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ECONOMY

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Submitted to Lee Kong Chian School of Business
in partial fulfillment of the requirements for the
Degree of Doctor of Business Administration

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2021

I hereby declare that this PhD dissertation is my original work and
it has been written by me in its entirety.
I have duly acknowledged all the sources of information
which have been used in this dissertation.

This PhD dissertation has also not been submitted for any degree
in any university previously.

WANG Ziwen
October 8, 2021

ABSTRACT

EFFECT OF GAMIFICATION NARRATIVE QUALITY ON USERS' VALUE CO-CREATION BEHAVIOR IN CONTEXT OF B2C SHARING ECONOMY

WANG Ziwen

B2C sharing economy is now a major part of the economic system in China and the essence of it is the value co-creation of the users and platforms. However, the means to effectively stimulate users into value co-creation in B2C sharing economy are not well-understood. While gamification marketing is a low cost means to enhance user participation, empirical research of high granularity is lacking. This dissertation seeks to fill the gap by exploring how gamification narrative quality affects users' value co-creation behavior in the B2C sharing economy model and the underlying mechanism.

Using the bike sharing industry in China as the setting, this dissertation begins with the quality of gamification narratives and explores how gamification marketing may facilitate the continuous user value co-creation in the B2C sharing economy model. First, I build a model of the mechanism through which gamification narrative quality influences users' value co-creation behavior based on flow theory, the self-determination theory and the self-construal theory. Secondly, I construct gamification narrative quality (GNQ) scale. Finally, I use the questionnaire method to test the model of mechanism.

The main research findings are as follows: (1) gamification narrative quality consists of five dimensions: sense of reality, resonation, acceptance, fun, and interaction; (2) the gamification narrative quality has a significant positive effect on users' value co-creation behavior; (3) the gamification narrative quality has a significant positive effect on the flow experience, which in turn has a significant positive effect on users' value co-creation behavior; (4) the gamification narrative quality has a significant positive effect on perceived autonomy, which in turn has a significant positive effect on users' value co-creation behavior; (5) self-construal moderates the relationships between gamification narrative quality and both flow experience and perceived autonomy, such that the positive relationship is weaker for interdependent self-construal than independent self-construal.

Key words: gamification narrative quality; value co-creation behavior; sharing economy; flow experience; perceived autonomy

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CHAPTER 1. INTRODUCTION

1.1 Research Background and Questions

The sharing economy model is shifting from C2C to B2C. C2C represents a market environment where one customer purchases goods or services from another customer using a third-party business or platform to facilitate the transaction. In contrast, B2C represents a more professional market environment where a company provides goods or services to a large number of customers through its own platform. Representative companies in C2C sharing economy are Uber and Airbnb. However, C2C has problems such as a lack of quality control or payment guarantees. Therefore, many platform companies began to introduce specialized organizations as the service providers and explore new operation models in B2C business. In the bike sharing sector in particular, the B2C sharing economy platforms such as Mobike and ofo have become new representatives of "Creation in China".

The foundation of the B2C model is the value co-creation between companies and users (Yin, Qian & Shen, 2019). Value co-creation is a process where companies and customers jointly create value via direct interactions (Prahalad & Ramaswamy, 2004). Successful value co-creation brings the companies higher customer lifetime value (Payne, Storbacka & Frow, 2008) and advantages in the competition (Prahalad & Ramaswamy, 2004) while providing users with personalized experience (Vargo & Lusch, 2008). But given that the sharing in the B2C model is based on business operation, where the resources

shared on platforms are companies' assets rather than idle resources of households, and that the customers in the sharing economy participate in sharing mostly because of lower prices instead of personal interest or hobbies (Xu, 2020), companies often need to offer heavy subsidies to encourage users' value co-creation on the platforms. Once the subsidies are terminated, the users' participation will dive immediately. For example, after the merger of DiDi with Uber in August 2016, the number of active users declined sharply as the subsidies dropped. According to the Cheetah Insight, the active user penetration in 2017 Q1 dropped by 25% from that of late November 2016 (Xu, 2020).

The continuous money-burning mode obviously makes it impossible for enterprises to obtain sustainable competitiveness. In this context, B2C sharing economy platforms begin to seek marketing means other than money-burning to attract consumer participation.

In recent years, the gamification marketing theory emerged in the backdrop where the virtual and the real worlds are highly integrated. This theory not only focuses on users' fun and gameplay (Robson, Plangger, Kietzmann, McCarthy & Pitt, 2016), but also considers gamification as a low-cost means to enhance user stickiness (Ueyama, Tamai, Arakawa & Yasumoto, 2014) and to promote users' continuous participation (Huotari & Hamari, 2017), uses (Zhou, Lyu & Zheng, 2019), and interaction (Hsu, Chang & Lee, 2013). Some companies, both from China and other countries, have applied points, mission and unlocking, checkpoints, rankings, badges, and other gamification elements to

virtual communities to effectively stimulate the participation by consumers. The Samsung Nation, for instance, uses gamification elements to encourage users to visit the community, share product experience, leave comments, view videos, fill questionnaires, etc. Mi Community, a Chinese tech product platform, has enhanced user stickiness through digital gamification elements including check-in, medals, chill-zones (communities), gold coins, points and rankings. It can be concluded thereby that the application of gamification marketing theory to the B2C sharing economy is likely to provide companies a new approach to get rid of the "dilemma of incentive for user value co-creation".

At present, flow theory and self-determination theory are two important theoretical bases for the academic community to explore the action mechanism of game-based marketing (Jin & Wang, 2019; Ning & Xi, 2017). The former states that gamified elements can improve consumer experience through flow experience, and its central flow experience refers to the state of full devotion and subsequently produces a sense of high pleasure and time distortion (Csikszentmihalyi, 1975). The latter states that gamified elements can improve consumer experience through perceived autonomy, which refers to an individual's perception of his own dominant process in an activity (Hsieh & Chang, 2016).

At the same time, in investigating the influence mechanism of gamification marketing on consumer stickiness, most studies consider gamification as a mere combination of gameplay elements and there is no high-granularity research on

individual elements (Xi & Hamari, 2020). In fact, the gamification narrative is the core of the top design of gamification marketing. It lies at the "dynamics" level of the DMC (dynamics, mechanics, components) pyramid framework, requiring a consistent and constant introduction to or storytelling of a certain event or mission in a game-like manner (Werbach & Hunter, 2012). The features of gamification narratives (including identifiable characters, imagination in the story, concision, plot twists and humor) may have a direct impact on the effect of gamification marketing (Chiu, Hsieh & Kuo, 2012; Jin & Wang, 2019; Van Laer, Ruyter, Visconti & Wetzels, 2014).

In addition, an individual's own characteristics have an important impact on the role of gamification marketing elements (Green, Brock & Kaufman, 2004). Construal is an important trait that reflects the relationship between the individual and the external environment. It falls into two categories: independent self-construal and interdependent self-construal. People with independent self-construal consider themselves unique and independent of their social environment. They define the self by differing from others. On the contrary, individuals of interdependent self-construal value their relations with others. When necessary, they tend to change their behaviors or adjust their moods to keep the group in harmony. People of this kind define themselves based on the social scenarios and relations they have.

Finally, value co-creation behavior, the user activity in the process with a high level of cognitive and emotional resources as well as external performance, is a

state of high level of participation, and forecasts the user participation and sustainability (stickiness). Therefore, this paper takes the value co-creation behavior as an indicator to reflect the level of user participation in the sharing economy.

Based on the above analysis, the questions below are put forth in this dissertation. The main research question is about how gamification narrative quality affects users' value co-creation behavior in the B2C Sharing Economy model. The secondary questions are about the mechanism in the B2C Sharing Economy model: (i) based on the flow theory, how gamification narrative quality affects users' value co-creation behavior by flow experience; (ii) based on the self-determination theory, how gamification narrative quality affects users' value co-creation behavior by perceived autonomy; and (iii) how self-construal affects flow theory-based and self-determination theory-based mechanisms. The research questions are summarized in Figure 1-1.

1.2 Significance

1.2.1 Theoretical significance

Gamification marketing and value co-creation are two hot topics in marketing research. Despite the work by many researchers in these areas, there is still space for further studies. First, most studies on elements in gamification only provide the classifications and conceptual frameworks, and do not discuss the elements separately or provide rigorous empirical analyses (Ning & Xi, 2017). Second, exploration of the mechanism to promote value co-creation behavior from the

perspective of gamification marketing is lacking. Third, in most studies on both gamification marketing and value co-creation, the setting is traditional economy based on the "vendor-customer" relationship, rather than the sharing economy based on the "platform-user" relationship. Therefore, it is necessary to explore the relation between specific gamification elements and value co-creation behavior and the related boundary conditions in the context of B2C sharing economy, which not only can break the "black box" of how gamification marketing drives value co-creation but also has the theoretical significance of expanding the research in gamification marketing and value co-creation.

1.2.2 Practical significance

The popularity of B2C sharing economy model has changed the meaning of value co-creation, where the co-creators have transformed from companies and customers to platforms and users. The essence of operation of B2C sharing economy is the value co-creation of the platforms and users. So it is critical for the existence and development of the B2C sharing economy platform companies to promote the users' value co-creation behavior. In reality, however, the relationship between platforms and users in the B2C sharing economy model is more equal and looser compared with that between companies and customers in traditional economy. Users are under less control from companies than customers, and enjoy more autonomy. Therefore it is a major challenge for B2C sharing economy platform companies to boost users' value co-creation behavior. Besides, while many companies have begun their gamification

marketing, most of their practice has not helped them achieve the business goals as expected. According to Gartner (2012), around 80% of gamification apps failed due to poor designs. As such, it is necessary to explore the mechanism that can promote users' value co-creation behavior starting from the design elements of gamification in the context of B2C sharing economy.

1.3 Contents and Framework

With users of shared bikes as its subjects, this dissertation begins with a discussion of the quality of gamification narratives and explores how gamification marketing may facilitate users' value co-creation in the B2C sharing economy model. To probe into the research questions, this dissertation investigates the following issues: (1) establishment of the dimensions of the GNQ (gamification narrative quality) scale and development of the scale; (2) mechanism through which the gamification narrative quality affects users' value co-creation behavior based on the flow experience theory; (3) the mechanism through which the gamification narrative quality affects users' value co-creation behavior based on the self-determination theory; (4) the mechanism through which self-construal moderates the relationship between gamification narrative quality and users' value co-creation behavior based on the self-construal theory.

1.4 Research Methods and Technical Road

This study follow the steps of "Data collection → Problem posing → Mechanism analysis → Scale development → Empirical analysis → Conclusions".

To be specific, based on previous research literature, primary data and secondary data, the following research questions are proposed. The main research question is about how gamification narrative quality affects users' value co-creation behavior in the B2C Sharing Economy model. The secondary questions are about the mechanism in the B2C Sharing Economy model: (i) based on flow theory, how gamification narrative quality affects users' value co-creation behavior by flow experience; (ii) based on self-determination theory, how gamification narrative quality affects users' value co-creation behavior by perceived autonomy; (iii) how self-construal affects flow theory-based and self-determination theory-based mechanism. Secondly, according to the theoretical analysis, this paper establishes two paths to construct the mechanism by which gamification narrative quality influences users' continuous value co-creation willingness. At the same time, the hypotheses are put forward. Subsequently, Gamification narrative quality scale is developed based on standard scale development procedures. Based on this scale, questionnaires were collected to test the hypotheses proposed. Finally, based on the test results, the conclusion of the study is drawn. At the same time, it puts forward the theoretical and practical value of the research.

CHAPTER 2. LITERATURE REVIEW

2.1 Studies on Gamification

2.1.1 Origin and definition of gamification

Existing definitions of gamification mostly focus on a certain perspective or a feature of application. From the perspective of game mechanisms, those theories believe that, when used in non-game contexts, game elements or functions may influence and encourage users' behaviors and achieve user interaction. Representative researchers supporting this theory include Petkov, Köbler, Foth, Medland and Krcmar (2011), Fitz-Walter, Tjondronegoro ande Wyeth (2011), Mekler, Brühlmann, Opwis and Tuch (2013), de Sousa Borges, Durelli, Reis and Isotani (2014), and Zichermann and Cunningham (2011). From the purpose point of view, gamification is applied beyond pure entertainment and is used to deliver the materials of teaching, thus attracting users to participate and solve problems. Such definition emphasizes the fulfillment of specific learning targets, supported by Simões, Redondo and Vilas (2013) and Ahn (2006). Focusing on game system design, some theories propose to center on people and attach great importance to the motives of users in the process of gamification. Users should be able to find all the pleasure and addictive elements and use them in real life or work. Hamari and Koivisto (2015) are among those who support this theory. Despite the varied perspectives, existing definitions agree that the main purpose of gamification is not creating a complete game of targets but using game elements to make the system targets more encouraging and intriguing and

ultimately change users' behaviors. They argue that companies should learn from game design to bring more pleasure to users with the products and services and make users as focused and persistent in companies' value co-creation as in playing games.

2.1.2 Classification of game elements

In order to seek effective paths where game design helps improve marketing performance, game elements in management are explored in studies on the basis of technical researches (game studies and information system). The DMC framework (Werbach & Hunter, 2012) is the most widely used. As shown in Figure 2-1, the framework uses three levels – dynamics, mechanics, and components – to illustrate game elements. Dynamics on the top of the pyramid represent the top-level design of gamification, composed of constraints, emotions, narratives, evolutions, and relations. They are the global concepts and cannot be used directly in the gamification system. Mechanics in the middle layer construct the realization process of gamification and contain challenges, opportunities, competitions, cooperation, feedback, rewards, rounds, and winning status. They are the fundamental processes that drive gamification and user participation. Components at the bottom are the specific expressions of gamification, including points, badges, leaderboards, profile pictures, content unlocking, teams, virtual goods, and social graphs. They are the expressions of dynamics and mechanics.

Considering that this dissertation is set in the background of the B2C sharing

economy model and that the DMC framework originates from business management and is widely used in management studies, the dissertation defines and explains gamification narratives based on the DMC classification framework.

2.2 Definition of Gamification Narrative

Some studies hold that stories and related discussions are the means of mutual support when humans are constructing life and communities and grant meanings to the world (Du and Chen, 2018).

As this concept integrates the ideas of gamification and narratives, the systematic review of two types of literature unfolds two perspectives of the definition and essence of gamification narratives. Specifically:

(1) Gamification perspective. This theory is originated from studies on narrative elements in gamification and holds that gamification narratives are a means of commercial design in gamification. Gamification narratives are seen as a specific element in gamification and an application of game elements in business. Based on the DMC framework, gamification narrative is therefore defined by Werbach and Hunter (2012) as the consistent and ongoing introduction of tasks or descriptions of stories for a certain event or mission in the community and is believed to bring pleasure to users. Chen (2015) pointed out that gamification narratives are a type of multi-dimensional and multi-threading "process narrative" which allows players to feel the changes in speed, motion, image, and sound and generate happy illusions of spreading and

fulfilling self-consciousness.

(2) Game perspective. This theory roots in the narrative studies in the context of games and holds that gamification narratives are the specific application of narratives in game scenarios and the explanation and expression of game stories or the meaning of game-related products. Jin and Wang (2019) defined game narratives as the introduction to the background, characters, and plots of games, presented in the form of background stories of the games. Heng, Zhao, Fan and Zhou (2020) considered gamification narratives as the application of narratives to role-playing games and holds that gamification narratives are the background information or storylines constructed in the games, mainly including the background information of characters and story development. It is also pointed out that gamification narratives have the following forms in role-playing games: concise written (or oral) cutscenes between checkpoints, the interactions and dialogues between players and other characters, and fully-dynamic images or machinima series.

It may be concluded from the above analysis that there are differences between the understandings of the essence of gamification narratives from the gamification perspective and the game perspective. The former tends to introduce narratives into the gamification field while the latter inclines to limit narratives to serious games. Although gamification and serious games both leverage game thinking and technologies to solve problems and engage participants, gamification has more applications and may be extended to

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broader scenarios than serious games. Therefore, by taking the gamification perspective in combination with the essence of gamification marketing, this dissertation defines gamification narratives as gamification elements that apply narratives to bring participants into a virtual world framework and enable them to produce game-like experience.

2.3 Status of Studies on Value Co-creation Behaviors

Value co-creation is a process where companies and customers jointly create value via direct interactions. Value co-creation behaviors often serve as an important foundation for empirical research on value co-creation. (Payne et al., 2008; Prahalad & Ramaswamy, 2004; Vargo & Lusch, 2008). So far, studies on value co-creation behaviors have three categories in general.

The first category is the formation mechanism of value co-creation behaviors, that is, the antecedent variables of value co-creation behaviors. Studies of this category have taken a large share in studies on value co-creation behaviors. Yen, Teng and Tzeng (2020) examined how innovativeness influences customer value co-creation behaviors. Luu (2019) tested not only the influence of corporate social responsibility on value co-creation behaviors but also the moderation effect of servant leadership and relationship marketing orientation between the two. Based on the studies of virtual communities, Chou et al. (2016) explored the process where perceived online justice influences value co-creation behaviors via the sense of virtual community.

The second category is the influencing mechanism of value co-creation

behaviors, namely, the exploration of the outcome variables of value co-creation behaviors. Shen and Wan (2019) tested the influencing model of the value co-creation behaviors on customer loyalty. Zhu, Yuan and Zhang (2018) tested the influence of two different types of customer value co-creation behaviors on brand loyalty. With the data acquired via online questionnaires and using structural equations, Bu, Jin and Li (2016) tested the influence of customers' interactive behaviors in value co-creation on customer value.

The third category is the studies on both the formation and influencing mechanisms of value co-creation behaviors. In the context of a hotel loyalty program, Liu and Jo (2020) tested the relations between value co-creation behaviors and the antecedent and outcome variables. Based on the social exchange theory, Delpechitre et al. (2018) tested the influence of salesperson emotional intelligence on customer value co-creation behaviors.

Through reviewing the literature on value co-creation behaviors, it is found that despite the wide spectrum of definitions, the definition by Yi and Gong (2013) of customer value co-creation behavior dimensions is used most widely. This study proposes that customer value co-creation behaviors are composed of two dimensions – customer participation behaviors and customer citizenship behaviors. Customer participation behaviors refer to the behaviors required for successful value co-creation (in-role behaviors). Customer citizenship behaviors, on the other hand, mean voluntary behaviors that are not necessary for value co-creation but may create extra value for companies (extra-role

behaviors).

The above review and sorting of studies on value co-creation behaviors yield the following findings. On the one hand, although the studies on the formation mechanism of value co-creation behaviors have been fruitful, few studies have been conducted on the influencing mechanisms of the value co-creation behaviors in the context of sharing economy. On the other hand, the dimensions of customer value co-creation behaviors proposed by Yi and Gong (2013) have been widely used in empirical studies. Therefore, based on the operationalization by Yi and Gong (2013) on customer value co-creation behaviors and in the context of sharing economy, this dissertation is designed to explore the formation mechanisms of customer value co-creation behaviors.

