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Exploring How Gamification Design Drives Customers' Co-Creation Behavior in Taiwan

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Abstract

This study has incorporated the mechanics-dynamics-emotions (MDE) and two behavioral learning paths to investigate the customers' co-creation behavior in Taiwan. The intuitive path begins with a gamification design that reflects the customers' proactive and innovative behavior; the cognitive path begins with persuasion knowledge remarks based on rational and reactive reasoning. These two paths conclude what forms user co-creation. The study collects data of 505 active social media users in Taiwan and employs structural equation modeling. The empirical findings demonstrate persuasive knowledge and gamification design are significantly associated with self-reference, and in turn, positively associated with co-creation. It indicates that cognitive behavior plays the main role in forming co-creation. Participants are more drawn to co-creation behaviors by the marketing contents that prompt reactive behaviors than proactive ones. Therefore, marketing managers can use appropriate stimuli to enhance co-creation behavior. Companies can design activities related to users, and more accessible for reactive, instead of proactive behavior, i.e., asking for their initiatives. It also suggests that companies' marketing campaigns should involve key opinion leaders matching the product image and the target audience's preferences. The novelty of this study is to introduce a novel augmented MDE framework to extend the "dynamics" into the incubation and implementation stage.

Keywords: Gamification Design, Persuasive Knowledge, Perceived Customization, Self-Reference, Co-Creation

JEL Classification Code: C12, C31, C83, M31

1. Introduction

In this increasingly competitive online environment, academics and industries are eager to find out new ways to attract customers, as the traditional service marketing techniques may not be valid in this era (Firman et al., 2020; Lee & Kwag, 2017; Quach & Thaichon, 2017). Kang (2017) stated that successful organizations focus on co-creating products and services with customers, and that integrates customers into core processes. Co-creation (CC) is defined as the process of solving problems together, integrating the resources of others through collaborative interactions (Godfrey & Warren, 2019; Stenroos & Jaakkola, 2012). The outgrowth of the concept 'co-creation' makes to understand the transfer towards a participatory culture (Young & Kang, 2017). A high level of participation in an online community is important for service marketing and branding (Phua, 2018). It seems like co-creation has become a new way to attract customers' attention to the services, products, or brands, leading organizations to success, and has been applied by several companies to create many corporate websites and fan pages (Bagheri et al., 2019). Hence, marketers who would like to gain more attention need to construct an attractive online environment that fosters customers' involvement to share their ideas and creativities (Godfrey & Warren, 2019; Lee, 2019).

Gamification is defined by Deterding et al. (2011) as "the use of game design elements in non-game contexts" (p. 1). It is defined as a process that improves services to assist consumers' value creation through gameful experiences, and it has swept the e-commerce market, with many companies using this concept to design their websites

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or applications to increase customer engagement (Burke, 2011; Yang et al., 2017). The concept of gamification has been a topic generating attention across different contexts and has grown at a significant speed in recent years (Buckley & Doyle, 2016). Therefore, utilizing the concept of game-playing to increase customers' co-creation seems to be a reasonable attempt.

Traditional gamification research focuses on utilizing the 'mechanics, dynamics, and aesthetics (MDA) framework proposed by Hunicke et al. (2004) to understand users' behavior in the engagement. Several new models have been proposed to investigate gamification, such as the mechanics, dynamics, and emotions (MDE) framework by Robson et al. (2014). The current study uses Robson et al.'s (2014) MDE paradigm to investigate the elements that influence customers' co-creation behavior.

This term 'gamification', is rather new to most of the people in Taiwan, so we invited people who have gaming experience to participate in the present study, as in Taiwan alone, there were 14.5 million game players (63% of the national population), and spent $1.3 billion in gaming products in 2018, which makes it the world's 15th largest games market (Newzoo, 2018). With such amount of game players and their spending power, it has made Taiwan an ideal place to investigate 'game players as customers' for non-game products' co-creation behavior.

Furthermore, the research framework we revise from the MDE framework is designed to be a dual-pathway one that consists of an intuitive (proactive) and cognitive (reactive) behavioral path. The expected contributions of the present study are twofold – for both academia and industry. Previous literature has explored variables that would explain customers' co-creation behavior, such as the relationship between gamification design and co-creation (Bagheri et al., 2019; Morschheuser et al., 2017; Yang et al., 2017; Young & Kang, 2017). The present study hopes to provide more insights by including new variables, which are categorized into two behavioral paths. These new insights can be added to the existing academic literature and may yield practical recommendations to the industry.

2. Theory Background and Hypotheses

2.1. MDE Framework

The mechanics-dynamics-emotions (MDE) framework proposed by Robson et al. (2014) can be used to explain the drivers of customers' co-creation behavior from a systematic viewpoint. The MDE framework shows that mechanics are game tools to describe specific elements, which normally include collections, badges, and achievements (Werbach & Hunter, 2012). Dynamics are the run-time behavior that can connect game players with the game system, including the freedom of making choices, responding to players' inner calls, and addressing the intrinsic motivation of players (Seaborn & Fels, 2015). Emotions describe aesthetical responses from the players, including exciting, fantasy feelings, and fun from reaching to the higher level and/or competing with other players by teamwork (Hunicke et al., 2004; Robson et al., 2014). The MDE framework is developed from the traditional stimulus-organism-response (SOR) model that is widely applied in psychology, marketing, and service management (Robson et al., 2014). The SOR model shows how people react to stimuli (mechanics), so in a service marketing context, consumers' responses (dynamics) are affected by the stimuli and mediated by the organisms (dynamics) (Vieira, 2013).

Based on the concept of MDE and its origin SOR, the present study eliminates the emotion (E) part, as the behavior/response we aim to study is physical responses instead of the mental ones. The reason is that the dynamics part is the black box of user experience in the USE framework (Cowley & Charles, 2016). Therefore, this study will propose a model containing mechanics (M) and two stages of dynamics (D).

