

Table 12 Independent samples t-test result

<i>Independent samples test</i>										
		<i>Levene's test for equality of variances</i>				<i>t-test for equality of means</i>				
		<i>F</i>	<i>Sig.</i>	<i>t</i>	<i>df</i>	<i>Sig. (2-tailed)</i>	<i>Mean difference</i>	<i>Std. error difference</i>	<i>95% confidence interval of the difference</i>	
									<i>Lower</i>	<i>Upper</i>
Post-test customer engagement	Equal variances assumed	0.18	0.68	2.13	231	0.03	0.19	0.09	0.01	0.37
	Equal variances not assumed			2.12	219.16	0.03	0.19	0.09	0.01	0.37

5.1.2 *Gamified environment*

The paired samples correlation table shows that the level of customer engagement result between pre-test and post-test in gamified environment are not significantly positively correlated ($r = 0.19$, $p = .05$).

The results from the paired samples test show that in the gamified environment, pre-test and post-test were correlated and there was no significant average difference between pre-test and post-test score [$t(104) = -7.37$, $p < 0.001$]. On average, post-test score was 0.62 higher than pre-test score (95% CI [-0.61, -0.35]).

According to the paired sample tests from both gamified and none gamified environment, the results show that post-test score from gamified environment and none gamified environment are significantly different from pre-test. Scores in the gamified environment tend to be higher than in the none gamified environment.

5.2 *Comparing none gamified environment and gamified environment post-test result with independent samples t-test*

An independent-samples t-test was conducted to compare the level of customer engagement in the NSD process after proceeding through gamified environment and none gamified environment. The results show that there is a significant difference in the scores for gamified environment (mean = 3.43, SD = 0.70) and none gamified environment (mean = 3.24, SD = 0.68) conditions; $t(231) = 2.13$. These results suggest that gamification does positively influence the level of customer engagement.

6 Discussion

Service is an intangible product that many organisations find challenging to improve or disrupt, mainly due to the one-way relationship or communication that exists between organisations and their customers (Alam and Perry, 2002). Taking this relationship into account, an organisation can only periodically and occasionally receive feedback from its customers. Therefore, in seeking an approach to strengthen this relationship and to make it more inclusive, this research study explored the use of gamification as a moderator variable to strengthen the engagement level of customers as well as their intention to be involved in the NSD process, that will ultimately lead to increasing the chance of success of the new service developed (not part of this research).

From the literature review, we could not find any previous study that investigated the influence of gamification in a NSD context using our variables, i.e., customer engagement, intention to be involved in the NSD process, and NSD process involvement. Moreover, the researchers found that the literature on the use of gamification in different types of product developments is still limited. This literature gap identification drove us to develop a conceptual model bringing various theories together. A quasi-experimental methodology and questionnaires were used to collect quantitative data. SEM was used to test our conceptual model. The four following hypotheses were validated:

Hypothesis 1 The degree of customer engagement positively affects their intention to be involved in the NSD process.

- Hypothesis 2 The degree of customer's intention to be involved in the NSD process has a positive effect on their involvement in this process.
- Hypothesis 3 Customers who participated in the gamified environment have a stronger relationship between intention to be involved in NDS process and NDS process than customers who participated in a none gamified environment.
- Hypothesis 4 The degree of customer engagement will be increasing after the customers were involved in the new gamified service development.

From the results, customer engagement level had a positive effect to the intention to be involved in NSD. This shows that customers who are highly engaged, have a higher intention to be involved in NSD process than the ones who are not or slightly engaged. Customers who are highly engaged want to contribute and to be part of a brand or organisation. They are not only feeling that they like the brand/organisation, but they develop a sense of belonging with the brand/organisation. Consequently, they are more willing to be involved in the NSD process. For those who are less involved, the gamification approach can be a convincing factor to get involved in the NSD, since it will look more fun, engaging and more rewarding.

As far as the relationship between intention to be involved in the NSD process and NSD process involvement, the research results from the experimentation show that the degree of customer's intention to be involved in the NSD process has a positive effect on their involvement in the process. Customers who have high level of intention to be involved in the NSD process are more likely to make the step in getting involved in the NSD process.