CHAPTER 3. MODELING AND RESEARCH HYPOTHESES

3.1 Deduction of Theoretical Model

According to the narrative transportation theory, high-quality narratives may enable people to experience a high level of cognitive and emotional participation, and consequently change people's attitudes and beliefs in the reality (Green & Brock, 2000). With this as the theoretical framework, the gamification narrative quality is considered as the antecedent variable which reflects the narrative quality, while the continuous value co-creation willingness plays the role of outcome variable, displaying individuals' attitude in the reality. Given that the flow theory and the self-determination theory are dominant in exploring the mechanism of gamification marketing (Jin & Wang, 2019; Ning & Xi, 2017), this research establishes two paths to examine how gamification narrative quality influences users' continuous value co-creation willingness: one is gamification narrative quality → flow experience → continuous value co-creation willingness, and the other gamification narrative quality → perceived autonomy → continuous value co-creation willingness. Flow experience and perceived autonomy are selected as the mediator variables in the perspectives of the flow theory and the self-determination theory respectively.

In addition, according to the narrative transportation theory, transportability is dependent on the characteristics of individuals (Green, Brock & Kaufman, 2004). Self-construal mirrors individuals' psychological characteristics and how one views his or her interdependence with the surrounding context (Markus &

Kitayama, 1991). For this reason, this dissertation takes users' self-construal as the moderator, with a belief that it can influence the relation between gamification narrative quality and the two mediators (flow experience and perceived autonomy).

Finally, the narrative transportation theory suggest that the transportability of individuals is influenced by their knowledge or experience related to the subject (Green et al., 2004). For this reason, this dissertation uses users' narrative experience as a control variable.

3.2 Research Hypotheses

3.2.1 Gamification narrative quality and users' value co-creation behavior

Narratives are consistent and continuous stories (Gatautis, Vitkauskaite, Gadeikiene & Piligrimiene, 2016) and the core element in the dynamics level of the DMC pyramid framework. Some researchers even propose that game design means the construction of stories (Jenkins, 2004). Users' value co-creation behavior refers to the willingness of users to participate in value co-creation in the future (Dong, Sivakumar, Evans & Zou, 2016). Such willingness and tendency are of paramount importance for companies to understand and retain users, maintain user relationships, and develop competitive advantages. High-quality gamification narratives are effective to support for user's continuous value co-creation behavior.

According to the self-determination theory, if the process of users' value

creation occurs on a user-orientation logic, the users will freely create the unique value they need on the sharing platform based on their demands while companies can only achieve value co-creation with the users by providing rules of the game (Yang & Tu, 2017). High quality gamification narratives are a critical strategy that not only delivers the rules to users in a natural manner but also reduces the users' sense of being controlled, thus enhancing their willingness to participate in value co-creation in the long term.

From the flow theory, it can be inferred that users may have fun in value co-creation thanks to gamification narratives. Such positive experience also involves the sharing platforms or companies that have initiated the value co-creation activity (Waiguny, Nelson & Marko, 2013) and makes users more likely to work with the companies. Studies have shown that gamification is a marketing strategy that transforms challenges into motivations. High-quality gamification narratives allow users to have fun in difficulties and invest positive emotions and behavior in service interactions (Harwood & Garry, 2015). Ultimately, brand engagement is formed. Positive participation, brand loyalty, repurchase intention, satisfaction, and trust are all important denotations of brand engagement (Pansari & Kumar, 2017) and are instrumental to build a long-term, value-driven bond between users and the brand, providing favorable conditions for continuous value co-creation between users and the platform (carrier of the brand).

In addition, based on the narrative transportation theory, when the individuals

are transported into the story, their attention is entirely attracted by the story and realistic mental reactions to the scenarios in the story are produced. Even if the story ends and the individuals return to the real world, their beliefs, self-conception and attitudes tend to stay that in the story (Richter, Appel & Calio, 2014). Therefore, successful storytelling may change users' way of thinking and facilitate their continuous value co-creation. This research thus proposes the following hypotheses:

H1: gamification narrative quality has a significant positive effect on users' continuous value co-creation willingness.

3.2.2 Flow theory-based mechanism

The flow theory is originated in the game industry. In the 1960s, Csikszentmihalyi, an American psychologist, realized that most studies of games were focused on the profits while overlooked the good experience brought about by games. He also found that, in gaming and other activities (e.g. extreme sports and literature creation), the participants tend to value their experience during the activities more than rewards. To explain this, he created the concept of flow experience. So far, there has been no unified definition of flow experience and studies of varied fields look at different dimensions. Nonetheless, by reviewing the literature, it can still be discovered that attention and recreation are always at the core in the definition and dimension development of flow experience (Jawaid, Roberta & Pamela, 1991). In the literature that attempts to conceptualize flow experience, researchers believe

that concentration and pleasure are prominent features of flow experience (Csikszentmihalyi, 1975; Duan, Zhai, Chi, Han & Zhang, 2017). Some studies of human-machine interaction find that "complete concentration on the interaction" and "being sincerely interested in the interaction" are the status of users in flow experience (Trevino & Webster, 1992; Webster, Ryan & Trevino, 1993). In a word, this dissertation defines flow experience as the full concentration, the resulting sense of pleasure, and time distortion of users (Csikszentmihalyi, 1975) during the value co-creation. Attention, sense of control, fun and time distortion are taken as the main parameters to measure users' flow experience.

First, it is indicated by the narrative transportation theory (Green & Brock, 2000) that gamification narratives can help generate flow experience in users mainly due to the following reasons: (1) Narratives reduce users' "resistance". While the purpose of marketing is to persuade consumers, stories can dilute consumers' perception of companies' willingness of persuasion (Moyer-Gusé and Nabi, 2010), and at the same time put consumers in a natural stress-free state during the service interaction. Users whose "resistance" is thus reduced are more easily attracted by the marketing activities. (2) Narratives will bring users a sense of "presence". Vivid stories can arouse the sense of reality in individuals who may feel even more real than real life (Gordon, Gerrig & Franklin, 2009). The feeling of being on the scene helps users break the limitations of the environment and highly concentrate on role-playing so that they lose the sense of time. (3)

Narratives can arouse strong emotions of users (Durkin & Wakefield, 2008). When users connect and resonate emotionally with the story, they participate in the marketing activities initiated by the companies wholeheartedly and voluntarily, which provides a good psychological state for generating flow experience. Based on the above analysis, the following hypothesis is proposed:

H2: gamification narrative quality has a significant positive effect on the flow experience.

Second, flow experience has a positive effect on users' value co-creation behavior. Flow experience reflects a phenomenon where an individual regards the behavior itself as the ultimate object and immerses himself/herself in it. Therefore, once users gain flow experience in the process of co-creation, they develop internal driving forces (Csikszentmihalyi, 1990) that foster the continuous value co-creation willingness. Specifically: (1) Flow experience may improve users' continuous use by driving their willingness and behaviors, a mechanism tested by scholars based on social media (Shang & Wu, 2017) and mobile devices (Hong, Lin & Hsieh, 2017). On digital platforms in the context of sharing economy in particular, continuous use is the basis for users' continuous value creation. It increases the total duration and opportunities of interactions among users and between users and platforms, and fosters the tendency of users to engage in behaviors beyond their roles in co-creation activities (Yang & Tu 2018). (2) Flow experience can enhance user stickiness (Duan et al., 2017). In traditional marketing, loyalty is only about customers'

purchasing behavior. However, with the continuous evolution of technologies, the mobile Internet makes customers not only purchasers of products but also users of platforms. The sharing economy further upgrades customers to users who enjoy services without purchasing. User stickiness is a new form of customer loyalty in the Internet age where loyal users prefer to contribute to the construction and development of sharing platforms, and tend to care about the overall interests of the platforms. Based on the above analysis, the following hypothesis is proposed:

H3: flow experience has a significant positive effect on users' value co-creation.

3.2.3 Self-determination-based mechanism

Self-determination theory holds that individuals' reactions in a certain activity depend on the degree to which three intrinsic psychological needs are satisfied. The more autonomy, competence, and relatedness one perceives in an activity, the more likely he or she is to behave actively and persistently (Deci, 2005). Perceived autonomy means an individual feels in charge of the activities rather than being compelled or controlled. Perceived competence means the degree to which an individual feels competent for a job or activity. Perceived relatedness means an individual's perception of his or her connection to others (Hsieh & Chang, 2016). This study mainly adopts perceived autonomy to explore the psychological activities of individuals in the sharing economy as influenced by gamification marketing. This approach is taken for the following reasons. First, as sharing platforms provide convenient access for users to participate in sharing,

individuals are far abler to share. And thus perceived competency may not be the main factor of individuals' participation in sharing economy. Second, sharing economy at present takes the form of temporary, access-based matching of dynamic demands, with some characteristics of liquid consumption (Bardhi & Eckhardt, 2017). Therefore, individuals are unlikely to acquire feel relatedness in the networks of sharing economy. Finally, sharing economy is essentially a free association of free people (Liu & Yan, 2017), where perceived autonomy is an important motivation for individuals' participation.

First, according to the self-determination theory, gamification narratives can help users produce flow experience for the following reasons:

Players are keen on gameplay because games are free of the restrictions in the real world and thus provide vast options for players by enabling the initiative to confront the challenges and obtain resources. Games are in essence the interpretation and realization of the self-determination system (Werbach & Hunter, 2012) and well-designed games may stimulate the sense of dominance in players (Kapp, 2012). If the gamification narratives are put at the core of game design, their quality will influence users' perceived autonomy. Based on the above analysis, the following hypotheses are proposed:

H4: gamification narrative quality has a significant positive effect on perceived autonomy.

When individuals perceive a high level of autonomy, their behaviors are likely to be internally driven. The individuals may feel a higher level of freedom,

enjoyment, and empowerment and thus become more willing to perform value co-creation. In addition, studies have shown that perceived autonomy is a determinant of the durability of customers' participation in value co-creation (Li, 2014). Based on the above analysis, the following hypothesis is proposed:

H5: perceived autonomy has a significant positive effect on users' value co-creation behavior.

3.2.4 Self-construal-based moderating mechanism

The concept of self-construal was first put forward by Markus and Kitayama (1991) based on the "self" in eastern and western cultures. In reflects the way that individuals consider their relations with others. There are two types—independent self-construal and interdependent self-construal. People with independent self-construal consider themselves unique and independent of their social environment. They define the self by differing from others. On the contrary, individuals of interdependent self-construal value their relations with others. When necessary, they tend to change their behaviors or adjust their moods to keep the group in harmony. People of this kind define themselves based on the social scenarios and relations they rely on.

Independent self-construal and interdependent self-construal usually coexist in one person (Singelis, 1994). One's self-construal attribute is decided by the relative power between the two types and the individual belongs to the dominant self-construal type. Based on its stability, self-construal can be divided into chronic and situation self-construal. The former one is subject to the influence

of the cultural background and is a stable self-construal system which is by no means formed in a short period; the latter, however, may be activated instantaneously by specific scenarios (Swaminathan, Winterich & Gürhan-Canli, 2007).

Individuals of independent self-construal believe that "I am what I am". They define themselves with their uniqueness and value individual independence. Their merits, capabilities, and tendencies are seldom affected by the surroundings. Those of interdependent self-construal, on the contrary, are convinced that "I am what people see me" and define themselves from the perspective of social relations and other people (Komissarouk & Nadler, 2014). This kind of personality value others' comments and the acceptance of the community (Shen, Wang, Liu & Liang, 2019). Studies have also found that individuals of independent self-construal are more sentimental than those of interdependent self-construal (Hong & Chang, 2015) and are more likely to purchase impulsively (Zhang & Shrum, 2009). Hence, individuals of independent self-construal are likely to be immersed in gamification narratives and produce flow experience as they are difficult to be disturbed by the surroundings. Those of interdependent self-construal, on the other hand, care more about the impact of their behaviors on their identity and images—for instance, they are concerned about "whether the state of impulse and intoxication may embarrass themselves". People of this type also pay attention to the effect of their behaviors on others— "if I may embarrass others by doing

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so". For such reasons, it is difficult for them to enter a state of high-level concentration. Based on the above analysis, the following hypotheses are proposed:

H6: self-construal moderates the relationships between gamification narrative quality and flow experience, such that the positive relationship is weaker for interdependent self-construal than independent self-construal.

Individuals of independent self-construal value the unique personalities that make them different from others and like to express themselves. They are inclined to extract decontextualized and useful information from gamification narratives that help achieve their goals. From this process, they are able to perceive autonomy (Yang, Stamatogiannakis & Chattopadhyay, 2015). Studies have revealed that individuals with independent self-construal pay more attention to differentiated targets and are highly sensitive to the unique features of products (Wang, Wang & Luo, 2012), while those of interdependent self-construal consider themselves very similar with others and stress on the strong relevance between themselves and the social environment. They see group target superior to personal goals and focus on the similarities with others so as to maintain the relations with other people. In gamification narratives, this kind of persons are more inclined to extract interpersonal information (Shen et al., 2019) from which they may perceive relatedness (Wang et al., 2012). Based on the above analysis, the following hypotheses are proposed:

H7: self-construal moderates the relationships between gamification narrative

quality and perceived autonomy, such that the positive relationship is weaker

for interdependent self-construal than independent self-construal.

CHAPTER 4. DEVELOPMENT OF THE GNQ SCALE

4.1 Definition and Dimensions of Gamification Narrative Quality

However, the existing studies have only defined the narrative quality in non-gamification scenarios and there is no clear definition of gamification narrative quality. Given that, this dissertation starts from users' perceptions and takes the perspective of narrative transportation. Based on the definitions of gamification narrative and of narrative quality in non-gamification scenarios (Yan & Yang, 2013), gamification narrative quality (GNQ) is defined as the indicator that measures how much the gamification narratives facilitate the transportation of users.

In non-gamification scenarios, researchers have adopted varied measures of narrative quality. Green and Brock (2000) used two criteria in this regard. One is whether the narratives are classical, that is, they attract audiences of all backgrounds in the long term; the other is whether the narratives become best-sellers, that is, they are viral in a short period. Escalas (2008) emphasized that the structure of narratives is a critical element that influences the extent of narrative transportation. Nielsen and Escalas (2010) believed that the clarity of fonts and other elements related to perceptual fluency are key to the effect of narrative transportation. Despite the differences in perspectives of measurements, all the studies emphasize the use of the transportation effect to evaluate the quality of narratives. The reason is that the narrative transportation

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theory holds that narratives in essence mean persuasion with transportability. For this reason, this dissertation builds the dimensions of gamification narrative quality based on transportability.

So far, there are two representative understandings of the transportability of narratives:

(1) Yan & Yang (2013) put forward three dimensions that reflect narrative transportability. (i) Deprivation of reality. Once people accept the narratives and enter the status of transportation, they enter the world made up by the narratives as if they are deprived of the real world. Such deprivation has two signs. Physically, the individuals accept the narratives and thereby become insensitive to the surroundings; mentally, the individuals cannot tell the differences between the narratives and real events and are unable to identify the logical errors and falsity in narratives. (ii) Strong emotions. Once people enter the transported status by accepting the narratives, they are immersed in the story. In other words, even though they know the story is made up, they produce strong emotions for the plots or characters in the narratives. (iii) Reservation of the attitudes. When individuals who have accepted the narrative exit the transported status and return to the real world, their attitudes and beliefs are remained changed by narrative transportation.

(2) Li, Hu, Wang & Liu (2015) summarized four dimensions of the effect of narrative transportation. (i) Sense of presence close to reality. Narratives trigger vivid mental reactions in people, which are so real and even more realistic and

lively than actuality. The virtual world, therefore, is viewed as reality by the transported individuals who feel like being in a real context. (ii) Strong emotional reactions. Narratives trigger emotions identical to that in the story, thus resonating with the transported individuals' minds. (iii) Liking for and agreement with the characters in narratives. Once individuals accept the narratives and enter the transportation status, they tend to agree with and be attracted by the characters in the narratives. By agreeing, the transported individuals think as the characters do, while by being attracted, the individuals do what the characters do. (iv) Reduction of negative perception. The reasons are as follows: first, the time order of narratives make the narrative information seem reasonable and acceptable to people, who thus then naturally accept the ideas in the narratives; second, a large volume of mental resources of the transported individuals are invested in narratives, depriving the individuals of the ability to refute or the motivation to do so; third, the narratives conceal the intention to convince which, therefore, is unlikely to be perceived by people and is unlikely to cause resistance.

It can be seen from the aforesaid opinions that; the "deprivation from reality" and the "sense of presence close to reality" in essence stress on the sense of reality produced by narrative transportation; "strong emotions", "strong emotional reactions" and "liking for and agreement with the narrative characters" highlight the resonation caused by narrative transportation; "reduction of negative perception" focuses on the acceptance thanks to narrative

transportation. "Reservation of attitudes" depicts the ultimate goal or results of narrative transportation, that is, the transported individuals' attitudes to the narrative world are brought to the real world and affect people's real attitudes. Therefore, this dissertation holds that "the reservation of attitudes" corresponds to the outcome variable studied—the "users' value co-creation behavior", and thus shall not act as a direct measure of narrative quality. By integrating the two views on narrative transportation above, the author extracted the sense of reality, resonation, and acceptance to be the dimensions for gamification narrative quality.

These three dimensions were selected based on non-gamification scenarios, thus requiring the consideration of gamification scenarios. "Gamification" refers to the application of game design elements to non-gamification scenarios, intending to provide game-like positive experiences for users (Robson, Plangger, Kietzmann, McCarthy & Pitt, 2015). So far, such positive experience has been explored basically through two constructs, that is, fun and interaction. Fun refers to a kind of subjective feeling produced in gamification scenarios and to encourage users through gamification is basically to create fun for users (Werbach & Hunter, 2012); interaction means the interaction between users and gamification elements and the game-like interaction is the fundamental distinction between gamification and non-gamification scenarios (McMillan, Hwang & Guiohk., 2003). Therefore, it is inferred that high-quality gamification narratives should produce these two positive experiences in the

recipients of narratives. In other words, fun and interaction should be included in the dimensions of gamification narrative quality.

Based on narrative transportation theory and through integrating the dimensions of gamification and non-gamification scenarios, the integrated dimensions of gamification narrative quality were proposed: **the sense of reality, resonation, acceptance, fun, and interaction**. Such integrated construct framework covers all major constructs of gamification narrative quality and thus is the basis of this dissertation to develop a gamification narrative quality scale which is expected to measure the quality of gamification narrative from the users' perspective.

4.2 Development of Measurement Items and Initial Scale

Considering the content and face validity, the development of the GNQ scale adopts deductive reasoning as the framework which is complemented by inductive reasoning. Specifically, under an integrated construct framework of GNQ that contains the sense of reality, resonation, conviction, fun, and interaction as dimensions, measurement items were collected from two sources. (1) Drawing on previous scales. First, research results on gamification and narrative quality-related concepts were analyzed to grasp the connotation of GNQ and related theories. Second, literature related to gamification and narrative quality was retrieved to find existing methods to measure gamification narrative quality and related variables. For gamification, our main reference was the 2 dimensions (fun and interaction) that Werbach and Hunter (2012) and McMillan et al. (2003) put forth in their exploration of the positive experience

of gamification. As to narrative quality, we drew mainly on several dimensions (detachment from reality, strong emotion, reservation of attitudes in reality, generation of nearly realistic sense of presence, evocation of strong emotional response, liking for and agreement with the narrative, reduction of negative perception) that Yan and Yang (2013) used to evaluate the narrative transportation effect. Based on the literature review of narrative transportation and gamification, measurement items that may represent the 5 dimensions were collected from existing scales.