The variables for the proposed MD model are categorized into dual pathways. The cognitive path tends to the individual rational analysis level, meaning individuals are rational participants in what they do. They present assumptions, analyze data, validate testing, and solve problems through given information in the game-playing environment (Ham & Nelson, 2016; Ham et al., 2015). Through this path, customers' reactive behavior can be examined as they act after they think. Contrarily, the intuitive path pertains to what makes customers enact without thinking much (Yang et al., 2017). Relatively, it is rational to call it a proactive behavior (Werbach & Hunter, 2012). By exploring and examining the variables in the research framework, imposing the dual-pathway, whether proactive or reactive path would encourage co-creation behavior more would be understood.

2.2. Co-Creation

Co-creation (CC) is defined as the process of solving problems together, which integrates the resources of suppliers and customers/users through collaborative interaction (Godfrey & Warren, 2019). In the online game-playing environment, through co-creation activities, users not only dedicate something to the online community but also provide useful insights to the game companies (Bagheri et al., 2019; Ind et al., 2013; Young & Kang, 2017). According to Service-Dominant Logic (Lusch & Vargo, 2006), value is not merely produced by the service providers, but generated in the process of users employing and integrating products with their own resources, which

can be named as the value of co-creation (Simeoni & Cassia, 2017). Based on the features of co-creation, service businesses and even organizations share mutual notions to co-create values via particular social platforms (Bagheri et al., 2019; Quash & Thaichon, 2017; Vargo et al., 2008). In the present study, co-creation behavior is considered as the response to the stimuli which is mediated by the organism (SOR model); hence, the possible variables which may affect customers' co-creation behavior will be identified as its antecedents and categorized in the proposed dual-pathway model, which is to follow.

2.3. Intuitive Path

Gamification design (GD)**:** Many companies use games as a tool to attract users to interact with each other and the contents, which is termed gamification, as it refers to a design that looks for increasing motivation of user engagement with the activities or the contents (Morschheuser et al., 2017). Gamification design (GD) means game players provide recommendations to manufacturers to modify certain functions when players run the games (Leclercq et al., 2018). GD is a feature applying elements in the game to non-game circumstances to make it attractive and alter users' behavior with intuitive reasoning (Yang et al., 2017). Gamification involves applying elements of gamefulness, gameful interactions, and gameful design with a specific intention in mind (Deterding et al., 2011). Players set some game-specific features, or create related accessories based on their unmet demands (Tarka, 2018). Some researchers indicate gamification design as the art of translating users' daily interactions into the game via intuitive thinking (Tarka, 2018; Yang et al., 2017). Thus, GD is identified as the 'stimulus' that contributes to the 'response' (co-creation), in the present study.

Perceived customization (PC): Customization presents as game players purchase related equipment to form different shapes of products to create more games (Soyeon, Sejin & Chris, 2017). PC in the online environment indicates that game companies can perceive rapidly supply individual user-tailored products and services (Kang, 2017). PC allows online customers to design products or services in line with their preferences at any time via online platforms (Soyeon et al., 2017). Therefore, PC is to attract users to buy the related equipment based on their own needs, and users perceive a high level of involvement with the system during customization (Sundar & Sampada, 2010). Customized service is almost a must-have service for every brand because users desire to select the products that can symbolize themselves. According to Kang (2017), PCs and personalization enable customers to produce new works, a process known as co-creation. Participation and enjoyment are the major causes for co-creation activity, and the PC is also a crucial aspect in developing users' interfaces (Sundar & Marathe, 2010). As a result, PC is thought to be one of the factors that can influence co-creation behavior.

2.4. Cognitive Path

Persuasive knowledge (PK) is the ability of individuals to influence others' behaviors and beliefs through the use of a large amount of information (Ham et al., 2015). Persuasive knowledge in the gaming environment means that game companies send out a variety of messages containing various advertisements for incentive treatments (e.g., earning points, avatars, leader boards, ranking, bonuses, etc.) to entice game players to accept and co-create with one another (Ham & Nelson, 2016). Persuasive knowledge involves the interaction between audiences and events/objects, and it is characterized by many cognitive elements (Hamby & Brinberg, 2018). People tend to cope with an event, such as messages from agents/salespeople, with existing knowledge based on the persuasive knowledge model (Boerman et al., 2017), which provides a way to identify, analyze, explicate, evaluate, and remember information; users decide how to cope with the persuasion attempts (Ham et al., 2015). In general, persuasion mentions transportation mechanisms and how stories or narrative forms alter people's beliefs (Escalas, 2013). Therefore, PK is considered a kind of cognitive learning mechanism and has an association with the co-creation behavior of users.

Players who feel like role-playing in the game and encounter game-related events and messages are referred to as self-reference (SR) (Zhang et al., 2018). Self-reference is defined as a style of perception in which individuals correlate content and information with themselves (Phua, 2018). This concept is commonly used in advertising and recommender systems, and it makes users wonder if the website content is highly relevant to their personal information (Zhang et al., 2018). Furthermore, users may embrace the messaging of the items or services due to their associating cognition (Seaborn & Fels, 2015). The customer-brand engagement model proposed by France et al. (2016) supports that self-congruity, which is comparable to self-reference, serves as a prelude to customer brand engagement. Customers' spirit is referred to as SR, and it is thought to have an impact on co-creation behavior.

2.5. Hypothesis Development

Effect of gamification design on perceived customization and self-reference: based on the features of gamification design, many organizations have started incorporating game-style elements to design their websites or applications (Leclercq et al., 2018; Yang et al., 2017).

The game-style aspects, according to Mitchell et al. (2020), would drive users' extrinsic (physical rewards) and intrinsic (social growth) desire to participate. Users are very likely to enter a flow state, meaningfully focused and engaged in an activity, as a result of the strong motivating pull, and hence neglect the difficult setting of perceived customization (Leclercq et al., 2018). Thus, we propose hypothesis one (H1) as follows:

H1: *Gamification design is positively associated with perceived customization.*

The present study states that users avail themselves with only finite cognitive resources at a particular point of time to allocate, encode, process and retrieve information based on cognitive load theory (Van Reijmersdal et al., 2010). While playing games, users generally allocate their time (cognitive resource) to perform self-related tasks (Suh et al., 2017). So, when users are more into the game-style tasks, the tasks or the outcomes of the tasks may be more associated with themselves. Hence, we propose hypothesis two (H2) as follows:

H2: *Gamification design positively associated with self-reference.*

Effect of persuasive knowledge on perceived customization and self-reference: Persuasive knowledge is classified into four constructs: authority, consistency, and reciprocity (Cialdini, 2007). Quach and Thaichon (2017) stated that if online users like the service providers, they are more likely to devote themselves to a specific online context. Furthermore, most of the online customers are skeptical and vigilant, authority and consistency would assist companies/brands construct a reliable environment for customers (Cowley & Charles, 2016). Lastly, reciprocity is a critical element in social interactions, then, online users would like to interact with brands and set up perceived customization products for themselves based on social exchange mechanisms (Cook et al., 2013). Hence, we propose hypothesis three (H3) as follows:

H3: *Persuasive knowledge is positively associated with perceived customization.*

According to Cacioppo and Petty (1984), if people are highly motivated by a topic, it is more likely that they will compare the information to their own knowledge and experience, and then arouse user experience of themselves. According to Phua (2018), the increase in ease of viewing product and brand advertisements is similar to the increase in user experience from persuasive strength, and this can lead to the concept of self-reference. Thus, we propose hypothesis four (H4) as follows:

H4: *Persuasive knowledge is positively associated with self-reference.*

Effect of gamification design on persuasive knowledge: Based on the characteristics of gamification design, it appears that they may easily encourage people to participate in games and related activities, then offer clear insight and leave a lasting impression (Ruggiero, 2015). Through continual interaction within the gaming environment, users are able to express their ideas and emotions over a longer period of time (Suh et al., 2017). As a result of the gamification design, consumers may be more motivated to learn more about the issue, pay more attention to the details of the products or services, and so be more easily persuaded (Cacioppo & Petty, 1984). As a result, we offer Hypothesis 5 (H5):

H5: *Gamification design is positively associated with persuasive knowledge.*

Effect of perceived customization and self-reference on co-creation: Co-creation is defined as the process of solving problems together by integrating the resources of the company and users through collaborative interaction (Stenroos & Jaakkola, 2012). Customization allows users to choose from several different products and make their own ones (Young & Kang, 2018). Accordingly, the perception of being able to customize can enhance customers' sense of identification and satisfaction, and generate revisit behavior (Soyeon et al., 2017). Hence, we can postulate that perceived customization will encourage customers to involve in co-creation activities, and that forms hypothesis six (H6) as follows:

H6: *Perceived customization is positively associated with co-creation.*

The self-reference effect is a tendency for users to encode communications based on how involved they are in them (Rogers et al., 1977). Customers are more likely to approve companies or items that may showcase their personal features, according to the self-reference effect (Phua, 2018). France et al. (2016) developed a customer-brand engagement model that shows a link between self-congruity and customer brand engagement. As previously said, self-congruity and self-reference are comparable, and co-creation behavior can be a part of engagement behavior. Thus, we propose hypothesis seven (H7) as follows:

H7: *Self-reference is positively associated with co-creation.*

The present study incorporates the dual-pathway variables into the MDA framework, to make it a systematic

and comprehensive research framework. Gamification design (GD) and persuasive knowledge (PK) are considered MDE's M (mechanics), as they both are tools that contain information that would drive users to behave (dynamics). The two variables which are driven by the two mechanical ones are perceived customization (PC) and self-reference (SR), and they are considered as the first step of behavior (dynamics 1: D1). Game dynamics is often presented by cognitive and affective intermediary states and processes which mediate the relationship between the stimuli and the responses, and perceived customization and self-reference can be deemed as a type of organism to the online game players. As D1 (PC & SR) pertains to behaviors that would drive further behaviors (responses), the present study terms D1 as the "incubation" stage. Incubation in the present study means a state or an act that helps to prompt the following action (behavior). The second step of the behavior is the co-creation behavior (D2), and it is the final behavior and termed the 'implementation' stage. On the face of it, implementation means the act of the behavior, following the incubation stage. Based on the nature of the present study, the emotional response is not sought, it is therefore left out. The proposed research framework is shown in Figure 1 below.

3. Research Method

3.1. Measures

We designed a self-administered questionnaire to conduct a survey. The questionnaire was formed by adapting existing scales from the extant literature. The scale for co-creation consisted of four categories: conscious attention, enthused participation, social connection, and community dimension, and a total of twelve items were adapted from Leclercq et al. (2018). Three categories were included in the perceived customization scale: collaborative, adaptive, and cosmetic, and nine items were adapted from Gilmore and Pine (1997). Two categories of self-reference were included: narrative process and analytical process, and six items were adapted from Escalas (2007). The scale of persuasive knowledge consisted of three categories: reciprocity, like and authority, and cosmetic, and nine items were included based on Cialdini (2007). Nine items for gamification design were adapted from Xi and Hamari (2019), which categorized this construct into three: immersion-related, achievement-related, and social related. Each item was measured by a 6-point Likert scale. The main reason to employ an even point scale rather than an odd point one was the removal of the neutral point. It can still show internal consistency while obtaining more respondents' perspectives and information by avoiding neutral opinions (Nunally, 1978). It is particularly relevant in Eastern society, which is characterized by a culture of neutrality in which one's opinion does not affect others.' (Cicchetti et al., 1985).

3.2. Samples and Data Collection

The target audience of the present study is the game players in Taiwan. Quota sampling was adopted as the sampling strategy, which requires the statistical features of the sample to meet that of the population, and plays a role in increasing the sample representativeness in a non-probability sampling context. As it was difficult to obtain the demographic information about the game players