The main finding of this research is the validation that 'gamification' acts as a moderator in the 'intention to be involved in NSD' and 'NSD process involvement' relationship. Participants who went through the gamified version of the experimentation demonstrated higher level of engagement and performed much better in the NSD than the ones who went through the none gamified experiment. The participants energy during the experimentation was also much higher in the gamified environment than in the none gamified environment. We could feel the sense of 'competition' between individuals and between teams, which lead to very positive outputs.

Another interesting finding of this research is the impact that going through the gamified environment had on the participants. For participants who went through the none gamified environment, the post test on level of customer engagement was not statistically different from the pre-test. For participants who went through the gamified environment, the level of engagement significantly increased after going through the gamified process. This finding reinforces the power of gamification and its long-term value.

Even if the experimentation was conducted with group of students in a Private University in Thailand, students 'acted' during the experimentation process as customers since they are truly customers of both Facebook and of the university services. According to this, the researchers believe that a similar experimentation process could also be applied in other contexts.

According to above, the significant results from this research can be identified as:

- 1 positive relationship between customer engagement and intention to be involved in NSD process
- 2 positive relationship between intention to be involved in NSD process and NSD process involvement
- 3 gamification performs as a moderator variable for this relationship
- 4 going through the NSD gamified process positively influence the post level of customer engagement.

7 Contribution to research and practice

This study contributed to advance current research. This study helped to fulfil a literature gap by providing a new initial framework that explains the previously unexplored relationship between four variables. Our conceptual model was tested on a small-scale in a very specific/limited environment but we believe it can help future researchers interested in this area to further test, validate and develop this initial attempt. Our main contribution lies on the validation of the moderating effect of gamification on the relationship between customer engagement and NSD process involvement. We also see some academic research value in the quasi-experimental methodology used to collect data. This under-used research methodology fits perfectly with the nature of the context we studied (innovation and gamification) and we strongly encourage future research to explore such methodology as it fits their research paradigm.

Our experimentation was conducted directly with the customers who had a chance to identify their problem, generate idea, and decide which idea should be pursued in the screening process. Previous research investigated NSD by conducting traditional interviews with innovation experts or product managers, CEO, or with the person involved in the product development in the organisation (Alam and Perry, 2002; Froehle and Roth, 2009). Similarly, previous studies on gamification focused on the motivation of participants toward activities such as involvement in online classes (Sailer et al., 2017; Strmečki et al., 2015). Our quasi-experimental study adds to this research and provides a means to better understand field data, rather than secondary data.

This study also contributed to practice. It proposed the importance and value of engaging customers early on in their NSD process. The literature strongly emphasises the value and benefits of engaged customers, so companies have to further develop approaches to increase the engagement level of their customers. By doing so, customers will be more inclined (higher intention) to be involved in the NSD process. Furthermore, if the NSD process is gamified, not only the likelihood that the quality and future success rate of this process output is higher, but additionally it will help further increase the customer engagement level. Therefore, it will contribute to self-reinforcement since the more customers get involved in the gamified NSD process, the more they get engaged,

and the more they want to be further involved. Our study did not investigate to which extent this last assumption is true, nor the limitations of this effect, but this could be investigated by further research.

Gamification changed participants' behaviour to be more engaged and better involved in the process especially during the idea generation phase (first phase of the NSD). During the experimentation, the researchers also found that rewards that motivate customers/participants to get involved in the process need to be carefully considered in accordance with the subjects. During the experimentation both bachelor and master's degree students were involved. The interaction between these two groups helped recording differences in reactions. For the bachelor's degree group, participants were excited with given points during the experimentation; while master degree group focused more on the types of reward. With regard to the activity environment, however, the atmosphere between gamified and none gamified environments were totally different. The researchers noticed that the gamified environment groups were more excited and active while those in the none gamified environment groups were seemingly disengaged and repeatedly asking to start the final activity during the experimentation process. With regard to this finding, organisations or practitioners that wish to implement gamification as a tool to foster involvement or engagement will need to consider the type of participants and after-process rewards. This can help reduce cost and time consumption in the long run.