(2) Open questionnaires. Qualitative data was further collected via interviews with researchers in gamification (6), managers in gamification companies (5) and senior users of gamification (5), including individual interviews and group interviews. The questions in the interviews center on "What is gamification narrative quality" and "How to evaluate gamification narrative quality". The specific questions are shown in Table 4-1. On that basis, open questionnaires were compiled to collect related information. 120 open questionnaire were distributed to users of sharing platforms in Beijing (the subjects) and 95 valid questionnaires were collected. In the questionnaires, the researchers set out the popularized definition of each dimension of integrated GNQ constructs. Based on the definitions, the subjects were requested to list at least 5 evaluative descriptions in the 5 dimensions when experiencing gamification narratives. The descriptions about the GNQ received finally are as follows: 82 descriptions are about the dimension sense of reality, 85 about resonation, 92 bout

acceptance, 75 about fun, and 87 about interaction.

From the aforementioned sources, the GNQ question base of this research was established. A number of items were selected to form the initial GNQ questionnaire. The selection of items was conducted on the basis of following principles: (i) descriptions consistent with the denotations of the dimensions; (ii) descriptions that appeared frequently in open questionnaires; (iii) descriptions that covered all aspects of each dimension; (iv) items in existing scales if they were similar to the descriptions in the open questionnaires.

As to the number of items in the initial questionnaire, the suggestion of Wu (2010) was adopted, that is, the number is expected to be 3 or 4 times of the formal questionnaire. According to previous studies, in order to avoid performing excessive research to achieve good internal consistency, the number of items in the initial questionnaire should be approximately 1.5 times that of the formal questionnaire. Considering that this research adopts deductive reasoning as the framework, the method of Guo and Fan (2018) was taken as reference, that is, the number of initial items selected should be 2 to 3 times of the formal items for each dimension. 46 initial measurement items were finally selected, among which 10 are in the dimension sense of reality, 8 in resonation, 10 in acceptance, 8 in fun, and 10 in interaction.

This dissertation also followed the method of Guo and Fan (2018) to test the content validity of the scale. One group of subjects were asked to read the definitions of constructs and the questions in the questionnaire. Then they

matched the constructs and questions. Based on the percentage of correct matches, content validity was determined. If the percentage of items correctly matched with the dimensions exceeded 60%, then the content validity was considered high. 10 subjects were invited to act as subjects in this research, among which 5 are university teachers in management (gamification marketing) and 5 are PhD candidates, so as to match the items with the dimensions according to the procedures above. 6 items whose percentages of correct matches were lower than 60% were deleted. 40 items (9 in the dimension sense of reality, 8 in resonation, 8 in acceptance, 8 in fun, and 7 in interaction) were left to form the initial GNQ scale for the first sample measurement.

4.3 Development of the Formal Scale and Test of the Quality

This research conducted 2 surveys with large sample questionnaires so as to generate a formal scale and test its quality: (i) the first survey was to measure the initial GNQ scale, for the purpose of exploratory factor analysis and subsequent tests of convergent validity and discriminant validity; (ii) the second survey was to measure the formal GNQ scale, for the purpose of confirmatory factor analysis and reliability test.

4.3.1 Measurement objects and sampling

Distribution and collection of questionnaires in the above 2 large sample surveys are as follows. (i) In the first survey, the social network of the researchers and the "snowball effect" were leveraged to hand out online questionnaires to subjects in a targeted approach. 420 valid questionnaires were

collected and 368 were left after invalid ones were deleted (a validity rate of 87.6%). The subjects were mostly users in Beijing that have experienced gamification marketing narrative. (ii) In the second survey, both online and offline methods were adopted to collect data. In the online mode, link to the questionnaires was sent to targeted users (subjects from Beijing, Shanghai, Wuhan, and other cities). 325 questionnaires were handed out and 288 valid ones were collected (a collection rate of 88.6%).

4.3.2 Exploratory factor analysis and development of formal scale

As the initial questionnaire was developed by integrating gamification scenarios and non-gamification ones, exploratory factor analysis was needed for the first survey, followed by tests of convergent and discriminant validity. The sample size of the first survey in this study is 368, which meets the sample requirement for factor analysis suggested by MacCallum, Widaman, Hong and Zhang (1999). That is, the sample size should be no less than 200. The process of the analysis was as follows:

(1) The KMO value was calculated and the Bartlett's test performed. To validate the factor analysis, we calculated the value of KMO and conducted the Bartlett's test. Form the calculation, the KMO value was 0.867 and the Bartlett's test χ^2 was 4340.16 (df=475, p<0.001), indicating that factor analysis was suitable.

(2) Principal component analysis was adopted and 5 factors were selected to conduct exploratory factor analysis on the 40 items of the initial GNQ.

Considering the latent factors might be relevant, oblique rotation, rather than orthogonal rotation, was conducted (Hair, Black, Babin & Anderson, 1998). The 5 factors explained 61.3% of the total variance altogether.

(3) Items whose cross-loadings were higher than 0.35 or whose index loadings were lower than 0.5 were deleted. There were 1 measure with a cross-loading higher than 0.35 and one with an index loading lower than 0.5, which were deleted.

(4) The remaining 38 items were attributed to the five dimensions in the theoretical model, with a factor loading of 0.556-0.868. For convenience of the application of the scale, 3 items with the highest factor loadings in each dimension were selected. 15 measures were finally selected to form the formal GNQ scale.

(5) Exploratory factor analysis was performed on the selected items of the formal scale with the same sample size, and the following results were obtained: there were 5 factors with the characteristic root >1, which explained 61.3% of the total variance altogether. The factor loadings of the test items ranged from 0.757 to 0.909 as shown in Table 4-2.

4.3.3 Reliability and validity tests of the formal scale

First, the reliability and internal structure validity of the formal scale were tested in this section based on the data from the sample (N=288) of the second survey. Therefore, following the approach of Guo and Fan (2018), the reliability of the scale was tested by dimensions. It can be seen that the Cronbach's α for the 5

dimensions ranges from 0.783 to 0.887(>0.70), the composite reliability ranges

from 0.783 to 0.88 9(>0.60), and the AVE ranges from 0.521 to 0.667 (>0.50).

The formal GNQ scale has good reliability in general.

Second, the internal structure validity of the formal GNQ scale was tested in

this section via confirmatory factor analysis, and the fit indices obtained were:

$\chi^2/df=127.85/80=1.60$, NFI=0.937, TLI=0.970, CFI=0.972, and RMSEA=0.039.

It can be seen that χ^2/df is between 1 and 2; NFI, TLI, and CFI>0.9; and

RMSEA<0.08. The results of the analysis indicate that there is a good fit

between the data and the scale structure. Meanwhile, most of the factor loadings

corresponding to the measures>0.7, indicating a good structure validity of the

scale. From Table 4-2 and Table 4-3 in combination, it can be seen that the

square of the correlation coefficient between any two dimensions is smaller than

the AVE of these 2 dimensions, indicating the independence and distinction

between the 5 dimensions.

CHAPTER 5. EMPIRICAL RESEARCH DESIGN

5.1 Definition and Measurement of the Variables

5.1.1 Definition and measurement of gamification narrative quality

The GNQ scale is used to measure gamification narrative quality. The items of the scale are shown in Table 5-1.

5.1.2 Definition and measurement of flow experience

According to the practice of Chinese researchers in recent years (Gong et al., 2019; Lin & Yu, 2019), we used a single-dimension scale containing attention, sense of control, enjoyment and time distortion to measure users' flow experience. The items in the scale are shown in Table 5-2.

5.1.3 Definition and measurement of perceived autonomy

According to perceived autonomy scales in studies on gamification marketing and value co-creation with some adaptive modification, a scale of 5 measurement items was finally generated, as show in Table 5-3.

5.1.4 Definition and measurement of value co-creation behavior

To strike a balance between completeness and operability, and considering that the subjects have changed from customers to users, adaptive modification and simplification was made to the scale of Yi and Gong (2013) in this study, and a user value co-creation behavior scale was finally generated. The specific items of the scale are shown in Table 5-4.

5.1.5 Definition and measurement of self-construal

This study adopted the Chinese version of the self-construal scale revised by Wang et al. (2008), and made adaptive modifications to the items. A self-construal scale was finally generated, as shown in Table 5-5.

The calculation method of Song et al. (2017) was adopted in this research. The score of self-construal was obtained by subtracting the average score of the interdependent self-construal of a subject from the average score of the independent self-construal and then adding 7 to the result (to avoid a negative score), that is: SC=DSC-TSC+7. A higher SC score indicates the individual's greater tendency towards independent self-construal, and a lower score means a greater tendency towards interdependent self-construal.

5.2 Pretest Procedures and Analysis

5.2.1 Pretest procedures

To get more accurate feedback, at the stage of pretest, we registered as members of several digital platforms that often launch gamification marketing, and joined a number of QQ groups and WeChat groups related to the digital platforms. From August 1 to 21, 2020, we handed out 60 questionnaires to members of the platforms, and 90 questionnaires to QQ groups and WeChat groups (150 in total). 118 questionnaires were collected, among which the incompletely written ones and those with obvious patterns were deleted. Finally, 98 valid questionnaires were obtained, with a collection rate of 78.67% and a valid response rate of 83.05%. We then performed pretest analysis on the 98 questionnaires to

determine whether the initial questionnaire was scientific and whether some items needed to be deleted or modified.

5.2.2 Data analysis on the pretest

A series of rigorous data analysis was conducted during the pretest to see whether the questionnaire was scientific, which consisted mainly of the validity and reliability test of the pretest questionnaire. This study followed the approach of Wu (2010) to analyze the pretest questionnaire in the following steps. First, we conducted validity test on the data collected from the pretest via exploratory factor analysis (EFA), and determined whether it was suitable for factor analysis via KMO value and Bartlett's test. Then we extracted common factors and determined the items that might be deleted via common factor analysis. Second, reliability test to the scale was conducted via Cronbach's α coefficient, corrected item-total correlation (CITC) was used to determine whether the internal consistency test was passed, and the items to delete were determined.

5.2.2.1 Exploratory factor analysis on the pretest questionnaire

(1) Exploratory factor analysis on the GNQ scale

From the results of the analysis, it can be seen that the KMO value of the GNQ scale items is 0.835>0.8. Besides, the approximate value of chi-square distribution of Bartlett's test is 1098.964, the degree of freedom is 105, and the significance probability is significant at $p<0.001$, indicating that common factors exist between the variables, the scale construct has good validity, and it is suitable to conduct exploratory factor analysis. Then, exploratory factor

analysis was conducted on GNQ, with the specific settings as follows: (i) Based on the 5 dimensions constructed, the number of common factors to extract is limited to 5; (ii) the factor extraction method is principal component analysis (PCA); and (iii) the rotation for the common factors is varimax rotation. The results of the analysis indicated that the eigenvalues of the explanation of the 5 common factors (after rotation) were 3.183, 2.825, 2.553, 2.401 and 1.106 respectively, which explained 80.442% of all the measurement items in total. Then the items in the scale that might be deleted were determined by referring the component matrix after rotation (varimax rotation). It is generally accepted that an item might be deleted in the following cases: (1) When a single item constitutes a factor, it will be deleted; (2) When the absolute value of the factor loading of an item is less than 0.5 and there is no convergent validity, the item will be deleted; (3) When the loadings of the same item on 2 or more factors are larger than 0.5, the item will be deleted. It can be seen from Table 5-6 that 5 common factors were extracted from 15 items of GNQ, and the factor loadings of the 15 items were all above the minimum standard of 0.5, meaning that the scale had a good construct validity and none of the 15 items needed to be deleted.

(2) Exploratory factor analysis on the scale of flow experience

It can be seen from the results of the analysis that the KMO value of the flow experience items is 0.745 >0.7, and the suitability for EFA is middling. Besides, the approximate value of chi-square distribution of Bartlett's test is 88.125, the degree of freedom is 6, and the significance probability is significant at $p < 0.001$,

indicating that common factors exist between the variables, the scale construct has good validity, and it is suitable to conduct exploratory factor analysis.

Then, the common factor was extracted based on the eigenvalue larger than 1, and principal component analysis was conducted. The eigenvalue of the common factor reached 2.082, which explained 52.055% in total of the variance of all the 4 measurement items. As only one common factor was extracted, the items in the scale that might be deleted could be determined by referring only to the component matrix. It can be seen that a common factor was extracted from the 4 items of flow experience, among which the loading of 3 items were larger than 0.7, higher than the minimum standard of 0.5. But the factor loading of item FE4 was 0.435, lower than the minimum standard of 0.5, so the item might be deleted. Factor analysis was conducted again after item FE4 was deleted. It can be seen from Table 5-7 that the factor loading of each measurement item of flow experience is over 0.7, higher than the minimum standard of 0.5. Therefore, we considered retaining 3 measurement items for flow experience.

(3) Exploratory factor analysis on perceived autonomy scale

Results of exploratory factor analysis on perceived autonomy are shown in Table 5-8. It can be seen from the results of the analysis that the KMO value of the perceived autonomy items is 0.767>0.7, and the suitability for EFA is middling. Besides, the approximate value of chi-square distribution of Bartlett's test is 309.303, the degree of freedom is 10, the significance probability is

significant at p<0.001, indicating that common factors exist between the variables, the scale construct has good validity, and it is suitable to conduct exploratory factor analysis.

Then, the common factor was extracted based on the eigenvalue larger than 1, and principal component analysis was conducted. The eigenvalue of the common factor reached 3.683, which explained 63.667% in total of the variance of all the 5 measurement items. As only one common factor was extracted, the items in the scale that might be deleted could be determined by referring only to the component matrix. It can be seen that a common factor was extracted from the 5 items of perceived autonomy, among which the loading of 4 items were larger than 0.6, higher than the minimum standard of 0.5. But the factor loading of item PA5 was 0.395, lower than the minimum standard of 0.5, so the item might be deleted. Factor analysis was conducted again after item PA5 was deleted. It can be seen that the factor loading of each measurement item of perceived autonomy was over 0.7, higher than the minimum standard of 0.5. Therefore, we considered retaining 4 measurement items for perceived autonomy.

(4) Exploratory factor analysis on the value co-creation behavior scale

The results of exploratory factor analysis on value co-creation behavior are shown in Table 5-9. It can be seen from the results of the analysis that the KMO value of the items of value co-creation behavior is 0.745 >0.7, and the suitability for EFA is middling. Besides, the approximate value of chi-square distribution

of Bartlett's test is 1123.296, the degree of freedom is 120, and the significance probability is significant at $p<0.001$, indicating that common factors exist between the variables, the scale construct has good validity, and it is suitable to conduct exploratory factor analysis. Then, we limited the number of common factors to extract to 2, and principal component analysis and varimax rotation were conducted. The eigenvalues of the explanation of the 2 common factors after rotation were 4.954 and 2.738 respectively, which explained 68.076% of all the measurement items in total. It can be seen that 2 common factors were extracted from the 16 items of value co-creation behavior, and the factor loadings of the 16 items were all above the minimum standard of 0.5, meaning that the scale had a good construct validity and none of the 16 items needed to be deleted. The results of EFA on value co-creation behavior are shown in Table 5-9.

(5) Exploratory factor analysis on the self-construal scale

It can be seen from the results of the analysis that the KMO value of the items of self-construal is 0.773>0.7, and the suitability for EFA is middling. Besides, the approximate value of chi-square distribution of Bartlett's test is 1872.633, the degree of freedom is 276, and the significance probability is significant at $p<0.001$, indicating that common factors exist between the variables, the scale construct has good validity, and it is suitable to conduct exploratory factor analysis. Then, we limited the number of common factors to extract to 2, and principal component analysis and varimax rotation were conducted. The

eigenvalues of the explanation of the 2 common factors after rotation are 8.496 and 5.479 respectively, which explained 69.172% of all the measurement items in total. It can be seen that 2 common factors were extracted from the 21 items of value co-creation behavior, and the factor loadings of the 21 items were all above the minimum standard of 0.5, meaning that the scale had a good construct validity and none of the 21 items needed to be deleted.

5.2.2.2 Reliability analysis on the pretest questionnaire

It can be seen from calculation that the Cronbach's α of the overall scale of GNQ is 0.854; at the level of sub-scale, the Cronbach's α of sense of reality, resonation, acceptance, fun and interaction are 0.809, 0.792, 0.812, 0.783 and 0.798 respectively. The Cronbach's α of the overall scale of flow experience is 0.845; the Cronbach's α of the overall scale of perceived autonomy is 0.856; the Cronbach's α of the overall scale of value co-creation behavior is 0.866. At the sub-scale level, the Cronbach's α of user participation behavior and user citizenship behavior are 0.825 and 0.819 respectively. The Cronbach's α of the overall scale of self-construal is 0.873; at the sub-scale level, the Cronbach's α of independent self-construal and interdependent self-construal are 0.835 and 0.843 respectively. The Cronbach's α of the overall scale is 0.905 (>0.8), and the criterion for suitability is met. All of the Cronbach's α values of the overall scales of GNQ, flow experience, perceived autonomy, value co-creation behavior and self-construal are >0.8, and the criterion for suitability is met. Therefore, all of the items pass the reliability test, indicating good internal

consistency reliability of the scales.

Finally, 15 measurement items were retained for GNQ, which were divided into the following independent variables: sense of reality (ZS1.1-ZS1.3), resonation (GM1.1-GM1.3), acceptance (JS1.1-JS1.3), fun (QW1.1-QW1.3), and interaction (HD1.1-HD1.3). 3 items were retained for flow experience (FE1.1-FE1.3); 4 for perceived autonomy (PA1.1-PA1.4); 16 for value co-creation behavior that were divided into user participation behavior (UPB1.1-UPB1.8) and user citizenship behavior (UCB1.1-UCB1.8); 24 for self-construal that were divided into independent self-construal (DSC1.1-DSC1.12) and interdependent self-construal (TSC1.1-TSC1.12).

5.3 Sample Selection and Data Collection in Formal Test

5.3.1 Sample selection

The subjects of the survey need to be determined before the formal research. Bike sharing industry is selected in this study as the background of the research, for the 2 reasons as follows.

First, bike sharing industry features typical characteristics of B2C sharing economy. Second, the economic and social challenges faced by the bike sharing industry call for exploration of non-monetary mechanism to promote users' value co-creation behavior.

After selecting bike sharing industry as the background of research, this study further targeted Mobike as the specific object due to the 3 reasons below.