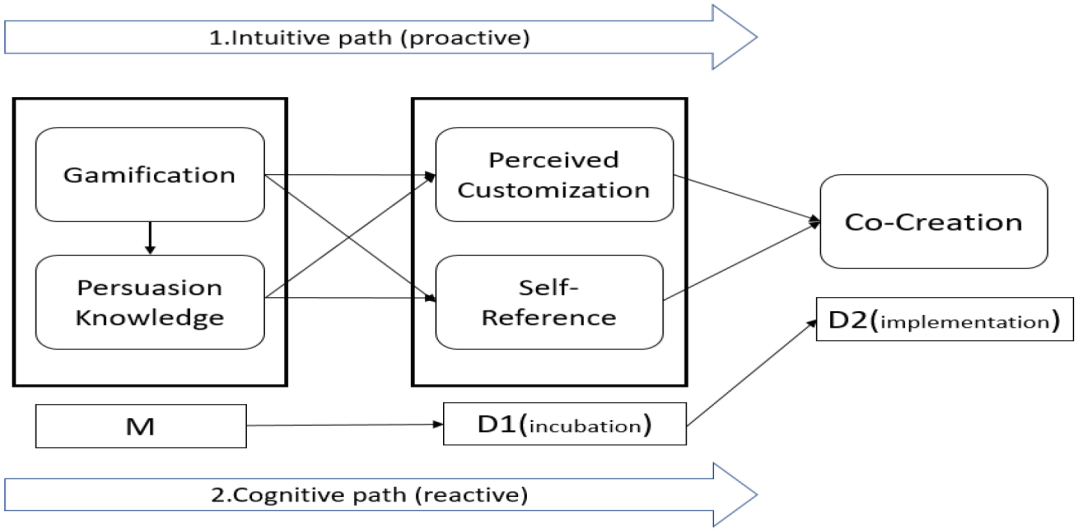

Figure 1: The Research Framework of the Present Study

in Taiwan, we decided to use the information of all active mobile social media users in Taiwan from Statista Research Development (2018) and took it as a proxy. Accordingly, game players in Taiwan were estimated to be 18 million people, accounting for 78.3% of the total population of Taiwan in 2018. Among this population, males accounted for 45.0% (8.10 million), and females accounted for 55.0% (9.90 million). As for age, users were divided into three different age groups: 5.04 million (28.0%) were under 24 years old, 5.40 million (30.0%) were between 25–34 years old, 4.68 million (26.0%) were between 35–44 years old, and 2.88 million (16.0%) were over 45 years old. Based on the percentages, convenience and snowballing sampling were employed to try to match the quotas.

The data collection tool was created in the form of an online questionnaire. To prevent the likelihood of a common method variance, this questionnaire was designed with a cover photo between construct items (Podsakoff et al., 2003). The questionnaire was distributed via a social media platform, Facebook, in March 2019.

4. Empirical Results

4.1. Sample Characteristics

A total of 505 valid questionnaires were collected, consisting of 220 males (43.4%), and 285 females (56.6%); 155 of the respondents were under 24 years old (30.6%); 150 were 25–34 years-old (29.8%); 100 were 35–44 years-old (19.8%); 100 were above 45 years-old (19.8%). Despite repeated attempts, the ratio of the collected data differed somewhat from the plan. Table 1 shows the planned sample structure as well as the empirical data statistics.

The common method variance (CMV) is investigated using Harman's one-factor analysis of the un-rotated principal components method (Malhotra et al., 2006). Within the 45 items, there were seven variables with eigenvalues larger than 1.0, and the seven factors together accounted for 70.6% of the total variance. Furthermore, not all the factors are obvious. Furthermore, the first component has a proportion of explained variation of 46.8%, which is less than 50%. As a result, the CMV issue is not apparent in this investigation (see Table 2).

4.2. Reliability and Validity Analysis

The reliability is first assessed by Cronbach's. The values of Cronbach's for the constructs of co-creation, perceived customization, self-reference, persuasive knowledge, and gamification design are 0.929, 0.840, 0.875, 0.878, and 0.920, respectively, which are acceptable as they are greater than 0.7, meaning each construct has a high internal consistency (Bagozzi & Yi, 1988). The composite reliability (CR) values for co-creation, perceived customization, self-reference, persuasive knowledge, and gamification design are satisfactory (0.926, 0.842, 0.877, 0.879, and 0.920, respectively) as they are larger than 0.6 (Fornell & Larcker, 1981).

Table 1: Planned Sample Structure and Empirical Demographics Characteristics of Samples

Planned Sample Structure	**Male**	**Female**	**Total**
Under 24	63 (12.6%)	77 (15.4%)	140 (28%)
25–34	68 (13.6%)	82 (16.4%)	150 (30%)
35–44	58 (11.6%)	72 (14.4%)	130 (26%)
Over 45	36 (7.2%)	44 (8.8%)	80 (16%)
Total	225 (45.0%)	275 (55.0%)	500 (100.0%)
Empirical Demographics Characteristics	**Count**	**Percentage (%)**	**Cumulative percentage (%)**
Gender			
Male	220	43.4	43.4
Female	285	56.6	100.0
Age			
Under 24	155	30.6	30.6
25~34	150	29.8	60.4
35~44	100	19.8	80.2
Above 45	100	19.8	100.0
Total	505	100.0	100.0

Table 2: Common Method Variance Testing with Factor Analysis

Number of Factors	Factor Loading	Percentage of Explained Variance	Accumulation Percentage of Explained Variance
1	21.104	0.468	0.468
2	2.786	0.062	0.531
3	2.431	0.054	0.585
4	1.880	0.042	0.623
5	1.465	0.033	0.659
6	1.077	0.024	0.683
7	1.048	0.023	0.706

The internal consistency is demonstrated by acceptable values of Cronbach's and CR (Kline, 2011). Three ways of estimating convergent validity suggested by Hair et al. (2010) are employed, which are checking the construct validity, factor loadings, the average variance extracted (AVE) values. Construct validity is demonstrated by having acceptable Cronbach's and CR, which are verified above. The factor loadings on a construct and an acceptable factor loading should be greater than 0.4 (Fornell & Larcker, 1981). The loading values are 0.812, 0.812, 0.911, and 0.942 for co-creation; 0.824, 0.775, and 0.799 for perceived customization; 0.857 and 0.909 for self-reference; 0.846, 0.845, and 0.834 for persuasive knowledge; 0.847, 0.900, and 0.924 for gamification design. When AVE's value is greater than 0.5, it indicates a good convergent validity (Fornell & Larcker, 1981). The AVE values for co-creation, perceived customization, self-reference, persuasive knowledge, and gamification design are satisfactory (0.759, 0.639, 0.780, 0.708, and 0.793, respectively). All the figures above indicate that convergent validity is demonstrated. A summary of the figures mentioned above is shown in Table 3.

Finally, discriminant validity is tested by comparing the AVE values with the squared inter-construct correlations (SICs) between two constructs. When a construct's AVE value is greater than its SICs, the discriminant validity is demonstrated (Hair et al., 2010). Based on the figures shown in Table 4, the discriminant validity of this study is stood.