Other than rewards, other triggers such as leader board and time limits are important factors in the gamified environment. During the experimentation, the researchers noticed that participants were alert and excited when they realised that the time had reached its limit, simultaneously with their real-time position on the leader board. These two triggers created a competitive environment, individually, as well as a collaborative atmosphere among groups. In terms of the implementation, implementer needs to consider the timeline for each phase since it encourages participants' focus and intention to involve which lead to a better engagement. This can be linked with the reward. In the experimentation process, under the gamified environment, the researchers stated clearly in the introduction part that rewards would be granted to the winner. This helped participants to be more focused throughout the activities as they knew that their activities impacted the outcome. In contrast, participants who participated under the none gamified environment seemed to be less focused and engaged unlike those in the gamified environment.

In terms of gamification, the most significant factor that practitioners need to consider is that the game element needs to bring positive motivation to the gamified environment, and that each person has a different reaction to different motivation types. In this research study, the game environment was created by using the concept of gamification elaborated by Wood and Reiners (2015) that recommends a gamified environment with components, mechanics, dynamics, and intentions elements. Since motivation is a significant factor to encourage and engage participants to be involved in the process, the researchers also considered the significant elements from the persuasive design theory from Fogg (2009) which are ability, motivation and triggers in order to ensure an increased level of motivation. During the experimentation, trigger elements were often used by embedding them into the game mechanics. With the combination of game elements and persuasive behaviour, the researchers found that participants' ability and motivation were enhanced in the gamified environment.

In addition, the gamification process for the experimentation in this research was developed by using the four phases of getting participant involved in the gamified environment by Chou (2015), which are discovery, on boarding, scaffolding, and endgame. Participants started to experience discovery the journey by introducing the overall process. Next, participants received rules and instruction of each stage together with the game mechanics. Following with scaffolding phase, they received the chance to interact and facing with the implementation of all the rules and instructions. The final phase (end game) helped participants get familiar with all game elements and game dynamics. It was found that adding a new trigger or new game element might help create an exciting atmosphere and increase involvement in-game environment.

To apply these findings to a real life situation, implementers can start identifying the type of behaviour expected from participants or customers, and think about the motivation elements that participants and customers will be engaged with in the process. When implementers know the overall objective and participant/customer nature, implementers can start designing the game elements which can be systematically incorporated to the environment.

However, one of the most important tasks for the game designers is to keep the atmosphere and environment positive and healthy. For instance, a certain participant might earn the highest score and, in turn, dispirit the other participants in the next activity since they know that they cannot keep up to that certain participant. This will cause the participants to become disengaged and, subsequently, affect the whole environment. This is not ideal and beneficial for the objective of the process.

8 Future research and limitations

Future research should extend the findings from this study and includes the entire the NSD process phases. Experiments with the collaboration of an organisation could be conducted, since certain phases require involvement and decisions from the organisation, they cannot be run in a stand-alone manner as we did for the three initial phases. Doing so will give a better appreciation of the impact of gamification all along the NSD process, and will also help measuring the quality and success rates of such an approach compared to a more traditional NSD approach.

Using follow-up assessments is another way that could be considered in future research studies. The idea is to follow-up with participants who are requested to complete post-tests. By doing so researchers will allow a certain time for participants to halt, reflect, and participate in each process one at a time which could extend the time needed between the pre-test and post-test compared to this experimentation. The results from the gamified and none gamified environments might be different from the current results as participants will be given more time to think and reflect or even apply a newly invented strategy to win each stage of the process. This could also help assess how lasting is the impact of gamification on the level of customer engagement.

The demographics of participants can also be extended and diversified in future research studies. Different types of participants or occupations might provide different results in comparison to the research which heavily relies on participations with similar age and occupational backgrounds. Lastly, conducting an experiment with customers of a company that are already involved in co-creation process (Mariano and Awazu, 2017;

Mariano and Casey, 2013) can be another viable option for future research. This can be a good opportunity to identify the capability of gamification as well as improving the use of gamification in a co-creation process which involves customers and companies that are already accustomed to gamification in their NSD.

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