First, Mobike exerts great influence on the bike sharing industry. (1) The

patented intelligent lock independently developed by Mobike integrates GPS
and communication modules and adopts the new generation IoT technologies.
It enables users to locate and use the nearest Mobike anytime and anywhere via
the smart phone app. They can park the bike in a proper area nearby the road
after arriving at the destination, and electronic payment and settlement can be
made upon the locking of the bike. The smart bike sharing model lays a
foundation for the development of the bike sharing industry. (2) As a company
taking the lead in bike sharing industry, Mobike is committed to continuous
enhancement of user experience in its development. For example, it officially
launched the function of "Unlocking without Scanning the Code" on July 23,
2018.

Second, Mobike has a solid user base. Mobike has acquired a huge amount of
bike sharing users since its establishment in January 2015 and the official launch
of smart bike sharing services on April 22, 2016. As of June 2017, Mobike had
about 100 million registered users, who complete 25 million ridings on about 5
million smart bikes every day. In addition, in January 2019, after Mobike was
fully connected to Meituan app, all the old Mobikes and new Meituan Bikes can
be ridden by scanning the code with Mobike app, which further extends
Mobike's user base. Mobike now has over 200 million registered users.

Third, Mobike initiated 2 typical marketing campaigns involving gamification
narrative. In November 2017 when the movie "Justice League" was on, Mobike
introduced elements of Marvel Heroes to launch the "Justice League" version

of Mobike: Super Batmobile, which featured high Warped-tail design, the effect of blast blower and a surreal sense of future. The main elements of the "Justice League" Mobike included hero wheels, heads with hero logo and projection head lights with hero symbols. There were 5 models of Justice League hero bikes: Batman, Wonder Woman, Flash, Steel and Aquaman, who symbolized the moment when justice woke up. Based on the 5 models of Justice League hero bikes, Mobike launched the Initiative of Orderly Bike Parking, which covered most of the improper behaviors in current bike sharing and the corresponding solutions including: (i) parking within white line with the head outward, (ii) no parking on tactile paving or traffic lane, (iii) parking in line gently, and (iv) ripping off the little text ads at hand. During the Halloween of 2017, to address the disorderly parking and other difficulties in bike sharing, Mobike initiated the red envelope winning game of "Rescuing the Zombie Bikes", which can be played in the following steps. (i) Start the Mobike app during the Halloween to find a zombie bike with the zombie icon. (ii) Transform yourself into a righteous hunter who rides the zombie bike to a secure area. Rides within 2 hours are free, and random rewards (red envelopes of up to 50-yuan each day) will be given for each zombie bike rescued. (iii) Choose an area with a larger reward to complete the rescue, and a larger amount of cash reward will be available. Mobike made a skillful use of the interesting Halloween to design a marketing campaign in form of a rescue task, which helped Mobikes in remote areas back to places where they were frequently used, and created

motivation for users to ride for free and earn red envelopes.

5.3.2 Data collection in formal test

Based on the results of the questionnaire design and pretest, we revised the questionnaire into an improved formal version, and then handed out the formal questionnaires (as shown in Appendix 1) to the target respondents in a large scale. The process of formal surveys is as follows: At random spots and time, 12 members of the research team handed out paper questionnaires to users who were going to use or had just finished using shared bikes (which ensures that the subjects are registered users of Mobike). They were asked to read the background texts including the gamification narratives before filling and returning the questionnaires. To guarantee the quality of the questionnaires, the following measures were taken: (1) all questionnaires were handed out in paper and collected on the site, in order to ensure a high response rate; (2) the 12 researchers were trained on the standardized requirements for the time, place and process for handing out questionnaires; (3) each subject was given RMB 20 yuan as a reward; (4) the anonymity and the academic purpose of this survey were highlighted to the subjects, so as to mitigate the related concerns about the questionnaires.

In October to November 2019, the research team of this study handed out 1200 paper questionnaires and collected 998 (a collection rate of 83.17%). In our processing of the collected questionnaires, those containing extreme data (98 questionnaires) and those with incomplete responses (231 questionnaires) were

deleted, and finally 669 (55.75%) valid questionnaires were obtained. According to Gorsuch (1983), the ratio of respondents to the number of items should be equal to or higher than 5:1. In this study the ratio of the number of valid questionnaires to the number of items is 669:68 (> 9), and the basic requirement on the number of valid questionnaires in empirical research is met.

CHAPTER 6.DATA ANALYSIS AND HYPOTHESIS TEST

6.1 Characteristics of Samples and Descriptive Statistical Analysis

SPSS25.0 is used in this study to conduct descriptive statistical analysis on the 669 valid questionnaires collected, which involves mainly the basic personal information of the valid samples (age, gender, education background, earnings, and occupation) and their narrative experience.

As show in table 6-1, among the 669 respondents, 456 (68.16%) are males and 213(31.84%) are females, with males accounting for a much higher percentage than female. As our subjects are mainly users of B2C sharing economy platforms, the above ratio indicates that males pay a higher attention to sharing economy platforms, which is consistent with the current situation of sharing economy platform participants. In terms of age groups, it can be seen that there are 88 (13.15%) respondents of under the age of 20, 120 (17.94%) respondents of 20-25, 265 (39.61%) respondents of 26-30, 129 (19.28%) respondents of 31-35, and 67 (10.01%) respondents of 36-40, indicating that more your people than old-aged participate in gamification marketing on B2C sharing economy platforms. This is might because young people are more willing to accept new things, more likely to pursue the concepts of sharing and gamification, and more ready to pay attention to and participate in gamification marketing on sharing economy platforms, which is also consistent with the current situation of sharing economy platform participants. In terms of education, 5 (0.75%) respondents

have an education background of junior high school or below, 16 (2.39%) senior

high school, 169 (25.26%) associate, 423 (63.23%, highest percentage) bachelor,

and 56 (8.37%) highly educated (master or above). It can be seen that most of

the respondents have a background of bachelor (fairly high education). In terms

of occupation, 46 (6.88%) of the respondents are freelancers, 226 (33.78%)

students, 96 (14.35%) employees in public sector, 75 (11.21%) employees in

state-owned enterprises, 59 (8.82%) employees in foreign companies, 103

(15.40%) professionals; 56 (8.37%) unemployed, and 8 (1.20%) others. It can

be seen that students account for a higher percentage while the distribution of

respondents of other occupations is basically balanced. This is might because

students have more spare time to visit sharing economy platforms and

participate in various activities; they are also more prone to mutual influence,

which contributes to their higher percentage. In terms of the personal monthly

earnings, 224 (33.48%) respondents have monthly earnings of RMB 3000 or

below, 115 (17.19%) RMB 3000-4999, 113 (16.89%) RMB 5000-6999, 112

(16.74%) RMB 7000-8999, 30 (4.48%) RMB 9000-11999, 29 (4.33%) RMB

12000-13999, 21 (3.14%) RMB 14000-15999, 11 (1.64%) RMB 16000-17999,

8 (1.20%) RMB 18000-19999, and 6 (0.90%) RMB20000 or above. It is

obvious that the groups with low and medium earnings account for a higher

percentage. This is consistent with the age distribution as customers in the low

age groups have relatively low earnings.

In addition, the frequency of the respondents' participation in gamification

related activities per week is used to reflect the users' level of narrative experience. In terms of the frequency of participating in gamification related activities, 263 users (39.31%) have a frequency of 1-2 times per week; 33 3 (49.78%) 3-4 times per week; 70 (10.46%) 5-6 times; and 3 (0.45%) 7 times or more. These findings indicate that most users do not have a high frequency of participating in gamification related activities, with loyal members having a frequency of 4 times or more per week and average users 1-4 times.

6.2 Controlling and Testing for Common Method Bias

SPSS 23.0 was used in this study to conduct unrotated principal component factor analysis on all the items in the questionnaire with the following results: the KMO was 0.801, the Chi-square was 8004.127, the degree of freedom was 210, the significance level was 0.000, and 9 factors with eigenvalues larger than 1 were extracted among which the maximum variance contribution rate of the first factor explained only 29.824% of the variance. Podsakoff and Organ (1986) held that the common method bias is not severe if a single factor from EFA (unrotated) explains no more than 50% of the variance, and researchers in China often use 40% as a criterion. Therefore, judged against either of the criterion, it can be tentatively concluded that the common method bias in this study is within an acceptable range (29.824%<40%<50%).

6.3 Reliability Test and Validity Test

6.3.1 Reliability test

Reliability test is an analysis on the reliability and stability of the scale to

determine the consistency between the measures. Internal consistency reflects whether the same construct is measured in each scale. Therefore, internal consistency is of particular importance for scales with multiple items. Cronbach's α coefficient is widely used in social sciences to test internal consistency. Therefore, Cronbach's α and CITC were used in this study to test the reliability of the scales. The results of the reliability test to the scales are shown in Table 6-2.

According to Wu (2010), the higher the CITC, the higher the internal consistency between the item and other items; the lower the CITC, the lower the internal consistency. Besides, Cronbach's α after the item is deleted also reflects the internal consistency of the scale. If the Cronbach's α after the item is deleted is lower than that of the sub-scale, the item has good internal consistency. It can be seen from Table 6-2 that, on the whole, the internal consistency reliability of each scale is good.

6.3.2 Validity test

Validity reflects the extent to which the measurement is valid, or the extent to which the results of the measurement reflect the contents of the target. The more the results of the measurement conform to the contents to be examined, the higher the validity is; otherwise the validity is lower (Qiu, 2010). Following the practice in previous management studies (Chi, Liu, Lu & Luo, 2019), content validity and construct validity of the scale were tested in this dissertation.

6.3.2.1 Content validity test

First, the scientific scale design procedures in this study ensure the content validity of the scale at a certain degree: (1) established scales in related domestic and foreign studies were adopted, which have been used and validated by many researchers; (2) based on the context of B2C sharing economy in this study, professors, experts and users in gamification marketing and value co-creation were widely heard to repeatedly revise the items of the scale and refine the language of the items; (3) results of the pretest and the feedback were used to further delete and revise the items, so that a scientific formal questionnaire was generated.

On that basis, the author and her assistant conducted a 2-stage Q-sorting to evaluate the content validity of the 62 items of the 10 variables: sense of reality, resonation, acceptance, fun, interaction, flow experience, perceived autonomy, user participation behavior, user citizenship behavior, and self-construal. The results reveal that the average accuracy of the items and the corresponding constructs reaches 96.7 %, indicating good content validity of the scales used in this study.

6.3.2.2 Construct validity test

Construct validity consists mainly of convergent validity and discriminant validity. AMOS26.0 and SPSS25.0 were used in this study to conduct confirmatory factor analysis on the items of the scale, so as to measure the construct validity of the scale. Convergent validity reflects the consistency

between the measures of the same construct, which can be determined in a comprehensive manner by referring to the goodness of fit of the measurement model in combination with standardized factor loading, AVE and CR composite reliability of the model. If the standardized factor loading is larger than 0.5, AVE is larger than 0.5 and CR composite reliability is larger than 0.7, the variable has good convergent validity (Fornell & Larcker, 1981). Table 6-3 shows that the standardized factor loadings of all the variables are larger than 0.5, AVEs larger than 0.5 and CR composite reliability larger than 0.7, indicating good convergent validity of the scale.

In addition, this study also referred to the statistical indicators and criteria of the goodness of fit test proposed by Bollen and Long (1993) to conduct model fit analysis on GNQ, flow experience, perceived autonomy, value co-creation behavior and self-construal. It can be seen from Table 6-4 that in comparison with the criteria for the goodness of fit test to the indicators, the fit indices of all of the 5 variables meet the minimum requirements, indicating good fit validity of the measurement models.

Discriminant validity reflect the discrimination between different constructs, which is usually evaluated by comparing the square root of AVE and the correlation coefficient between latent variables. If the square root of AVE is larger than the correlation coefficient between a latent variable and other latent variables, the measurement model is considered to have good discriminant validity (Fornell & Larcker, 1981). The numbers on the diagonal in Table 6-5

are square roots of AVE, and other numbers are correlation coefficients between the variables. It can be seen that the square roots of AVE are larger than the correlation coefficients between each pair of variables. Therefore, the discriminant validity of the scale passes the test.

6.4 Test of Hypotheses

6.4.1 Test of hypotheses on relationship between GNQ, flow experience and value co-creation behavior

6.4.1.1 Test of the main effect and mediating effect

The control variables of the models need to be determined first. Studies on gamification narratives indicate that the subjects' demographic variables (age, gender, education background, earnings) and narrative experience may influence the effect of GNQ on flow experience, perceived autonomy and value co-creation behavior. Therefore, this study takes demographic variables (age, gender, education background, earnings) and narrative experience as control variables. Hypotheses on the effect of GNQ on value co-creation behavior involve direct effect and mediating effect. Direct effect includes the effect of GNQ on flow experience and on value co-creation behavior. And there is the mediating effect of flow experience between GNQ and value co-creation behavior. The independent variable GNQ is divided into 5 dimensions: sense of reality, resonation, acceptance, fun, and interaction; the dependent variable value co-creation behavior is divided into 2 dimensions: user participation behavior and user citizenship behavior; and the mediator is flow experience.

This study followed the steps below to conduct data analysis and test hypotheses on direct effect and mediating effect:

Step 1: test of the direct effect of GNQ on flow experience. (1) Model 1 was established to explore the relationship between control variables (age, gender, education and narrative experience) and flow experience; (2) Model 2 was generated by adding to Model 1 the 5 dimensions of the independent variable GNQ (sense of reality, resonation, acceptance, fun, and interaction), the function of which is to test whether the 5 dimensions of GNQ have a direct effect on flow experience. Identification of the relationship between GNQ and flow experience lays a basis for subsequent test of the mediation of flow experience. Step 2: test of the direct effect of GNQ on value co-creation behavior. (1) Model 3 was established to explore the relationship between control variables (age, gender, education and narrative experience) and value co-creation behavior; (2) Model 4 was generated by adding to Model 3 the 5 dimensions of the independent variable GNQ (sense of reality, resonation, acceptance, fun and interaction), the function of which is to test whether the 5 dimensions of GNQ have a direct effect on value co-creation behavior; (3) Model 5 was generated by adding to Model 4 the mediator flow experience, the function of which is to test whether flow experience has a direct effect on value co-creation behavior and whether flow experience mediates the relationship between GNQ and value co-creation behavior.

Furthermore, we need to test multicollinearity, which means linear correlation

exists between explanatory variables, that is, multiple explanatory variables have common trend of variation. Multicollinearity is usually measured with variance inflation factor (VIF). Generally, VIF>100 indicates severe multicollinearity between explanatory variables; 10<VIF<100 means strong multicollinearity between explanatory variables; and 0<VIF<10 means no multicollinearity between explanatory variable. Besides the hierarchical regression analysis, this study also conducted multicollinearity diagnosis to reveal whether multicollinearity exists between the variables. Results of the analysis on the above models are shown in Table 6-6.

The increase of adjusted R^2 from Model 1 (0.035) to Model 2 (0.563) can be seen from results of the analysis in Table 6-6, indicating the increase of explanatory power from Model 1 to Model 2. Model 1 and Model 2 have F of 9.357 and 67.335 respectively (significant at p<0.0010), both of which pass the significance test. VIF values of all the variables are larger than 0 and smaller than 10, indicating no multicollinearity between the variables, which establishes the validity of the models. The function of Model 1 is to test whether the 5 control variables have direct effects on flow experience. It can been seen from Table 6-6 that age (β=0.102, p<0.05), education (β=0.113, p<0.05) and narrative experience (β=0. 162, p<0.01) all have significant positive correlation with flow experience, which means old age, high education and rich narrative experience predict high degree of the users' flow experience. However, gender (β=0.037, p=0.782) and earnings (β=0.099, p=0.332) do not have significant positive

correlation with flow experience. The results of Model 2 indicate that sense of reality has a significant positive effect on flow experience, where the coefficient $\beta=0.323$ ($p<0.01$). Resonation has a significant positive effect on flow experience, where the coefficient $\beta=0.335$ ($p<0.01$). Acceptance has a significant positive effect on flow experience, where the coefficient $\beta=0.293$ ($p<0.01$). Fun has a significant positive effect on flow experience, where the coefficient $\beta=0.321$ ($p<0.01$). Interaction has a significant positive effect on flow experience, where the coefficient $\beta=0.279$ ($p<0.01$). Therefore, H2 is validated as a whole.

The adjusted R^2 of Model 3, Model 4 and Model 5 (0.129, 0.345 and 0.369 respectively) increases in sequence, indicating the increase of the explanatory power of Model 3, Model 4 and Model 5 in sequence. Models 3, 4 and 5 have F of 7.632, 23.123 and 41.288 respectively (significant at $p<0.001$), all of which pass the significance test. Results of the analysis on VIF indicate that VIF values of the variables are larger than 0 and smaller than 10, indicating no multicollinearity between the variables, which establishes the validity of the models. The function of Model 3 is to validate whether the 5 control variables have direct effects on value co-creation behavior. It can be seen from Table 6-6 that narrative experience has a significant positive correlation with value co-creation behavior ($\beta=0.119$, $p<0.05$), indicating that rich user narrative experience predicts high level of value co-creation behavior. However, the users' age ($\beta=0.093$, $p=0.382$), gender ($\beta=0.021$, $p=0.555$), education ($\beta=0.075$,

p=0.432) and earnings (β=0.097, p=0.415) have no significant correlation with value co-creation behavior. The function of Model 4 is to test whether GNQ has a direct effect on value co-creation behavior. Results of the analysis indicate that sense of reality has a significant positive effect on flow experience, where the coefficient β=0.220 (p<0.01); resonation has a significant positive effect on flow experience, where the coefficient β=0.193 (p<0.01); acceptance has a significant positive effect on flow experience, where the coefficient β=0.136 (p<0.05); fun has a significant positive effect on flow experience, where the coefficient β=0.127 (p<0.05); interaction has a significant positive effect on flow experience, where the coefficient β=0.222. Therefore, H1 is validated as a whole.

It is clear from the results of Model 2 and Model 4 that there is a significant correlation between the 5 dimensions of the independent variable GNQ (sense of reality, resonation, acceptance, fun, and interaction) and flow experience and value co-creation behavior, so the mediation of flow experience can be further tested. Then Model 5 was generated by adding flow experience to Model 4, the function of which is to test the mediation of flow experience between GNQ and value co-creation behavior. Results of the analysis reveal a significant positive correlation between flow experience and value co-creation behavior, where the coefficient β=0.593 (p<0.01), indicating the mediation of flow experience as a whole. Results of the test in Model 4 above have indicated the significant positive correlation between the 5 dimensions of GNQ (sense of reality,

resonation, acceptance, fun and interaction) and value co-creation behavior. The results of Model 5 after adding flow experience indicate a significant correlation between flow experience and value co-creation behavior, and a significant decrease in the effects on value co-creation behavior of sense of reality ($\beta=0.128$, $p<0.10$), resonation ($\beta=0.097$, $p<0.10$) and interaction ($\beta=0.197$, $p<0.10$), indicating the partial mediation of flow experience between sense of reality, resonation and interaction and value co-creation behavior. And the relationship between acceptance ($\beta=0.013$, $p=0.12$) and fun ($\beta=0.019$, $p=0.29$) and value co-creation behavior became insignificant, indicating the full mediation of flow experience on the relationship between acceptance and fun and value co-creation behavior.