4.3. Hypothesis Testing Results

Structural equations modeling (SEM) is employed to examine the hypotheses in this study. The structural model is examined, and two kinds of measurements for the goodness of fit statistics are employed: absolute measurements and incremental measurements. The results show that the structural model has good fit (Kline, 2011) based on the goodness-of-fit indices- χ^2/ degree of freedom (df) = 3.485 ($2< \chi^2 <5$), goodness of fit index (GFI) = 0.935, augmented goodness of fit index (AGFI) = 0.902, normed fit index (NFI) = 0.959, incremental fit index (IFI) = 0.952, and comparative fit index (CFI) = 0.970, are all above 0.9. Additionally, root mean square of residual (RMSR) = 0.035, is smaller than 0.05, and root mean square error of approximation (RMSEA) = 0.070, is smaller than 0.08, indicating a good fit (Bagozzi & Yi, 1988).

Hypothesis testing results are shown in Table 5. Only one hypothesis is not supported, which is H6. The effect of perceived customization on co-creation behavior has shown a significant negative impact (H_6: $\beta_6 = -0.259$, $t = -2.463$), which is different from our hypothesis.

Table 5 also shows the bootstrapping samples for each path in terms of coefficient of determination (R-square), effect size (f-square), and collinearity detection (variance inflation factor analysis = VIF), as well as the partial least square (PLS), results from Smart 3.0 software. Firstly, the R^2 values could represent a model's explanatory power. Based on the empirical results, the R^2 values all range from 0.539 to 0.318 and lie at satisfactory levels above 0.26 (Hair et al., 2019). Secondly, the effect size (f^2) can assess how the removal of certain predictor constructs affects an endogenous construct's R^2 value. The effect size for each structural path is estimated by the change in R^2 that would occur if the structural path is omitted from the model. Thus, calculated effect sizes are examined for each of the structural paths, and they are somewhat redundant to the size of the path coefficients. As a rule of thumb, f^2 values higher than 0.02, 0.15, and 0.35 show that the model has a small, medium, or large effect sizes, respectively (Khalilzadeh & Tasci, 2017). Based on the empirical results in Table 5, the achieved effect sizes of 0.019, 0.058, 0.125, 0.136, 0.143, 0.327, and 1.183, respectively, represent weak

Table 3: Results of Reliability and Validity Analysis

Construct Item	Cronbach's *α*	Cronbach's *α* if Item Deleted	Loading	Composite Reliability [CR]	Average Variance Extracted [AVE]
Co-Creation					
Conscious attention		0.907	0.812		
Enthused participation	0.929	0.914	0.812	0.926	0.759
Social connection		0.909	0.911		
Community engagement		0.899	0.942		
Perceived Customization					
Collaborative		0.785	0.824		
Adoptive	0.840	0.782	0.775	0.842	0.639
Transparent		0.765	0.799		
Self-Reference					
Narrative process	0.875	–	0.857	0.877	0.780
Analytical process		–	0.909		
Persuasive Knowledge					
Reciprocity		0.838	0.846		
Like	0.878	0.810	0.845	0.879	0.708
Authority		0.835	0.834		
Gamification Design					
Immersion		0.909	0.847	0.920	0.793
Achievement	0.920	0.861	0.900		
Social		0.879	0.924		

Notes: CR = (sum of standardized loading)^2/[(sum of standardized loading)^2 + (sum of measurement error)]; AVE = (sum of square standardized loadings^2)/[(sum of square standardized loadings^2) + (sum of measurement error)].

Table 4: Means, Standard Deviations, and Bivariate Correlations and AVEs

Variables	Mean	Standard Deviation	A.	B.	C.	D.	E.
A. Gamification design	4.499	0.888	**0.793**				
B. Persuasive knowledge	4.561	0.763	0.375	**0.708**			
C. Perceived Customization	4.731	0.662	0.211	0.219	**0.639**		
D. Self-reference	4.501	0.790	0.254	0.346	0.300	**0.780**	
E. Co-creation	4.161	0.977	0.331	0.349	0.241	0.285	**0.759**

Note: The diagonal figures in bold are the AVEs, the lower diagonal figures are the square of the correlations (SIC – Squared Inter-Construct correlation), the upper diagonal figures are the correlations.

and moderate redundancy and effect size on each path. Therefore, the results show that perceived customization and self-reference have successfully explained the effects on co-creation. Thirdly, the variance inflation factor (VIF) is employed to assess the collinearity of the formative indicators. The VIF values in Table 5 indicate that no collinearity problem stood since they all range from 1.000 to 2.183 and are smaller than 3.0 (Hair et al., 2019).

Table 5: Empirical Results and Hypothesis Testing of Study Model

Hypothesized Pathway	Coefficient	*t*-value	*p*-value	Test	R^2	VIF	f^2
H1: Gamification design → Perceived customization	0.124	2.203	0.012**	Accept	0.318	2.183	0.058
H2: Gamification design → Self-reference	0.111	2.972	0.001***	Accept	0.330	2.183	0.019
H3: Persuasive knowledge → Perceived customization	0.386	6.549	0.001***	Accept	0.357	2.183	0.125
H4: Persuasive knowledge → Self-reference	0.440	10.238	0.001***	Accept	0.485	2.183	0.327
H5: Gamification design→ Persuasive knowledge	0.565	19.978	0.001***	Accept	0.539	1.000	1.183
H6: Perceived customization → Co-creation	−0.295	−2.463	0.007**	Not Accept	0.378	1.825	0.136
H7: Self-reference → Co-creation	0.978	6.989	0.001***	Accept	0.388	1.825	0.143

Notes:
1. Structural model goodness-of-fit indices: χ^2/df: 3.485; GFI: 0.935; AGFI: 0.902; CFI: 0.970; IFI: 0.952; NFI: 0.959; RMSR: 0.035; RMSEA: 0.070. 2. **Correlation is significant at the 0.01 level (one-tailed) ***Correlation is significant at the 0.001 level (one-tailed) f^2 = [(R^2 of structural path included) – (R^2 of structural path excluded)] / [1/(R^2 of structural path included)].

5. Discussion and Implications

5.1. Discussion

As expected, gamification design and persuasive knowledge have a positive influence on co-creation through enhancing the sense of self-reference, which extends the studies of Suh et al. (2017) and Phua (2018). The present study offers a more rounded description of gamification design and persuasive knowledge to evaluate the drivers of user co-creation. Co-creation behaviors are found mainly based on persuasive knowledge—self-reference—co-creation (PK—SR—CC) path instead of gamification design—perceived customization—co-creation (GD—PC—CC) one, indicating that peoples' motivation to co-create is determined by perceived personalization assessment and self-related status rather than the actual understanding of the personalization.

It can be seen from Figure 1 that the cognitive (reactive) path is more relevant to people than the intuitive (proactive) path. The surprising and worth mentioning result is the significant negative effect of perceived customization on co-creation behavior, which is inconsistent with Kang's (2017) study. Perceived customization represents people's comprehensiveness about a message sent by a brand, which should encourage co-creation behavior. The significant negative effect shows that such knowledge apparently does not appertain to self-related characteristics and somehow backfires co-creation motivation. That means that based on the elaboration likelihood model's (ELM) message-processing mechanism (Cacioppo & Petty, 1984), people tackle information through the peripheral path instead of the central path. The different results may be caused by the different target audiences – Kang's study focuses on online shoppers and the present study focuses on online gamers. The different characteristics between these two groups might shed some light on the differences.

5.2. Implications

In terms of academic implications, the main one is the application and modification of the MDE framework from Robson et al. (2014). The purpose of this study is to examine the drivers of the game user co-creation behavior, by employing the concept of the MDE framework in introducing two pathways. Based on the nature of the present study, the emotions (E) are left out, and instead, two steps of dynamics are designed (D1 & D2). Gamification design (GD) and persuasive knowledge (PK) as mechanics (M) are confirmed to have a positive impact on self-reference (dynamics 1) and, in turn, to have a positive impact on co-creation (dynamics 2). Therefore, the present study modifies the MDE and provides a new framework that breaks down the behaviors (dynamics) into two stages: D1 as incubation, and D2 as implementation. This new framework will help to categorize different behaviors and determine their connection.

It can be considered in terms of practical implications based on the dual-pathway model we developed. In this study, the GD-PC-CC (intuitive/proactive) approach fails, whereas the PK—SR—CC (cognitive/reactive) path succeeds. On the co-creation behavior, this suggests that the cognitive (reactive) way is more essential than the intuitive (proactive) path. That is, customers are more reactive than proactive to the contents provided, meaning customers tend to dislike making efforts (e.g. asking for their initiatives - ask for an idea, or naming a product) when interacting with the service marketing messages. Instead, an easier way to interact with the marketing messages will

be better (e.g. asking for their choice - providing 4 options for customers to choose from).

To go into the details of the relationships between constructs, based on the GD—SR—CC path, companies can utilize gamification design in the fan pages and websites incorporating role-playing games to induce customers to participate. When customers perceive the gamification design related to them, they are more willing to co-create with the brands/companies. According to the PK—SR—CC path, game firms' marketing strategies should include key opinion leaders who match the product image and the preferences of the target audience. As evidence, users will feel more relevant to them as a result of this persuasive power, which will encourage them to join in co-creation activities.

5.3. Limitations and Future Research

The research limitations are twofold. First, the present study only investigates the effect of gamification applications on service platforms with social, achievement, and immersion categories (Leclercq et al., 2018). Other facets may affect the effect of gamification (e.g. complexity and loss situation). Second, in the sample design, this study takes the population who are active mobile social media users as a proxy for the population of actual online game players, and the samples collected are not exactly close to the proportions of the population, though reasonable attempts (e.g., more samples) were made to make samples more representative, limited time and resources hinder the results. This can be improved in future studies.

References

Bagozzi, R. P., & Yi, Y. (1988). On the evaluation of structural equations models. *Academic of Marketing Science*, *16*(1), 76–94. https://doi.org 10.1007/BF02723327

Bagheri, S., Kusters, R. J., Trienekens, J. J. M., & Grefen, P. W. P. J. (2019). A reference model-based user requirements elicitation process: Toward operational business-IT alignment in a co-creation value network. *Information and Software Technology*, *111*(1), 72–85. https://doi.org/10.1016/j.infsof.2019.03.012

Boerman, S. C., Willemsen, L. M., & Van der Aa, E. P. (2017). This post is sponsored: effects of sponsorship disclosure on persuasive knowledge and electronic word of mouth in the context of Facebook. *Journal of Interactive Marketing*, *38*(1), 82–92. https://doi.org/10.1016/j.intmar.2016.12.002

Buckley, P., & Doyle, E. (2016). Gamification and student motivation. *Interactive Learning Environments*, *24*(6), 1162–1175. https://doi.org/10.1080/10494820.2014.964263

Burke, B. (2011). What's next: The gamification of everything. *Gartner*. https://blogs.gartner.com/brian_burke/2011/01/27/whats-next-the-gamification-of-everything/.

Cacioppo, J. T., & Petty, R. E. (1984). The elaboration likelihood model of persuasion. *Advances in Consumer Research*, *11*(1), 673–675. https://richardepetty.files.wordpress.com/2019/01/1986-advances-pettycacioppo.pdf

Cialdini, R. (2007). *Influence: The psychology of persuasion*. New York: Harper Business.

Cicchetti, D. V., Shoinralter, D., & Tyrer, P. J. (1985). The effect of a number of rating scale categories on levels of interrater reliability: A Monte Carlo investigation. *Applied Psychological Measurement*, *9*(1), 31–36. https://doi.org/10.1177/014662168500900103

Cook, K., Cheshire, C., & Rice, R. N. (2013). Social exchange theory. In: Delamater, J., & Ward, A. (Eds.), *Handbook of social psychology*. New York: Kluwer Academic/Plenum Publishers.