To further test the mediation of flow experience, this study followed the steps to test mediating effect proposed by (MacKinnon, Lockwood & Williams, 2004), and used SPSS25.0 Process and Bootstrapping to test the mediation of flow experience between the 5 dimensions of GNQ and value co-creation behavior. To achieve stable and reliable results, this study set the number of resampling in Bootstrapping as 5000, and tested whether the mediating effects and the difference between them are significant on the basis of whether 0 is included in the 95% confidence interval of path coefficient, so as to determine whether a mediating effect exists. The results are shown in Table 6-7. Significant indirect effects can be seen along the following paths: sense of reality → flow experience → value co-creation behavior; resonation → flow

experience → value co-creation behavior; acceptance → flow experience →

value co-creation behavior; fun → flow experience → value co-creation

behavior; and interaction → flow experience → value co-creation behavior. The

standard errors are within an acceptable range, and 0 is not included in the 95%

confidence interval. Thus the mediating effect of flow experience is further

validated.

6.4.1.2 Test of moderating effect of self-construal

In the test of the hypotheses on the effect of GNQ on flow experience, both

direct effect and moderating effect are involved, and the dependent variable is

always flow experience. In use of SPSS25.0 to analyze the moderating effect,

to reduce multicollinearity between variables in the regression equation, Chen

et al. (2012) proposed centralization of the independent variables and

moderators before construction of the product terms of independent variables

and moderators, as well as centralization of control variables at the same time.

The sub-models were then built and data analysis conducted in the following

steps to complete tests of the direct effect and moderating effect: (1) The above

Model 1 was used to explore the relationship between control variables

(demographic variables and narrative experience) and flow experience; (2)

Model 2 was generated by adding the variable GNQ to Model 1, which was

used to determine whether GNQ has a direct effect on flow experience; (3)

Model 6 was generated by adding the variable self-construal to Model 2, which

was used to determine whether GNQ and self-construal have direct effects on

flow experience; (4) Model 7 was generated by adding the product term of GNQ and self-construal to Model 6, which was used to determine the moderating effect of self-construal between GNQ and flow experience. Results of the analysis on the above models are shown in Table 6-8.

The results of the analysis in Table 6-8 reveal that the adjusted R^2 of Model 1, Model 2, Model 6 and Model 7 (0.035, 0.563, 0.691 and 0.735 respectively) increases in sequence, indicating the increase of explanatory power of Model 1, Model 2, Model 6 and Model 7 in sequence. Model 1, Model 2, Model 6 and Model 7 have F of 9.357, 67.335, 79.935 and 57.409 respectively (significant at p<0.001), all of which pass the significance test. Results of the analysis on VIF indicate that the VIF values of all the variables are larger than 0 and smaller than 10, indicating no multicollinearity between the variables, which establishes the validity of the models. Calculation in Model 1 and Model 2 has validated the significant effects on flow experience of the 5 dimensions of the independent variable GNQ (sense of reality, resonation, acceptance, fun and interaction), which lays a foundation for testing the moderating effect of self-construal between GNQ and flow experience. Model 6 indicates that sense of reality (β=0.255, p<0.001), resonation (β=0.288, p<0.001), acceptance (β=0.276, p<0.001), fun (β=0.295, p<0.001), interaction (β=0.255, p<0.001) and self-construal (β=0.325, p<0.001) all have a significant positive effect on flow experience. It is found that in Model 7, the product term of resonation and self-construal has a significant positive effect on flow experience (β=0.172, p<0.01);

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and the product term of fun and self-construal has a significant positive effect on flow experience (β=0.135, p<0.01). Therefore, hypotheses H6b and H6d are supported. But the product term of sense of reality and self-construal (β=-0.053, p=0.073), the product term of acceptance and self-construal (β=-0.039, p=0.120), and the product term of interaction and self-construal (β=-0.029, p=0.135) have no significant effect on flow experience. Therefore, hypotheses H6 are partially supported.

It can be seen from Figure 6-1 that the higher the users' independent self-construal, the stronger the effect of resonation on flow experience. Therefore, self-construal has positive moderation on relationship between resonation and flow experience. Similarly, as shown in Figure 6-2, the higher the users' independent self-construal, the stronger the effect of fun on flow experience. Therefore, self-construal has positive moderation on relationship between fun and flow experience.

6.4.2 Tests of hypotheses on relationship between GNQ, perceived autonomy and value co-creation behavior

6.4.2.1 Tests of the main effect and mediating effect

As in 6.4.1.1, this study takes demographic variable (age, gender, education background, earnings) and narrative experience as control variables. Hypotheses on the effect of GNQ on value co-creation behavior involve direct effect and mediating effect. Direct effect includes the effect of GNQ on perceived autonomy and on value co-creation behavior. And there is the

mediating effect of perceived autonomy between GNQ and value co-creation behavior. In this study, the same steps as in 6.4.1.1 were used for data analysis, and the hypotheses of direct and mediating effects were tested. Results of the analysis on the above models are shown in Table 6-9.

The increase of adjusted R^2 from Model 1 (0.046) to Model 2 (0.588) can be seen from results of the analysis in Table 6-9, indicating the increase of explanatory power from Model 1 to Model 2. Model 1 and Model 2 have F of 8.123 and 56.235 respectively (significant at $p<0.0010$), both of which pass the significance test. VIF values of all the variables are larger than 0 and smaller than 10, indicating no multicollinearity between the variables, which establishes the validity of the models. The function of Model 1 is to test whether the 5 control variables have direct effects on perceived autonomy. It can been seen from Table 6.8 that age ($\beta=0.113$, $p<0.05$), education ($\beta=0.120$, $p<0.05$) and narrative experience ($\beta=0.212$, $p<0.01$) all have significant positive correlations with perceived autonomy, which means old age, high education and rich narrative experience predict high degree of perceived autonomy. However, gender ($\beta=0.012$, $p=0.625$) and earnings ($\beta=0.076$, $p=0.223$) do not have significant positive correlations with perceived autonomy. The results of Model 2 indicate that sense of reality has a significant positive effect on perceived autonomy, where the coefficient $\beta=0.215$ ($p<0.01$). Resonation has a significant positive effect on perceived autonomy, where the coefficient $\beta=0.228$ ($p<0.01$). Acceptance has a significant positive effect on perceived autonomy, where the

coefficient β=0.312 (p<0.01). Fun has a significant positive effect perceived autonomy, where the coefficient β=0.301 (p<0.01). Interaction has a significant positive effect on perceived autonomy, where the coefficient β=0.257 (p<0.01). Therefore, H4 is validated as a whole.

The adjusted R^2 of Model 3, Model 4 and Model 5 (0.035, 0.435 and 0.479 respectively) increases in sequence, indicating the increase of the explanatory power in sequence of Model 3, Model 4 and Model 5. Models 3, 4 and 5 have F of 7.335, 28.126 and 61.202 respectively (significant at p<0.001), all of which pass the significance test. Results of the analysis on VIF indicate that the VIF values of the variables are larger than 0 and smaller than 10, indicating no multicollinearity between the variables, which establishes the validity of the models. The function of Model 3 is to validate whether the 5 control variables have direct effects on value co-creation behavior.

It is clear from the results of Model 2 and Model 4 that there is a significant correlation between the 5 dimensions of the independent variable GNQ (sense of reality, resonation, acceptance, fun, and interaction) and perceived autonomy and value co-creation behavior, so the mediation of perceived autonomy can be further tested. Then Model 5 was generated by adding perceived autonomy to Model 4, the function of which is to test the mediation of perceived autonomy between GNQ and value co-creation behavior. Results of the analysis reveal a significant positive correlation between perceived autonomy and value co-creation behavior, where the coefficient β=0.375 (p<0.01), indicating the

mediation of perceived autonomy as a whole. Results of the test in Model 4 above have indicated the significant positive correlation between the 5 dimensions of GNQ (sense of reality, resonation, acceptance, fun and interaction) and value co-creation behavior. The results of Model 5 after adding perceived autonomy indicate a significant correlation between perceived autonomy and value co-creation behavior, and a significant decrease in the effects on value co-creation behavior of acceptance (β=0.125, p<0.05) and fun (β=0.109, p<0.05), indicating the partial mediation of perceived autonomy between acceptance and fun and value co-creation behavior. And the relationship between sense of reality (β=0.101, p=0.23), resonation (β=0.103, p=0.20) and interaction (β=0.095, p=0.55) and value co-creation behavior became insignificant, indicating the full mediation of perceived autonomy on the relationship between sense of reality, resonation and interaction and value co-creation behavior.

To further test the mediation of perceived autonomy, this study followed the steps of Bootstrapping as in section 6.4.1 to test the mediation of perceived autonomy between the 5 dimensions of GNQ and value co-creation behavior. The results are shown in Table 6-20. Significant indirect effects can be seen along the paths sense of reality $\rightarrow$ perceived autonomy $\rightarrow$ value co-creation behavior, resonation $\rightarrow$ perceived autonomy $\rightarrow$ value co-creation behavior, acceptance $\rightarrow$ perceived autonomy $\rightarrow$ value co-creation behavior, fun $\rightarrow$ perceived autonomy $\rightarrow$ value co-creation behavior, and interaction $\rightarrow$ perceived autonomy $\rightarrow$ value co-creation behavior; the standard errors are within an

acceptable range; and 0 is not included in the 95% confidence interval. Thus the mediating effect of perceived autonomy is further validated.

6.4.2.2 Test of moderating effect of self-construal

In the test of the hypotheses on the effect of GNQ on perceived autonomy, both direct effect and moderating effect are involved, and the dependent variable is always perceived autonomy. As in the test of the moderating effect in section 6.4.1.2, centralization of the independent variables and moderators was conducted before construction of the product term of independent variables and moderators, and centralization of control variables was carried out at the same time. Results of the analysis on the above models are shown in Table 6-21.

The results of the analysis in Table 6-21 reveal the increase of the adjusted R^2 of Model 1, Model 2, Model 6 and Model 7 (0.035, 0.563, 0.702 and 0.723 respectively) in sequence, indicating the increase of explanatory power of Model 1, Model 2, Model 6 and Model 7 in sequence. Model 1, Model 2, Model 6 and Model 7 have F of 8.123, 56.235, 63.137 and 59.325 respectively (significant at p<0.001), all of which pass the significance test. Results of the analysis on VIF indicate that the VIF values of all the variables are larger than 0 and smaller than 10, indicating no multicollinearity between the variables, which establishes the validity of the models. Calculation in Model 1 and Model 2 has validated the significant effects on perceived autonomy of the 5 dimensions of the independent variable GNQ (sense of reality, resonation, acceptance, fun and interaction), which lays a foundation for testing the

moderating effect of self-construal between GNQ and perceived autonomy. Model 6 indicates that sense of reality ($\beta=0.203$, $p<0.001$), resonation ($\beta=0.210$, $p<0.001$), acceptance ($\beta=0.269$, $p<0.001$), fun ($\beta=0.273$, $p<0.001$), interaction ($\beta=0.211$, $p<0.001$) and self-construal ($\beta=0.379$, $p<0.001$) all have significant positive effects on perceived autonomy, so the moderating effect of self-construal can be tested. It is found that in Model 7, the product term of acceptance and self-construal has a significant positive effect on perceived autonomy ($\beta=0.211$, $p<0.01$); the product term of interaction and self-construal has a significant positive effect on perceived autonomy ($\beta=0.122$, $p<0.01$). Therefore, hypotheses H7c and H7e are supported. But the product term of sense of reality and self-construal ($\beta=-0.062$, $p=0.097$), the product term of resonation and self-construal ($\beta=0.012$, $p=0.109$), and the product term of fun and self-construal ($\beta=-0.035$, $p=0.066$) have no significant effect on perceived autonomy. Therefore, hypotheses H7 are partially supported.

It can be seen from Figure 6-3 that the higher the users' independent self-construal, the stronger the effect of acceptance on perceived autonomy. Therefore, self-construal has positive moderation on relationship between acceptance and perceived autonomy. Similarly, as shown in Figure 6-4, the higher the users' independent self-construal, the stronger the effect of interaction on perceived autonomy. Therefore, self-construal has positive moderation on relationship between interaction and perceived autonomy.

6.5 Summary of the Results of the Hypothesis Test

The hypotheses in this study and the results of the test are shown in Table 6-22

below.

CHAPTER 7. CONCLUSIONS AND OUTLOOK

7.1 Conclusions

First, a 5-dimension scale of gamification narrative quality in the context of B2C sharing economy is developed. In contrast, the previous studies on gamification start from the overall design of gamification and lack a focus on the specific elements of gamification narrative. The existing studies have only defined the narrative quality in non-gamification scenarios and there is no clear definition of gamification narrative quality. This dissertation starts from users' perceptions and takes the perspective of narrative transportation. Based on the definition of gamification narrative and narrative quality in non-gamification scenarios, gamification narrative quality is defined as the indicator that measures how much the gamification narratives facilitate the transportation of users. Based on this definition, this dissertation integrates dimensions in both non-gamification and gamification context and proposes specific dimensions that cover the connotation of gamification narrative quality: sense of reality, resonation, acceptance, fun, and interaction. And with deductive reasoning as the research framework which is complemented by inductive reasoning, a GNQ scale comprising 5 dimensions and 15 items is developed, laying a foundation for subsequent empirical research on gamification narrative.

Second, based on flow theory and self-determination theory, there are 2 paths through which gamification narrative quality influences user's value co-creation behavior: "gamification narrative quality → flow experience → value co-

creation behavior", and "gamification narrative quality → perceived autonomy → value co-creation behavior". In specific, the 5 dimensions of gamification narrative quality (sense of reality, resonation, acceptance, fun, and interaction) all have a significant positive effect on user's value co-creation behavior. That is, when users in B2C sharing economy experience gamification narratives, the higher level of sense of reality, resonation, acceptance, fun and interaction they get, the higher their tendency towards value co-creation behavior. Therefore, this dissertation reveals and tests the above 2 paths in the context of B2C sharing economy, and establishes that gamification narrative quality as an effective non-monetary incentive can help companies stimulate users' active participation in value co-creation at a low cost in the context of B2C sharing economy. Flow experience and perceived autonomy are 2 core variables of user psychology in the 2 paths of incentive.

Third, according to the self-construal theory, self-construal moderates the effect of gamification narrative quality on user's value co-creation behavior. In specific, the findings in this dissertation reveal that in either path of "gamification narrative quality → flow experience → value co-creation behavior" or "gamification narrative quality → perceived autonomy → value co-creation behavior", users of independent self-construal are more likely than those of interdependent self-construal to exhibit value co-creation behavior when experiencing gamification narrative.

7.2 Theoretical Contribution

This study enriches and expands research results in gamification marketing and value co-creation, and makes contribution in the 5 aspects below:

First, previous studies on the working mechanism of gamification marketing are based mainly on 2 theories: the self-determination theory of motivation psychology and the flow theory of positive psychology. According to the former, the working mechanism of gamification marketing is a mechanism of self-determination; the latter proposes that gamification marketing influences users via flow experience. However, few studies compare the working mechanism of gamification from the perspective of the 2 theories. This study reveals that both flow experience and perceived autonomy have significant mediating effects between gamification narrative quality and users' value co-creation behavior, indicating the coexistence of 2 mechanisms. It further verifies self-determination theory and flow theory as important basis for interpreting the working mechanism of gamification marketing, which confirms the viewpoints of Ning and Xi (2017).

Second, in previous studies on gamification marketing, the focus has been on classification of game design elements (Nobre & Ferreira, 2017; Werbach & Hunter, 2012) so as to propose layers and frameworks of gamification marketing elements, and there is little specific analysis on gamification marketing elements (Ning & Xi, 2017). This study starts from gamification narrative quality to explore the effect of gamification marketing.

Third, while previous studies on gamification marketing and value co-creation focus mainly on traditional economy, sharing economy reshapes the interaction mode between consumers and businesses in traditional economy, and consumers become users who have greater control and dominance (Yang & Tu, 2017). Therefore, this study explores the influence of gamification narrative quality on users' value co-creation behavior in the context of B2C sharing economy, which extends the application of the gamification marketing theory and value co-creation theory.

Fourth, while there are previous studies that associate gamification marketing with value co-creation and consider gamification a new tool to boost customers' value co-creation (Nobre & Ferreira, 2017), little exploration has been made as to how this tool influences customers' value co-creation behavior. The findings in this study further reveal the close relationship between gamification marketing and value co-creation.

Fifth, most of the previous studies on gamification marketing are theoretical or qualitative. This study carries out empirical research to test the specific effect of gamification narrative quality on users' value co-creation behavior, and further validates the conceptual framework in theoretical research in gamification marketing.

7.3 Management implications

This dissertation builds a conceptual model of the effect of gamification narrative quality on value co-creation behavior via 2 paths: "gamification

narrative quality → flow experience → value co-creation behavior", and "gamification narrative quality → perceived autonomy → value co-creation behavior". The results of the empirical tests reveal that: gamification narrative quality can promote user's value co-creation behavior via flow experience and perceived autonomy; self-construal can moderate the relationship between gamification narrative quality and value co-creation behavior. The above results provide a theoretical basis for practice of gamification and value co-creation by businesses in the context of B2C sharing economy, and enrich existing research in gamification marketing and value co-creation. This study can also provide guidance in practical marketing management:

First, users' value co-creation behavior in B2C sharing economy can be promoted via gamification narrative quality. B2C sharing economy grants users a high level of autonomy, who are no longer just passive recipients of values, but co-creators as well. The users' high level value co-creation behavior can not only help platform companies identify and address the users' individual needs and enhance their competitiveness, but also help users gain unique experience of the current products and services, thus building up trust between users and platform companies, reducing transaction and search costs, generating positive word of mouth, and strengthening brand loyalty (Chi et al., 2020). Therefore, value co-creation behavior is the key to successful operation of B2C sharing economy. The findings in this dissertation reveal that high gamification narrative quality can promote users' value co-creation behavior in B2C sharing

economy. In specific, companies can use the GNQ scale developed in this dissertation to evaluate and test the gamification narrative quality, and design high quality gamification narrative based on the 5 dimensions (sense of reality, resonation, acceptance, fun, and interaction), thus realizing low cost incentive for users.

Second, enhancing users' flow experience and perceived autonomy is an important non-monetary incentive for B2C sharing economy companies to promote users' value co-creation behavior. First, studies reveal 2 paths through which users' value co-creation behavior can be driven by means of gamification narrative quality in B2C sharing economy: (1) Granting the users perceived autonomy, so that the users experience high level of autonomy in their interaction with the platforms or other users; and (2) Creating flow experience for the users, so that they gain fun, sense of control and high level of concentration in their value co-creation. Therefore, B2C sharing economy companies need to develop marketing strategies centering on enhancement of users' perceived autonomy and flow experience, so as to effectively promote users' value co-creation behavior in B2C sharing economy.

Third, accurate identification of the users' self-construal can help boost the effect of gamification narrative on value co-creation behavior. Self-construal is influenced by the individual's cultural background, and is a stable measure that reflects people's perception of the extent to which they are separate from or connected with others. The findings in this dissertation reveal that: self-

construal moderates the relationships between gamification narrative quality and flow experience, such that the positive relationship is weaker for interdependent self-construal than independent self-construal; self-construal moderates the relationships between gamification narrative quality and perceived autonomy, such that the positive relationship is weaker for interdependent self-construal than independent self-construal. In general, users of independent self-construal are more likely than those of interdependent self-construal to exhibit value co-creation behavior when experiencing gamification narrative. Therefore, before trying promotion of users' value co-creation behavior via gamification narrative, B2C sharing economy companies need to evaluate the different types of the users' self-construal and adopt different marketing strategies accordingly, so as to carry out more efficient gamification marketing.

7.4 Limitations and Outlook

First, limited by the resources of the research team, this dissertation explores the effect of gamification narrative quality on users' value co-creation behavior only in the context of travel industry (bike sharing). While travel is a typical industry in sharing economy, there are differences between industries, and the generalization of the conclusions in this study remains to be validated. For example, in the accommodation sharing industry, where the users need to pay higher participation costs and have longer and deeper interactions with the landlords, the impact of gamification narrative quality on users' value co-

creation behavior may be more dependent on emotional value and interpersonal interaction than perceived autonomy and flow experience. Therefore, the conclusions of this study may not be applicable to the accommodation sharing industry. However, for the sharing industry that only requires short-term interaction and low cost (Wi-Fi and video sharing), the conclusions of this study can be relevant.

Second, this dissertation adopts the user-based perspective to measure gamification narrative quality based on the users' perception from the surveys. While this approach stresses the role of the users as the final judge of the value, it has some limitations in terms of the objectivity of gamification narrative quality. Further research in measurement of the gamification narrative quality can be carried out in future from the perspective of the platforms.

Third, there is currently no uniform scale of flow experience, and different combinations of dimensions are adopted in different scales. The flow experience scale used in this study derives mainly from the research of Koufaris (2002), which measures the subjects mainly in 3 dimensions: concentration, enjoyment and perceived control. Measurement scales with more dimensions are not selected mainly because too many items will extend the duration of the measurement, thus reducing the reliability and validity of the measurement. However, this may neglect other dimensions such as time distortion, curiosity, etc. Therefore, it is necessary to measure more dimensions of flow experience in future research when exploring the relationship between gamification

narrative quality and users' continuous value co-creation willingness.

Lastly, this study explores the relationship between gamification narrative quality and value co-creation behavior based mainly on the flow theory and self-determination theory. Further tests of this relationship from the perspectives of other theories need to be considered in future research.

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FIGURES

Figure 1-1 Research model
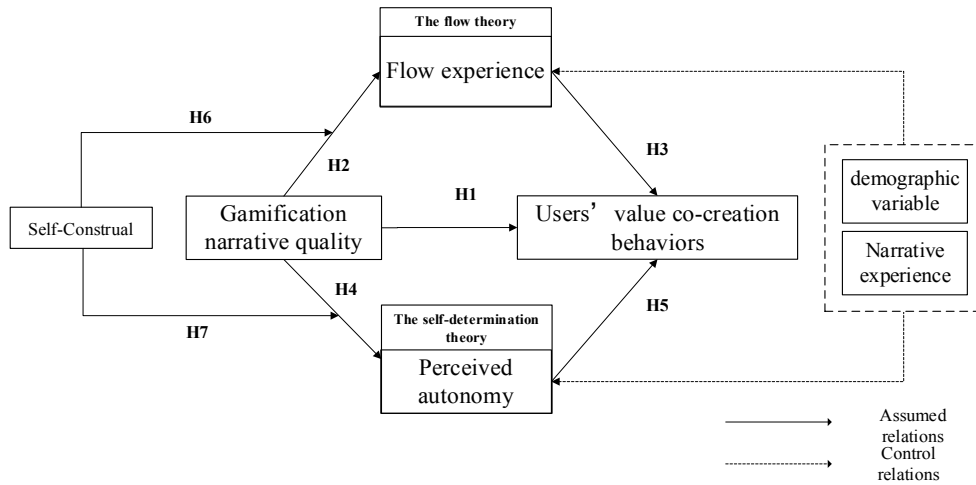
Figure 2-1 DMC Framework
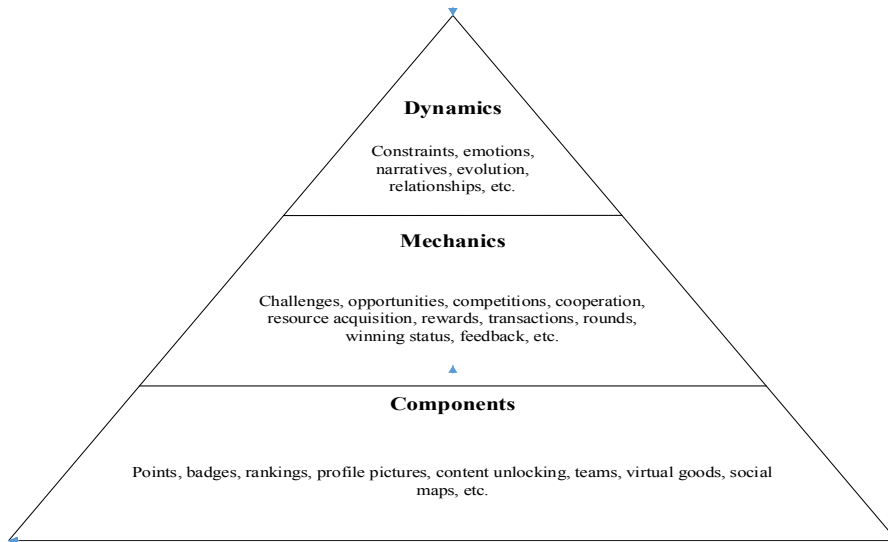
Source: research of Werbach and Hunter (2012)

Figure 6-1 Moderation of self-construal on relationship between resonation and flow experience
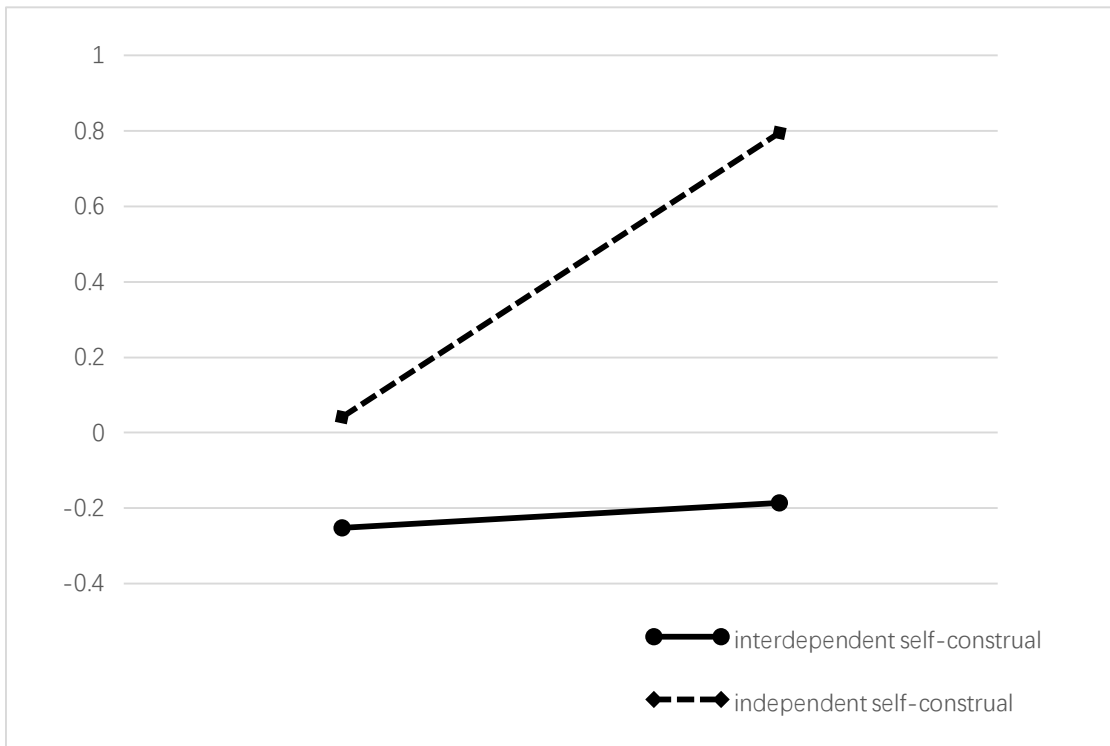
Figure 6-2 Moderation of self-construal on relationship between fun and flow experience
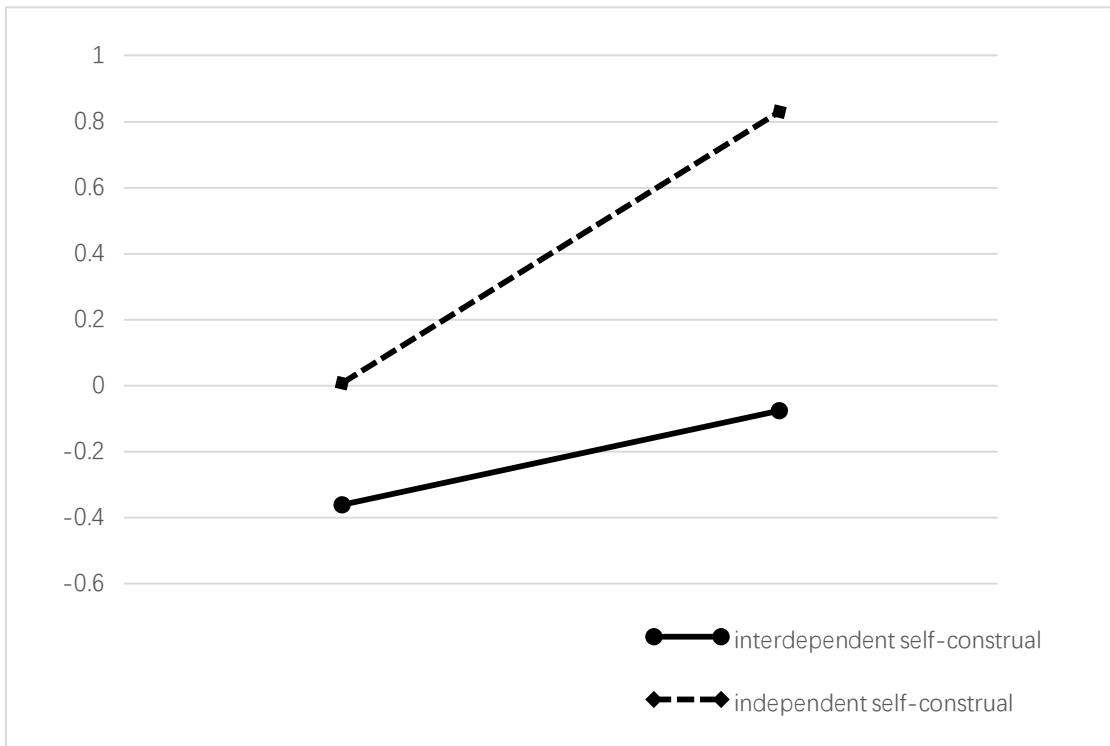
Figure 6-3 Moderation of self-construal on relationship between acceptance and perceived autonomy

Figure 6-4 Moderation of self-construal on relationship between interaction and perceived autonomy

Tables

Table 4-1 Questions in interviews on gamification narrative quality

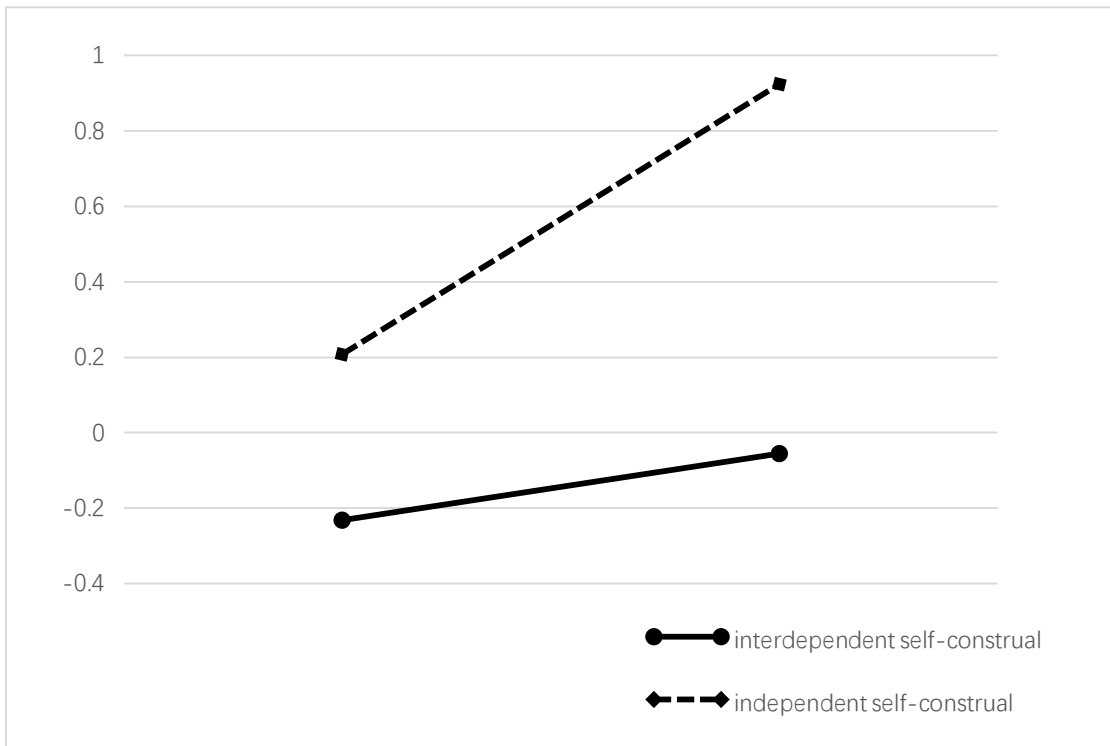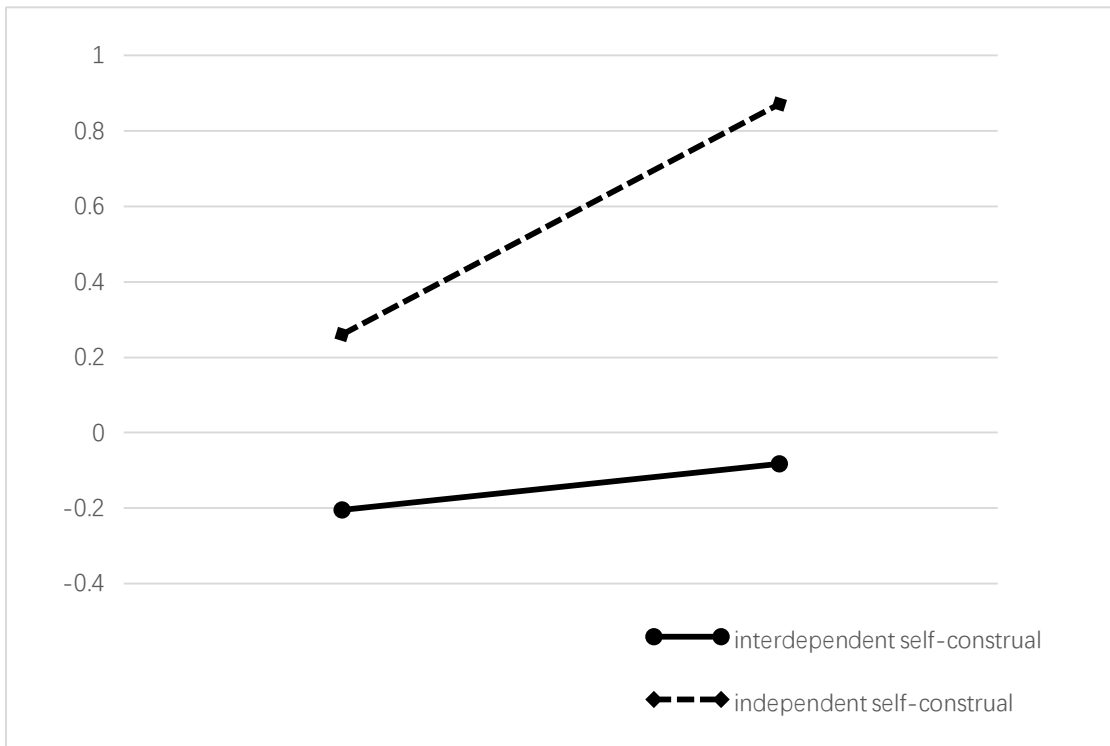| No.	Please answer the following questions based on your recent experience with the gamification marketing narrative on a platform of B2C sharing economy that impresses you most:
1	What is the gamification marketing campaign you participated in?
2	What are the form and contents of the gamification narrative you experienced?
3	What features does the gamification narrative have? What are the differences between the gamification narrative and traditional ones?
4	What is the reason that the gamification narrative appeals to you?
5	How the five dimensions (reality, resonation, acceptance, fun, and interaction) are embodied in the gamification narrative?
6	What elements can the five dimensions (reality, resonation, acceptance, fun, and interaction) be subdivided into?
7	What is the performance of a good gamification narrative in terms of the five dimensions?
8	What is the performance of a bad gamification narrative in terms of the five dimensions?
9	Besides the five dimensions, from what aspects can the quality of a gamification narrative be evaluated?
10	Which dimension or factor do you think has the greatest effect on the quality of a gamification narrative? Why?

Table 4-2 Factor loadings and reliability test measures of the exploratory and confirmatory factor analysis

Items	Sense of reality (ZS)	Resonation (GM)	Acceptance (JS)	Fun (QW)	Interaction (HD)
ZS1	0.757 (0.727)				
ZS2	0.812 (0.793)				
ZS3	0.814 (0.818)				
GM1		0.817 (0.783)			
GM2		0.812 (0.768)			
GM3		0.879 (0.828)			
JS1			0.877 (0.841)		
JS2			0.899 (0.833)		
JS3			0.765 (0.720)		
QW1				0.868 (0.832)	
QW2				0.909 (0.878)	
QW3				0.767 (0.699)	
HD1					0.817 (0.697)
HD2					0.831 (0.733)
HD3					0.821 (0.722)

Note: The numbers in the columns corresponding to the 5 dimensions are the factor loadings of the test items of EFA on the first sample (N=368), and the numbers in the brackets are the factor loadings of the test items of CFA on the second sample (N=288).

ZS = sense of reality, GM = resonation, JS = acceptance, QW = fun, HD = interaction.