Cowley, B., & Charles, D. (2016). Behavlets: A method for practical player modeling using psychology-based player traits and domain-specific features. *User Modeling and User-Adapted Interaction*, *26*(2–3), 257–306. https://doi.org/10.1007/s11257-016-9170-1

Deterding, S., Dixon, D., Khaled, R., & Nacke, L. E. (2011). From game design elements to gamefulness: Defining gamification. *Proceedings of the 15th International Academic MindTrek Conference: Envisioning Future Media Environments,* Tampere, Finland, September 28–30, 2011 (pp. 9–15). New York: ACM Press. https://doi.org/10.1145/2181037.2181040

Escalas, J. E. (2007). Self-referencing and persuasion: Narrative transportation versus analytical elaboration. *Journal of Consumer Research*, *33*(4), 421–429. https://doi.org/10.1086/510216

Escalas, J. E. (2004). Imagine yourself in the product: Mental simulation, narrative transportation, and persuasion. *Journal of Advertising*, *33*(2), 37–48. https://doi.org/10.1080/00913367.2004.10639163

Firman, A., Putra, A. H. P. K., Mustapa, Z., Ilyas, G. B., & Karim, K. (2020). Re-conceptualization of the business model for marketing nowadays: Theory and implications. *Journal of Asian Finance, Economics, and Business*, *7*(7), 279–291. https://doi.org/10.13106/JAFEB.2020.VOL7.NO7.279

Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, *18*(1), 39–50. https://doi.org/10.1177/002224378101800104

France, C., Merrilees, B., & Miller, D. (2016). An integrated model of customer-brand engagement: Drivers and consequences. *Journal of Brand Management*, *23*(2), 119–136. https://doi.org/10.1057/bm.2016.4

Gilmore, J. H., & Pine, B. J. (1997). The four faces of mass customization. *Harvard Business Review*, *75*(1), 91–101. https://hbr.org/1997/01/the-four-faces-of-mass-customization

Godfrey, D. M., & Warren, N. B. (2019). Understanding co-creation: Re-examining value and experience in consumer research.

Advances in Consumer Research, *47*(2), 297–303. https://doi.org/10.3389/fpsyg.2016.00793

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2010). *Multivariate data analysis: A global perspective*. Upper Saddle River: Pearson Education.

Hair, J. F., Risher, J. J., Sarstedt, M., & Ringle, C. M. (2019). When to use and how to report the results of PLS-SEM. *European Business Review*, *31*(1), 2–24. https://doi.org/10.1108/EBR-11-2018-0203

Ham, C. D., & Nelson, M. R. (2016). The role of persuasive knowledge, assessment of benefit and harm, and third-person perception in coping with online behavioral advertising. *Computers in Human Behavior*, *62*(4), 689–702. https://doi.org/10.1016/j.chb.2016.03.076

Ham, C. D., Nelson, M. R., & Das, S. (2015). How to measure persuasive knowledge. *International Journal of Advertising*, *34*(1), 17–53. https://doi.org/10.1080/02650487.2014.994730

Hamby, A., & Brinberg, D. (2018). Cause-related marketing persuasive knowledge: Measuring consumers' knowledge and ability to intercept CRM promotions. *Journal of Consumer Affairs*, *52*(2), 373–392. https://doi.org/10.1111/joca.12167

Hunicke, R., Leblanc, M., & Zubek, R. (2004). MDA: A formal approach to game design and game research. *Proceedings of the Challenges in Games AI Workshop:* 19th National Conference of Artificial Intelligence, San Jose, California, July 25-26, 2004 (pp. 1–5). Palo Alto, CA: AAAI Press. https://doi.org/10.1.1.79.4561.

Ind, N., Iglesias, O., & Schultz, M. (2013). Building brands together: Emergence and Outcomes of Co-Creation. *California Management Review*, *55*(3), 5–26. https://doi.org/10.1525/cmr.2013.55.3.5

Kang, J. M. (2017). Customer interface design for customer co-creation in the social era. *Computers in Human Behavior*, *73*(4), 554–567. https://doi.org/10.1016/j.chb.2017.03.032

Khalilzadeh, J., & Tasci, A. D. A. (2017). Large sample size, significance level, and the effect size: Solutions to perils of using big data for academic research. *Tourism Management*, *62*(1), 89–96. https://doi.org/10.1016/j.tourman.2017.03.026

Kline, R. B. (2011). *Principles and practices of structural equation modeling* (3rd ed). New York: Guilford Publications.

Kwon, S., Ha, S., & Kowal, C. (2017). How online self-customization creates identification: Antecedents and consequences of consumer-customized product identification and the role of product involvement. *Computers in Human Behavior*, *75*(1), 1–13. https://doi.org/10.1016/j.chb.2017.04.051

Leclercq, T., Hammedi, W., & Poncin, I. (2018). The boundaries of gamification for engaging customers: Effects of losing a contest in online co-creation communities. *Journal of Interactive Marketing*, *44*(1), 82–101. https://doi.org/10.1016/j.intmar.2018.04.004

Lee, W. J. (2019). Evaluating perceived smartness of product from consumer's point of view: The concept and measurement. *Journal of Asian Finance, Economics, and Business*, *6*(1), 149–158. https://doi.org/10.13106/JAFEB.2019.VOL6.NO1.149

Lee, J. W., & Kwag, M. (2017). Corporate marketing strategy using social media: A case study of the Ritz-Carlton Seoul. *Journal of Asian Finance, Economics, and Business*, *4*(1), 79–86. https://doi.org/10.13106/JAFEB.2017.VOL4.NO1.79

Liu, D., Santhanam, R., & Webster, J. (2017). Toward meaningful engagement: A framework for design and research of gamified information systems. *MIS Quarterly*, *41*(4), 1011–1034. https://doi.org/10.25300/MISQ/2017/41.4.01

Lusch, R. F., & Vargo, S. L. (2006). *The service-dominant logic of marketing: Dialog, debate, and directions*. New York: M.E. Sharpe.

Malhotra, N. K., Kim, S. S., & Patil, A. (2006). Common method variance in IS research: A comparison of alternative approaches and a reanalysis of past research. *Management Science*, *52*(12), 1865–1883. https://doi.org/10.1287/mnsc.1060.0597

Mitchell, R., Schuster, L., & Jin, H. S. (2020). Gamification and the impact of extrinsic motivation on needs satisfaction: Making work fun? *Journal of Business Research*, *106*(3), 323–330. https://doi.org/10.1016/j.jbusres.2018.11.022

Morschheuser, B., Riar, M., Hamari, J., & Maedche, A. (2017). How do games induce cooperation? A study on the relationship between game features and we-intentions in an augmented reality game. *Computers in Human Behavior*, *77*(2), 169–183. https://doi.org/10.1016/j.chb.2017.08.026

Newzoo. (2018). Taiwan games Market 2018. *Newzoo*. https://newzoo.com/Insights/Infographics/Taiwan-Games-Market-2018/.