Table 4-3 Results of the CR, AVE and discriminant validity tests (N=288)

Items	α	AVE	Composite reliability	ZS	GM	JS	QW	HD
reality (ZS)	0.801	0.622	0.809	0.789				
Resonation (GM)	0.869	0.629	0.868	0.398	0.793			
Acceptance (JS)	0.887	0.667	0.889	0.576	0.456	0.817		
Fun (QW)	0.879	0.591	0.88	0.263	0.546	0.307	0.769	
Interaction (HD)	0.783	0.521	0.783	0.539	0.416	0.375	0.392	0.722

Note: The (underlined) numbers on the diagonal line are the square roots of the AVE, and the numbers underneath the diagonal line are correlation coefficients between the factors.

ZS = sense of reality, GM = resonation, JS = acceptance, QW = fun, HD = interaction.

Table 5-1 Measurement scale of gamification narrative quality

Variables	Operational definitions	No.	Items	Source
reality	The extent to which the recipient experiences sense of reality in the gamification narrative	ZS1	The story makes me feel being on the scene	Yan and Yang (2013); Li et al. (2015)
		ZS2	The story brings me to a new environment	
		ZS3	The story makes me unable to tell the reality from illusion	
Resonation	The extent to which the gamification narrative brings about emotion, affection and identification to the recipient	GM1	The story evokes my strong emotion	
		GM2	I strongly identify with or love the character in the story	
		GM3	I resonate with the role or plot in the story	
Acceptance	The extent to which the recipient accepts the values and motivation in the gamification narrative	JS1	I am willing to accept the values in the story	
		JS2	I consider the story logical	
		JS3	The story does not repel me	
Fun	The extent to which the recipient experiences interest and fun in the gamification narrative	QW1	The story makes me feel quite at ease	Werbach and Hunter (2012); McMillan et al. (2003)
		QW2	The story makes me feel like playing a game	
		QW3	The story brings me pleasure	
Interaction	The extent to which the recipient experience interaction with the gamification narrative	HD1	I have interaction with other characters in the story	
		HD2	I have some connections with the story	
		HD3	I had a psychological dialogue with the story.	

Note: ZS = sense of reality, GM = resonation, JS = acceptance, QW = fun, HD = interaction.

Table 5-2 Measurement scale of flow experience

Variable	Operational definition	No.	Items	Sources
Flow experience	The full concentration, the resulting sense of pleasure, and time distortion of users during the value co-creation	FE1	When rescuing the zombie bikes, I am highly dedicated	Koufaris and Hampton-Sosa, (2004); Koufaris (2002)
		FE2	When rescuing the zombie bikes, I feel that everything is in my hands	
		FE3	I enjoy rescuing the zombie bikes	
		FE4	I feel time fly in rescuing the zombie bikes	

Note: FE = flow experience.

Table 5-3 Measurement scale of perceived autonomy

Variable	Operational definition	No.	Items	Sources
Perceived autonomy	Users feel that their acts in the value co-creation are out of their inner will and that they dominate over their acts.	PA1	I feel that I'm really being myself in the campaign of "Rescuing the Zombie Bikes"	Standage et al.(2005); Hsieh and Chang(2016)
		PA2	I feel that I'm free in the campaign of "Rescuing the Zombie Bikes"	
		PA3	I take part in the campaign of "Rescuing the Zombie Bikes" because I am willing to	
		PA4	I do not feel external pressure when rescuing the zombie bikes	
		PA5	I can express my ideas and opinions naturally when rescuing the zombie bikes	

Note: PA = perceived autonomy.

Table 5-4 Measurement of value co-creation behavior

Variables	Operational definition	No.	Items	Sources
UPB	In-role behaviors of the users necessary to satisfy the service and activity needs, behaviors the users have to engage in to enhance the service value.	UPB1	I paid attention to how others carry out this campaign effectively.	
		UPB2	I searched for information on this campaign.	
		UPB3	I gave the Mobike platform the required information.	
		UPB4	I gave other users the required information.	
		UPB5	I performed all the tasks that were required.	
		UPB6	I followed the campaign's directives or orders.	
		UPB7	I was friendly to the mobile platform	
		UPB8	I was polite to the mobile employee	Yi and Gong (2013) ; Yen et al.(2020)
UCB	The users' extra-role behaviors of actively participating in product design, development, manufacturing, etc. to enhance the product and service value, voluntary but not necessary or compulsory behaviors.	UCB1	If I had a useful idea on how to improve campaign, I informed the mobile platform.	
		UCB2	When I experienced a problem, I informed the mobile platform.	
		UCB3	I said positive things about this campaign to others.	
		UCB4	I recommended this campaign to others.	
		UCB5	I assisted other users if they need my help.	
		UCB6	I provided advice to other users.	
		UCB7	If the Mobike platform or employee made a mistake during campaign, I was patient.	
		UCB8	If I encounter difficulties during campaign, I was willing to put up with it.	

Note: UPB = user participation behavior; UCB = user citizenship behavior

Table 5-5 Measurement of self-construal

Variables	Operational definition	No.	Items	Sources
DSC	An individual of independent self-construal tends to believe he/she is special and unique, value the development of the uniqueness and hold a view of independence	DSC1	I am concerned the most about taking good care of myself	
		DSC2	I feel comfortable when praised or rewarded separately	
		DSC3	I would speak out rather than being misunderstood	
		DSC4	I behave consistently no matter who is with me	
		DSC5	I think health is above all	
		DSC6	I call new acquaintances by name, even if they are much older than me	
		DSC7	I behave consistently at home and in the workplace/campus	
		DSC8	Speaking in class is not a problem for me	
		DSC9	I like to be straightforward when dealing with new acquaintances	
		DSC10	To me, maintaining an active mind is important	
		DSC11	I value the characteristics independent of others	Singelis (1994) ;
		DSC12	I am happy to be unique in many ways	Wang et al. (2008)
TSC	An individual with interdependent self-construal tends to seek correspondence with others, value harmonious relationship with others and hold a view of interdependence.	TSC1	I respect the authoritative persons I am dealing with	
		TSC2	If the group I belong to needs me, I will stay in the group even though I feel unhappy	
		TSC3	When one of my friends is in trouble, it is my responsibility to help him/her	
		TSC4	My parents' advice should be considered when I am planning for my education/career	
		TSC5	I tend to avoid argument even when I disagree with others in the group	
		TSC6	For me, it is important to respect the group decisions	
		TSC7	I may sacrifice my interest for the group's good	
		TSC8	When on a bus, I give my seat to the elderly even I am not asked to	
		TSC9	I often feel that a good social network is more important than my achievements	

TSC10	To me, it is critical to keep going well along with others
TSC11	I am happy because the people around me are happy
TSC12	I admire those who are humble

Note: DSC = independent self-construal; TSC = interdependent self-construal

Table 5-6 EFA of GNQ

Items	Factor1	Factor2	Factor3	Factor4	Factor5
ZS1	0.856	0.017	0.082	0.053	0.138
ZS2	0.845	0.142	0.023	0.076	0.312
ZS3	0.878	0.131	0.063	0.143	0.124
GM1	0.057	0.882	0.094	0.032	0.149
GM2	0.192	0.889	0.085	0.087	0.052
GM3	0.352	0.891	0.149	0.221	0.141
JS1	0.332	0.162	0.891	0.116	0.055
JS2	0.161	0.022	0.819	0.123	0.188
JS3	0.149	0.338	0.799	0.011	0.125
QW1	0.101	0.166	0.156	0.882	0.222
QW2	0.013	0.299	0.244	0.901	0.022
QW3	0.263	0.096	0.096	0.789	0.261
HD1	0.102	0.066	0.229	0.011	0.832
HD2	0.056	0.022	0.132	0.059	0.855
HD3	0.321	0.263	0.022	0.067	0.862
KMO			0.835		
Bartlett's sphericity test	Approx. Chi-Square			1098.964	
	df			105	
	Sig.			0.000	
Factor eigenvalue	3.183	2.825	2.553	2.401	1.106
Cumulative interpretable variance (%)	21.220	40.051	57.069	73.071	80.442

Note: ZS = sense of reality, GM = resonation, JS = acceptance, QW = fun, HD = interaction.

Table 5-7 EFA of flow experience

Items	Factor	load after deleting the item
FE1	0.816	0.841
FE2	0.728	0.722
FE3	0.801	0.845
FE4	0.435	deleted
KMO	0.745	
Bartlett's sphericity test	Approx. Chi-Square	1123.296
	df	120
	Sig.	0.000
Factor eigenvalue	4.954	
Cumulative interpretable variance (%)	30.965	

Note: FE = flow experience.

Table 5-8 EFA of perceived autonomy

Items	Factor	load after deleting the item
PA1	0.786	0.882
PA2	0.831	0.798
PA3	0.832	0.859
PA4	0.692	0.703
PA5	0.395	deleted
KMO	0.767	
Bartlett's sphericity test	Approx. Chi-Square	309.303
	df	10
	Sig.	0.000
Factor eigenvalue	3.683	
Cumulative interpretable variance (%)	63.667	

Note: PA = perceived autonomy.

Table 5-9 EFA of value co-creation behavior

Items	Factor1	Factor2
UPB1	0.571	0.23
UPB2	0.616	0.267
UPB3	0.575	0.053
UPB4	0.687	0.021
UPB5	0.653	0.157
UPB6	0.619	0.272
UPB7	0.642	0.302
UPB8	0.676	0.222
UCB1	0.125	0.786
UCB2	0.19	0.769
UCB3	0.053	0.647
UCB4	0.056	0.585
UCB5	0.008	0.647
UCB6	0.242	0.516
UCB7	0.235	0.673
UCB8	0.382	0.702
KMO	0.745	
Bartlett's sphericity test	Approx. Chi-Square	1123.296
	df	120
	Sig.	0.000
Factor eigenvalue	4.954	2.738
Cumulative interpretable variance (%)	30.965	68.076

Note: UPB = user participation behavior; UCB = user citizenship behavior

Table 5-10 EFA of self-construal

Items	Factor1	Factor2
DSC1	0.771	-0.184
DSC2	0.703	0.064
DSC3	0.774	0.612
DSC4	0.759	-0.381
DSC5	0.664	0.21
DSC6	0.601	0.187
DSC7	0.694	0.11
DSC8	0.672	0.115
DSC9	0.753	0.057
DSC10	0.719	0.172
DSC11	0.648	0.202
DSC12	0.776	0.122
TSC1	0.125	0.783
TSC2	0.19	0.669
TSC3	0.053	0.747
TSC4	0.156	0.695
TSC5	0.018	0.649
TSC6	0.249	0.719
TSC7	0.231	0.876
TSC8	0.389	0.595
TSC9	0.108	0.649
TSC10	0.142	0.716
TSC11	0.231	0.676
TSC12	0.182	0.742
KMO	0.773	
	Approx. Chi-Square	1872.633
Bartlett's sphericity test	df	276
	Sig.	0.000
Factor eigenvalue	8.496	5.479
Cumulative interpretable variance (%)	33.266	69.172

Note: DSC = independent self-construal; TSC = interdependent self-construal

Table 6-1 Sample Basic Information (N=669)

Properties	Category	Sample size	Percentage (%)
Gender	Male	456	68.16
	Female	213	31.84
Age	<20	88	13.15
	20-25	120	17.94
	26-30	265	39.61
	31-35	129	19.28
	36-40	67	10.01
Education background	Junior middle school	5	0.75
	Senior high school	16	2.39
	College degree	169	25.26
	Bachelor degree	423	63.23
	Master's and above	56	8.37
occupation	Self-employed	46	6.88
	Student	226	33.78
	Institution staff	96	14.35
	State workers	75	11.21
	Foreign employees	59	8.82
	Professionals	103	15.40
	Unemployed person	56	8.37
	Others	8	1.20
earnings	<3000	224	33.48
	3000-4999	115	17.19
	5000-6999	113	16.89
	7000-8999	112	16.74
	9000-11999	30	4.48
	12000-13999	29	4.33
	14000-15999	21	3.14
	16000-17999	11	1.64
	18000-19999	8	1.20
	>20000	6	0.90
narrative experience	1-2 times per week	263	39.31
	3-4 times per week	333	49.78
	5-6 times per week	70	10.46
	> 7 times per week	3	0.45

Table 6-2 Reliability test to the formal questionnaire

Constructs and α		Items	CITC	α after the item was deleted
GNQ α=0.832	Sense of reality α=0.789	ZS1.1	0.645	0.772
		ZS1.2	0.673	0.753
		ZS1.3	0.732	0.733
	Resonation α=0.802	GM1.1	0.693	0.759
		GM1.2	0.734	0.768
		GM1.3	0.735	0.771
	Acceptance α=0.801	JS1.1	0.703	0.774
		JS1.2	0.693	0.768
		JS1.3	0.651	0.781
	Fun α=0.803	QW1.1	0.659	0.762
		QW1.2	0.647	0.773
		QW1.3	0.732	0.735
	Interaction α=0.791	HD1.1	0.735	0.721
		HD1.2	0.632	0.709
		HD1.3	0.666	0.707
Flow experience α=0.863		FE1.1	0.675	0.806
		FE1.2	0.736	0.722
		FE1.3	0.731	0.726
Perceived autonomy α=0.866		PA1.1	0.691	0.767
		PA1.2	0.687	0.759
		PA1.3	0.697	0.773
		PA1.4	0.713	0.752
VCB α=0.853	UPB α=0.821	UPB1.1	0.639	0.812
		UPB1.2	0.623	0.807
		UPB1.3	0.663	0.806
		UPB1.4	0.696	0.792
		UPB1.5	0.682	0.813
		UPB1.6	0.694	0.799
		UPB1.7	0.662	0.821
		UPB1.8	0.661	0.832
	UCB α=0.806	UCB1.1	0.618	0.801
		UCB1.2	0.622	0.799
		UCB1.3	0.631	0.783
		UCB1.4	0.632	0.792
		UCB1.5	0.632	0.792
		UCB1.6	0.645	0.776
		UCB1.7	0.625	0.802
		UCB1.8	0.613	0.797
		DSC1.1	0.631	0.803

		DSC1.2	0.635	0.805
		DSC1.3	0.633	0.799
		DSC1.4	0.632	0.806
		DSC1.5	0.698	0.749
		DSC1.6	0.719	0.745
	DSC	DSC1.7	0.635	0.787
	α=0.827	DSC1.8	0.722	0.736
		DSC1.9	0.666	0.768
		DSC1.10	0.686	0.769
		DSC1.11	0.693	0.753
Self-construal		DSC1.12	0.707	0.745
α=0.855		TSC1.1	0.642	0.799
		TSC1.2	0.692	0.775
		TSC1.3	0.623	0.809
		TSC1.4	0.693	0.785
		TSC1.5	0.696	0.773
	TSC	TSC1.6	0.689	0.776
	α=0.836	TSC1.7	0.667	0.783
		TSC1.8	0.688	0.791
		TSC1.9	0.665	0.785
		TSC1.10	0.651	0.792
		TSC1.11	0.703	0.762
		TSC1.12	0.686	0.782
Cronbach's α of the overall scale=0.929				

Table 6-3 Results of standardized factor loading, AVE and CR tests

Variables	Items	Standardized factor loadings	AVE	Square root of AVE	CR
reality	ZS1	0.653			
	ZS2	0.696	0.612	0.782	0.827
	ZS3	0.719			
Resonation	GM1	0.725			
	GM2	0.723	0.675	0.822	0.853
	GM3	0.721			
Acceptance	JS1	0.783			
	JS2	0.772	0.635	0.797	0.899
	JS3	0.756			
Fun	QW1	0.775			
	QW2	0.768	0.655	0.809	0.912
	QW3	0.782			
Interaction	HD1	0.756			
	HD2	0.798	0.666	0.816	0.867
	HD3	0.775			
Flow experience	FE1	0.801			
	FE2	0.812	0.703	0.838	0.892
	FE3	0.823			
Perceived autonomy	PA1	0.815			
	PA2	0.835	0.705	0.840	0.866
	PA3	0.843			
	PA4	0.828			
UPB	UPB1	0.816			
	UPB2	0.826			
	UPB3	0.831			
	UPB4	0.812	0.707	0.840	0.902
	UPB5	0.833			
	UPB6	0.816			
	UPB7	0.827			
	UPB8	0.832			
UCB	UCB1	0.812			
	UCB2	0.831			
	UCB3	0.828			
	UCB4	0.819	0.712	0.843	0.867
	UCB5	0.832			
	UCB6	0.821			
	UCB7	0.823			

	UCB8	0.829			
	DSC1	0.753			
	DSC2	0.745			
	DSC3	0.765			
	DSC4	0.769			
	DSC5	0.767			
DSC	DSC6	0.745	0.709	0.842	0.886
	DSC7	0.719			
	DSC8	0.787			
	DSC9	0.778			
	DSC10	0.769			
	DSC11	0.729			
	DSC12	0.766			
	TSC1	0.735			
	TSC2	0.722			
	TSC3	0.843			
	TSC4	0.823			
	TSC5	0.812			
TSC	TSC6	0.725	0.722	0.850	0.903
	TSC7	0.835			
	TSC8	0.712			
	TSC9	0.836			
	TSC10	0.739			
	TSC11	0.802			
	TSC12	0.834			

Table 6-4 Results of analysis on fit indices of the main variables

Variables	X^2/df	RMSEA	IFI	TLI	CFI	NFI
GNQ	2.021	0.066	0.982	0.961	0.982	0.971
Flow experience	1.832	0.047	0.985	0.975	0.985	0.973
Perceived autonomy	1.253	0.032	0.986	0.979	0..986	0.975
Value co-creation behavior	1.892	0.049	0.995	0.983	0.995	0.981
Self-construal	1.932	0.051	0.996	0.985	0.996	0.991
Criteria of fit test	Good: 1-3 Acceptable: 3-5	Good: <0.05 Acceptable: <0.08	>0.90	>0.90	>0.90	>0.90

Table 6-5 Mean values, variances, correlation coefficient matrix and square roots of AVE of the formal questionnaire scale

	ZS	GM	JS	QW	HD	FE	PA	UPB	UCB	DSC	TSC
ZS	**0.782**										
GM	0.434	**0.822**									
JS	0.453	0..456	**0.797**								
QW	0.535	0.726	0.475	**0.809**							
HD	0.283	0.695	0.476	0.545	**0.816**						
FE	0.375	0.426	0.410	0.495	0.475	**0.838**					
PA	0.515	0.421	0.432	0.601	0.476	0.621	**0.840**				
UPB	0.311	0.712	0.632	0.535	0.459	0.555	0.463	**0.840**			
UCB	0.398	0.397	0.623	0.499	0.512	0.535	0.561	0.472	**0.843**		
DSC	0.467	0.497	0.425	0.379	0.495	0.379	0.576	0.532	0.619	**0.842**	
TSC	0.366	0.512	0.353	0.510	0.512	0.493	0.525	0.492	0.573	0.623	**0.850**
Mean value	3.977	4.012	3.977	4.023	3.888	4.007	3.965	3.997	4.928	4.032	4.153
Standard deviation	0.572	0.517	0.593	0.533	0.623	0.431	0.497	0.467	0.472	0.435	0.68

Note: ZS=sense of reality, GM=resonation, JS=acceptance, QW=fun, HD=interaction, FE=flow experience, PA=perceived autonomy, UPB=user participation behavior, UPB=user citizenship behavior, DSC=independent self-construal, and TSC= interdependent self-construal. The numbers on the diagonal are square roots of AVE

Table 6-6 Results of hierarchical regression analysis on GNQ, flow experience and value co-creation behavior

Measures		Flow experience		VCC (UPB & UCB)		
Models		Model 1	Model 2	Model 3	Model 4	Model 5
Control variables	Age	0.102*	0.071	0.093	0.074	0.033
	Gender	0.037	0.015	0.021	0.019	0.007
	Education	0.113*	0.033	0.075	0.037	0.028
	Earnings	0.099	0.079	0.097	0.075	0.055
	NE	0.162**	0.088	0.119*	0.099	0.039
reality			0.323***		0.220***	0.128*
Resonation			0.335***		0.193***	0.097*
Acceptance			0.293***		0.136*	0.013
Fun			0.321***		0.127*	0.019
Interaction			0.279***		0.222***	0.197*
Mediator	FE					0.593***
Statistical parameters	R^2	0.052	0.472	0.035	0.22	0.398
	Adjusted R^2	0.035	0.563	0.129	0.345	0.369
	Adjusted ΔR^2	——	0.528	——	0.316	0.150
	F	9.357***	67.335***	7.632***	23.123***	41.288***
	VIF	1.356-1.356	1.379-1.657	1.356-1.356	1.379-1.657	1.455-1.993

Note: *** indicates $p<0.001$, ** indicates $p<0.01$, * indicates $p<0.05$, NE=narrative experience, and FE=flow experience

Table 6-7 Results of test of mediating effect of flow experience between GNQ and VCC (Bootstrapping)

Independent variables	Mediators	Dependent variables	Indirect effects	Standard errors	95% confidence interval	
					Lower limit	Upper limit
reality	FE	VCC	0.3214**	0.0281	0.2937	0.4631
Resonation	FE	VCC	0.2235**	0.0492	0.1961	0.3072
Acceptance	FE	VCC	0.2515**	0.0301	0.2012	0.3591
Fun	FE	VCC	0.2929**	0.0335	0.2037	0.4179
Interaction	FE	VCC	0.3001**	0.0288	0.2556	0.4222

Note: ** indicates $p<0.05$, samples of Bootstrapping =5000, and PE=flow experience

Table 6-8 Results of hierarchical regression analysis on GNQ, self-construal and flow experience

Measures		Flow experience	
Models		Model 6	Model 7
Control variables	Age	0.065	0.057
	Gender	0.012	0.009
	education	0.016	0.011
	Earnings	0.065	0.035
	NE	0.069	0.039
Sense of reality		0.225***	0.205***
Resonation		0.288***	0.266***
Acceptance		0.276***	0.235***
Fun		0.295***	0.277***
Interaction		0.255***	0.230***
Moderators	SC	0.325***	0.319***
	Sense of reality ×SC		-0.053
	Resonation × SC		0.172**
	Acceptance × SC		-0.039
	Fun × SC		0.135**
	Interaction × SC		-0.029
Statistical parameter	R2	0.563	0.579
	Adjusted R2	0.691	0.735
	Adjusted ΔR2	0.128	0.044
	F	79.935***	57.409***
	VIF	1.379-1.725	1.400-1.799

Note: *** indicates $p<0.001$, ** indicates $p<0.01$, * indicates $p<0.05$, NE=narrative experience, SC=self-construal

Table 6-9 Results of hierarchical regression analysis on GNQ, perceived autonomy and value co-creation behavior

Measures		Perceived autonomy		VCC (UPB&UCB)
Models		Model 1	Model 2	Model 5
Control variables	Age	0.113*	0.098	0.005
	Gender	0.012	0.007	0.006
	Education	0.120*	0.079	0.012
	Earnings	0.076	0.063	0.033
	NE	0. 212**	0.112	0.022
reality			0. 215***	0.101
Resonation			0.228***	0.103
Acceptance			0.312***	0.125*
Fun			0.301***	0.109*
Interaction			0.257***	0.197
Mediators	PA			0.375***
Statistical parameters	R^2	0.051	0.602	0.398
	Adjusted R^2	0.046	0.588	0.479
	Adjusted ΔR^2	——	0.542	0.253
	F	8.123***	56.235***	61.202***
	VIF	1.275-1.349	1.392-1.736	1.566-1.999

Note: *** indicates p<0.001, ** indicates p<0.01, *indicates p<0.05,

NE=narrative experience, and PA=perceived autonomy

Table 6-20 Results of test of the mediating effect of perceived autonomy between GNQ and VCC (Bootstrapping)

Independent variables	Mediators	Dependent variables	Indirect effects	Standard errors	95% confidence interval	
					Lower limit	Upper limit
reality	PA	VCC	0.2325**	0.0323	0.2011	0.3312
Resonation	PA	VCC	0.3339**	0.0371	0.2555	0.3535
Acceptance	PA	VCC	0.2030**	0.0299	0.1998	0.2230
Fun	PA	VCC	0.3005**	0.0246	0.2435	0.3679
Interaction	PA	VCC	0.3301**	0.0303	0.3006	0.4566

Note: *** indicates $p<0.001$, ** indicates $p<0.01$, * indicates $p<0.05$, Bootstrapping samples=5000, and PA=perceived autonomy

Table 6-21 Results of hierarchical regression analysis on GNQ, self-construal and perceived autonomy

Measures		Perceived autonomy	
Models		Model 6	Model 7
Control variables	Age	0.073	0.052
	Gender	0.003	0.002
	Education	0.045	0.032
	Earnings	0.043	0.022
	NE	0.093	0.063
reality		0.203***	0.193***
Resonation		0.210***	0.188***
Acceptance		0.269***	0.223***
Fun		0.273***	0.235***
Interaction		0.211***	0.183***
Moderators	SC	0.379***	0.355***
	Sense of reality × SC		-0.062
	Resonation × SC		0.012
	Acceptance × SC		0.211**
	Fun × SC		-0.035
	Interaction × SC		0.122**
Statistical parameters	R2	0.621	0.633
	Adjusted R2	0.702	0.723
	Adjusted ΔR2	0.114	0.021
	F	63.137***	59.325***
	VIF	1.392-1.823	1.392-2.121

Note: *** indicates $p<0.001$, ** indicates $p<0.01$, * indicates $p<0.05$, NE=narrative experience, and SC=self-construal

Table 6-22 Results of hypothesis test in this study

Hypotheses	Supported or not
H1: gamification narrative quality has a significant positive effect on users' continuous value co-creation willingness.	Yes
H2: gamification narrative quality has a significant positive effect on the flow experience.	Yes
H3: flow experience has a significant positive effect on users' value co-creation.	Yes
H4: gamification narrative quality has a significant positive effect on perceived autonomy.	Yes
H5: perceived autonomy has a significant positive effect on users' value co-creation behavior.	Yes
H6: self-construal moderates the relationships between gamification narrative quality and flow experience, such that the positive relationship is weaker for interdependent self-construal than independent self-construal.	Partially
H7: self-construal moderates the relationships between gamification narrative quality and perceived autonomy, such that the positive relationship is weaker for interdependent self-construal than independent self-construal.	Partially

Appendix 1 formal questionnaires

Dear sir/miss,

Thank you for your time to complete the questionnaire! I am a doctoral candidate at Cheung Kong Graduate School of Business, and I am doing a research titled "Effect of Gamification Narrative Quality on Users' Value Co-creation Behavior in the B2C Sharing Economy Model". The data collected from this anonymous survey will be used in this research only and not for any commercial purpose. Your responses will be kept fully confidential. Please complete the questionnaire based on your actual experience of participating in Mobike's campaign of "Rescuing the Zombie Bikes", and there are no criteria for right or wrong responses. Thank you again for your help and valuable suggestions!

Part I: Basic Personal Information (Please tick (√) the applicable box (□))

1. Your gender: □Male □Female

2. Your age: □under 20 □20-25 □26-30 □31-35 □36 or above

3. Your education background □Junior high school □Senior high school □Associate □Bachelor □Master or above

4. Your occupation □Freelancer □Student □Employee in public sector □Employee in state-owned enterprise □Employee in foreign company □Professional □Unemployed □Other

5. Your monthly income □Under RMB3000 □RMB 3000-4999 □RMB5000-6999 □RMB7000-8999 □RMB9000-11999 □RMB12000-13999 □RMB14000-15999 □RMB16000-17999 □RMB18000-19999 □RMB20000 or above

6. Narrative experience: □1-2 times per week □3-4 times per week □5-6 times per week

☐7 times or above per week

Part II: Survey Questions (Please tick (√) the applicable box (☐) based on your true feelings)

1. When answering the following questions on the gamification narrative quality in your participation in Mobike's campaign of "Rescuing the Zombie Bikes", please choose the description that is most consistent with your evaluation based on your actual experience.

(Please tick (√) the corresponding number, where 1=Strongly disagree; 2=Disagree; 2=Somewhat disagree; 4=Not sure; 5=Somewhat agree; 6=Agree; 6=Strongly agree)

1-Strongly disagree; 2-Disagree; 3-Somewhat disagree; 4-Not sure; 5-Somewhat agree; 6-Agree; 7-Strongly agree	
Reality	
1) The story makes me feel being on the scene	1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐
2) The story brings me to a new environment	1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐
3) The story makes me unable to tell the reality from illusion	1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐
Resonation	
1) The story evokes my strong emotion	1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐
2) I strongly identify with or love the character in the story	1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐
3) I resonate with the role or plot in the story	1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐
Acceptance	
1) I am willing to accept the values in the story	1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐
2) I consider the story logical	1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐
3) The story does not repel me	1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐
Fun	
1) The story makes me feel quite at ease	1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐
2) The story makes me feel like playing a game	1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐

3) The brings me pleasure	1□ 2□ 3□ 4□ 5□ 6□ 7□
Interaction	
1) I have interaction with other characters in the story	1□ 2□ 3□ 4□ 5□ 6□ 7□
2) I have some connections with the story	1□ 2□ 3□ 4□ 5□ 6□ 7□
3) I have mental dialogues with the story	1□ 2□ 3□ 4□ 5□ 6□ 7□

2. When answering the following questions on the flow experience in your participation in Mobike's campaign of "Rescuing the Zombie Bikes", please choose the description that is most consistent with your evaluation based on your actual experience. (Please tick (√) the corresponding number, where 1=Strongly disagree; 2=Disagree; 3=Somewhat disagree; 4=Not sure; 5=Somewhat agree; 6=Agree; 7=Strongly agree)

1-Strongly disagree; 2-Disagree; 3-Somewhat disagree; 4-Not sure; 5-Somewhat agree; 6-Agree; 7-Strongly agree	
1) When rescuing the zombie bikes, I am highly dedicated	1□ 2□ 3□ 4□ 5□ 6□ 7□
2) When rescuing the zombie bikes, I feel that everything is in my hands	1□ 2□ 3□ 4□ 5□ 6□ 7□
3) I enjoy rescuing the zombie bikes	1□ 2□ 3□ 4□ 5□ 6□ 7□

3. When answering the following questions on the perceived autonomy in your participation in Mobike's campaign of "Rescuing the Zombie Bikes", please choose the description that is most consistent with your evaluation based on your actual experience. (Please tick (√) the corresponding number, where 1=Strongly disagree; 2=Disagree; 3=Somewhat disagree; 4=Not sure; 5=Somewhat agree; 6=Agree; 7=Strongly agree)

1-Strongly disagree; 2-Disagree; 3-Somewhat disagree; 4-Not sure; 5-Somewhat agree; 6-Agree; 7-Strongly agree	
1) I feel that I'm really being myself in the campaign of "Rescuing the Zombie Bikes"	1□ 2□ 3□ 4□ 5□ 6□ 7□
2) I feel that I'm free in the campaign of "Rescuing the Zombie Bikes"	1□ 2□ 3□ 4□ 5□ 6□ 7□
3) I take part in the campaign of "Rescuing the Zombie Bikes"	1□ 2□ 3□ 4□ 5□

because I am willing to	6□ 7□
4) I do not feel external pressure when rescuing the zombie bikes	1□ 2□ 3□ 4□ 5□ 6□ 7□

4. When answering the following questions on the value co-creation behavior in your participation in Mobike's campaign of "Rescuing the Zombie Bikes", please choose the description that is most consistent with your evaluation based on your actual experience. (Please tick (√) the corresponding number, where 1=Strongly disagree; 2=Disagree; 3=Somewhat disagree; 4=Not sure; 5=Somewhat agree; 6=Agree; 7=Strongly agree)

1-Strongly disagree; 2-Disagree; 3-Somewhat disagree; 4-Not sure; 5-Somewhat agree; 6-Agree; 7-Strongly agree	
Customer participation behavior	
1) I paid attention to how others carry out this campaign effectively.	1□ 2□ 3□ 4□ 5□ 6□ 7□
2) I searched for information on this campaign.	1□ 2□ 3□ 4□ 5□ 6□ 7□
3) I gave the Mobike platform the required information.	1□ 2□ 3□ 4□ 5□ 6□ 7□
4) I gave other users the required information.	1□ 2□ 3□ 4□ 5□ 6□ 7□
5) I performed all the tasks that were required.	1□ 2□ 3□ 4□ 5□ 6□ 7□
6) I followed the campaign's directives or orders.	1□ 2□ 3□ 4□ 5□ 6□ 7□
7) I was friendly to the mobile platform	1□ 2□ 3□ 4□ 5□ 6□ 7□
8) I was polite to the mobile employee	1□ 2□ 3□ 4□ 5□ 6□ 7□
Customer citizenship behavior	
1) If I had a useful idea on how to improve campaign, I informed the mobile platform.	1□ 2□ 3□ 4□ 5□ 6□ 7□
2) When I experienced a problem, I informed the mobile platform.	1□ 2□ 3□ 4□ 5□ 6□ 7□
3) I said positive things about this campaign to others.	1□ 2□ 3□ 4□ 5□ 6□ 7□
4) I recommended this campaign to others.	1□ 2□ 3□ 4□ 5□ 6□ 7□
5) I assisted other users if they need my help.	1□ 2□ 3□ 4□ 5□ 6□ 7□
6) I provided advice to other users.	1□ 2□ 3□ 4□ 5□

	6☐ 7☐
7) If the Mobike platform or employee made a mistake during campaign, I was patient.	1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐
8) If I encounter difficulties during campaign, I was willing to put up with it.	1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐

5. When answering the following questions on the self-construal in your participation in Mobike's campaign of "Rescuing the Zombie Bikes", please choose the description that is most consistent with your evaluation based on your actual experience. (Please tick (√) the corresponding number, where 1=Strongly disagree; 2=Disagree; 3=Somewhat disagree; 4=Not sure; 5=Somewhat agree; 6=Agree; 7=Strongly agree)

1-Strongly disagree; 2-Disagree; 3-Somewhat disagree; 4-Not sure; 5-Somewhat agree; 6-Agree; 7-Strongly agree	
Independent self-construal	
1) I am concerned the most about taking good care of myself	1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐
2) I feel comfortable when praised or rewarded separately	1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐
3) I would speak out rather than being misunderstood	1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐
4) I behave consistently no matter who is with me	1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐
5) I think health is above all	1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐
6)I call new acquaintances by name, even if they are much older than me	1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐
7) I behave consistently at home and in the workplace/campus	1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐
8) Speaking in class is not a problem for me	1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐
9) I like to be straightforward when dealing with new acquaintances	1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐
10) To me, maintaining an active mind is important	1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐
11) I value the characteristics independent of others	1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐
12) I am happy to be unique in many ways	1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐
Independent self-construal	
1) I respect the authoritative persons I am dealing with	1☐ 2☐ 3☐ 4☐ 5☐

	6☐ 7☐
2) If the group I belong to needs me, I will stay in the group even though I feel unhappy	1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐
3) When one of my friends is in trouble, it is my responsibility to help him/her	1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐
4) My parents' advice should be considered when I am planning for my education/career	1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐
5) I tend to avoid argument even when I disagree with others in the group	1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐
6) For me, it is important to respect the group decisions	1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐
7) I may sacrifice my interest for the group's good	1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐
8) When on a bus, I give my seat to the elderly even I am not asked to	1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐
9) I often feel that a good social network is more important than my achievements	1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐
10) To me, it is critical to keep going well along with others	1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐
11) I am happy because the people around me are happy	1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐
12) I respect those who are humble	1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐

Appendix 2 A Case of Gamification Marketing Promoting Users' Co-creation in Sharing Economy

The dockless bike sharing has experienced unprecedented expansion and prosperity worldwide since it came out in 2015. However, the development of the bike sharing projects in China cities has witnessed opposite poles in just three years. In the beginning, it received positive feedback including government support, public approval, and a flourishing market. Recently, the sustainability of the development of bike sharing has been severely challenged, which is manifest in the mandatory suspension of bike release in major cities, bankruptcies declared by most bike companies, and piles of "zombie bikes" waste. According to statistics from relevant departments, the year of 2016 is a period of explosive growth, during which the number of bike-sharing users reached 18.86 million, compared with the 2.45 million in 2015. Meanwhile, there are also cemeteries of sharing bikes in major cities, but no professional bike disposal agency participating in the recycling. Under the circumstance, cities in China will face congested roads, waste of resources and environmental pollution arising from a large number of abandoned shared bikes. Therefore, to find a suitable and effective method for recycling and managing shared bikes is an urgent problem in the current bike sharing industry.

To deal with the problem, Mobike launched the event of earning cash by "Saving Zombie Bikes" in a few days around the Halloween in the absence of institutional and financial support. The event implanted game elements in

marketing to promote value co-creation in the sharing economy. Despite the low cost invested, users were attracted to help Mobike recycle zombie bikes, and create commercial and environmental value together with Mobike. First of all, Mobike introduced the game background in the event of "Saving Zombie Bikes": shared bikes which were supposed to be neatly placed on sides of the road were seen in the river or even hung on the tree. No one cared about the injured bikes, and evil thoughts floated out and attached to the human body and turned into zombie bikes. The gamified description aroused users' interest and gave them a sense of mission to save the zombie bikes, which was conducive for users to accept the task of "Saving Zombie Bikes" and have a common wish to participate in the events and co-create value. Second, Mobike used gamification narrative to introduce steps of "Saving Zombie Bikes" for users: (1) During the Halloween, open the Mobike APP and find the zombie bikes with the "zombie" icon; (2) Become a just hunter and ride a zombie bike to a safe area. It was free to ride for 2 hours. Users could get random rewards for every rescued bike, which could be up to 50 yuan per day. (3) Choose an area of greater reward to lock the bike, complete the rescue, and get more money with a fixed amount. Both the mysterious Halloween and zombie icons allowed users to easily master the rules of the game. At the same time, the user's sense of justice was enhanced by acting as "just hunters" guarding the city. Mobike used the interesting Halloween to create a gamification marketing plan of small saving tasks in a clever manner, which not only allowed its bikes in more remote

areas to return to the usual places, but also created the motivation for users to

grab money reward and free riding.