Nunally, J. C. (1978). *Psychometric theory*. New York: McGraw-Hill.

Phua, P. J. (2018). Starring in your own Snapchat advertisement: Influence of self-brand congruity, self-referencing and perceived humor on brand attitude and purchase intention of advertised brands. *Telematics and Informatics*, *33*(5), 1524–1533. https://doi.org/10.1016/j.tele.2018.03.020

Podsakoff, P. M., Mackenzie, S. B., Lee, J. Y., & Podsakoff, N. P. (2003). Common method biases in behavioral research: A critical review of the literature and recommended remedies. *Journal of Applied Psychology*, *88*(5), 879–903. https://doi.org/10.1037/0021-9010.88.5.879

Quach, S., & Thaichon, P. (2017). From connoisseur luxury to mass luxury: Value co-creation and co-destruction in the online environment. *Journal of Business Research*, *81*(2), 163–172. https://doi.org/10.1016/j.jbusres.2017.06.015

Robson, K., Plangger, K., Kietzmann, J., McCarthy, I., & Pitt, L. (2014). Understanding gamification of consumer experiences. *Advances in Consumer Research*, *42*(2), 352–356. https://www.acrwebsite.org/volumes/1017445/volumes/v42/NA-42

Rogers, T. B., Kuiper, N. A., & Kirker, W. S. (1977). Self-reference and the encoding of personal information. *Journal of Personality and Social Psychology*, *35*(9), 677–688. https://doi.org/10.1037//0022-3514.35.9.677

Ruggiero, D. (2015). The effect of a persuasive social impact game on affective learning and attitude. *Computers in Human Behavior*, *45*(2), 213–221. https://doi.org/10.1016/j.chb.2014.11.062

Seaborn, K., & Fels, D. I. (2015). Gamification in theory and action: A survey. *International Journal of Human-Computer Studies*, *74*(1), 14–31. https://doi.org/10.1016/j.ijhcs.2014.09.006

Simeoni, F., & Cassia, F. (2019). From vehicle suppliers to value co-creators: The evolving role of Italian motorhome manufacturers. *Current Issues in Tourism*, *22*(2), 218–236. https://doi.org/10.1080/13683500.2017.1293619

Soyeon, K., Sejin, H., & Chris, K. (2017). How online self-customization creates identification: Antecedents and consequences of consumer-customized product identification and the role of product involvement. *Computers in Human Behavior*, *75*(1), 1–13. https://doi.org/10.1016/j.chb.2017.04.051

Stenroos, A. L., & Jaakkola, E. (2012). Value co-creation in knowledge-intensive business services: A dyadic perspective on the joint problem-solving process. *Industrial Marketing Management*, *41*(1), 15–26. https://doi.org/10.1016/j.indmarman.2011.11.008

Sundar, S. S., & Marathe, S. S. (2010). Personalization versus customization: The importance of agency, privacy, and power usage. *Human Communication Research*, *36*(3), 298–322. https://doi.org/10.1111/j.1468-2958.2010.01377.x

Suh, A., Cheung, C. M. K., Ahuja, M., & Wagner, C. (2017). Gamification in the workplace: The central role of the aesthetic experience. *Journal of Management Information Systems*, *34*(1), 268–305. https://doi.org/10.1080/07421222.2017.1297642

Statista Research Development. (2018). *A number of active mobile social media users in the Asia Pacific from 2016 to 2018 by country*. https://www.statista.com/Statistics/295643/Mobile-Social-Media-Mau-Asia-Pacific-Countries/

Tarka, P. (2018). The views and perceptions of managers on the role of marketing research in decision making. *International Journal of Market Research*, *60*(1), 67–87. https://doi.org/10.1177/1470785317744854

Van Reijmersdal, E. A., Jansz, J., Peters, O., & van Noort, G. (2010). The effects of interactive brand placements in online games on children's cognitive, affective, and conative brand responses. *Computers in Human Behavior*, *26*(6), 1787–1794. https://doi.org/10.1016/j.chb.2010.07.006

Vargo, S. L., Maglio, P. P., & Akaka, M. A. (2008). On value and value co-creation: A service systems and service logic perspective. *European Management Journal*, *26*(3), 145–152. https://doi.org/10.1016/j.emj.2008.04.003

Vieira, V. A. (2013). Stimuli-organism-response framework: A meta-analytic review in the store environment. *Journal of Business Research*, *66*(9), 1420–1426. https://doi.org/10.1016/j.jbusres.2012.05.009

Werbach, K., & Hunter, D. (2012). *For the win: How game thinking can revolutionize your business*. Philadelphia, PA: Wharton Digital Press.

Xi, N., & Hamari, J. (2019). The relationship between gamification, brand engagement, and brand equity. *Proceedings of the 52nd Annual Hawaii International Conference on System Sciences, Grand Wailea, Maui, Hawaii, USA, January 8–11, 2019*. (pp. 812–821). New York: ACM Press. https://doi.org/10.24251/HICSS.2019.099

Yang, Y., Asaad, Y., & Dwivedi, Y. (2017). Examining the impact of gamification on the intention of engagement and brand attitude in the marketing context. *Computers in Human Behavior*, *73*(3), 459–469. https://doi.org/10.1016/j.chb.2017.03.066

Young, J., & Kang, M. (2017). Customer interface design for customer co-creation in the social era. *Computers in Human Behavior*, *73*(4), 554–567. https://doi.org/10.1016/j.chb.2017.03.032

Zhang, H. L. Z., Zhao, L., & Gupta, S. (2018). The role of online product recommendations on customer decision-making and loyalty in social shopping communities. *International Journal of Information Management*, *38*(1), 150–166. https://doi.org/10.1016/j.ijinfomgt.2017.07.006