
Effect of Gamification through Badge Implementation on Data Collection Using Online Questionnaire

Jakkrit Suvansavetr & Pimmanee Rattanawicha
Chulalongkorn University, Thailand

Abstract: Online questionnaire is one of the most popular survey methods for both academic and commercial purposes. Nevertheless, it presents a challenge to surveyors in terms of quality of the answers because it is self-administrated. The objective of the study is to explore the effect of using gamification through one single game element implementation, Badge, in online questionnaire, whether there are significantly differences of no responding and satisfying behavior between gamified online questionnaire and conventional online questionnaire or not. Gender and gaming experience are influential factors on adopting gamification and have been taking into consideration as moderators. The result shows no significant difference in nonresponsive ratio regardless gender and gaming experience. This study also found an interesting result of higher unanswered questions on gamified online questionnaire. In term of internal consistency, females or frequent gamers respond well to gamification resulting in higher internal consistency when using gamification. However, if females or infrequent gamers have satisfying behavior, the consistency of gamified questionnaire is lower.

Keywords: Gamification, Badge, Online Questionnaire, None responding, Satisfying

1. Introduction

1.1 Background

Businesses place importance into customer insights so that they could respond to those needs and achieve business competitive edge, market shares, and profits. While understanding consumer behavior normally comes from a valid and reliable research, data collection plays a vital role in those researches. Questionnaire has its own advantages including saving time, effort, and cost. It is convenient and easy to analyze, especially when the sample size is huge or is scattered.

Developments in Information and Communications Technology have enhanced the way people exchange and share information via the Internet in the fastest and most convenient way possible. This has gained popularity for the technology and made online questionnaire one of the most popular survey methods for both academic and commercial purposes. Advantages of online questionnaire includes its ability to reach target surveyed anywhere, anytime; effective data collection; electronic data format that allows analysts to instantly study the data. Online questionnaire also offers flexibility in design, format, language used, and personalization. Nevertheless, it presents a challenge to surveyors in terms of quality of the answers because it is self-administrated; in other words, surveyed self-control the answer process; therefore, if the surveyed do not really ponder their answers (Satisfying), do not complete all the questions, or dropout in the middle of the questionnaire (Nonresponding), the quality of the answers will be incomplete or of poor quality.

Gamification, a process of applying game element into non-gaming contexts to create game-like psychological and behavioral outcome, has become an increasingly intriguing method for academic researchers. Gaming element, such as Badges, can be used as motivations to drive target audiences to perform tasks. However, there have not been enough studies on whether or not the adoption of one single element of gaming in surveys can enhance the quality of the answers; hence, this study is aimed at concluding if utilizing Badges as a sole gaming element in online questionnaire can help improve systematic, collaborative, and engaging responses of surveyed.

Harms, Seitz, Wimmer, Kappel, and Grechenig (2015) used Badges in online questionnaire related to sport. The study found that Badges made surveyed feel entertained while answering the questionnaire; nevertheless, the research did not study the quality of the answers. Therefore, this research is determined to study whether or not Badges will alter behavior of

surveyed and improve “No responding” and “Satisfying” behaviors. Genders and Gaming experiences are also influential factors that can affect the quality of answers in online questionnaires that adopt Gamification; therefore, the two factors will also be included into consideration in this study as moderators.

1.2 Study objective

The objective of this study is to study effect of gamification through badge implementation on data collection using online questionnaire to No responding and satisfying behavior by identifying Nonresponsive ratio, Unanswered Question and Internal consistency as dependent variables. Also, this study takes Genders and Gaming experiences into consideration as moderators.

2. Literature Review

2.1 Gamification

Gamification is a Persuasive Technology used to alter, without forcing, attitude or behavior of target audiences with Motivational Affordances to achieve Psychological and Behavioral Outcomes. Seeking the right Motivational Affordances can be a challenge for researcher as target audiences have diverse psychological and behavioral backgrounds and dispositions (Hamari, Koivisto, & Pakkanen, 2014).

Badge is an incentive for achievement when a target audience accomplishes a set of tasks or conditions. Badge, in itself, is composed of three components: (1) Signifier that distinguishes one Badge from the others – it can be in a form of Name, (2) Completion Logic that determines the condition in the process from which the target audience will be rewarded with a designated Badge, and (3) Reward or the Badge that the target has worked for (Hamari & Eranti, 2011). The study of Jurado, Fernandez, and Collazos (2015) proved that Gamification; e.g. Points, Badges, and Leaderboards, can help augment collaboration and knowledge management within a team of workers. Badges have also been found to help increase transactions, comments, and pageviews of peer-to-peer trading websites. (Hamari, 2017) There has also been a research that studied the influence of Badges in academic learners; however, the research found insufficient evidence as to whether or not Badges did enhance engagement of the students (Falkner & Falkner, 2014).

2.2 Online Questionnaire

Krosnick (1991) stated that, intensive and extensive deliberation on questions can shorten attention span of surveys. Since online questionnaire is self-administered, some surveys can choose to skip some questions, not respond to some, randomly select answers, or drop out of the questionnaire without completing it. According to Bosnjak and Tuten (2001), in online questionnaire, there are seven survey behaviors: (1) Complete Responders: surveys who answer all question, (2) Unit Non-responders: surveys who did not look at nor answer any question, (3) Answering Drop-outs: these surveys answered some questions but drop out, (4) Lurkers: they looked at the questions but did not answer any one of them, (5) Lurking Drop-outs: these surveys looked at some questions but did not answer at all, (6) Item Non-responders: they looked at every question but only answered some of them, and (7) Item Non-responding Drop-outs: they looked at and answered some of the questions. The behaviors types 2 to 7 are considered as none responding Behaviors. This research studies the behaviors, except type 2, by comparing no response ratio and unanswered question of Gamified online questionnaire and conventional online questionnaire.

When it comes to answering questions, the surveys with satisfying behavior does not go through the four steps of thinking and answering process. These four steps comprise, first, interpreting questions; second, retrieve raw data from their memories; third, process the raw information to form the answers; and, finally, submitting the clearest and best answers. They

can make Random and Speeding Responses by choosing the first answers they see that seem reasonable enough (Krosnick, Narayan, & Smith, 1996).

2.3 Genders

There is a study shows that males are motivated to play game rather than females (Chou & Tsai, 2007). Computer Anxiety also affects female gamer's more than male gamers (Wang & Wang, 2008). However, Koivisto and Hamari (2014) did a study on an exercise application that utilizes Gamification (Badges, Levels, and Points) and found that female users were more motivated to exercise by the game elements than their counterparts were.

2.4 Gaming Experience

Gaming experience refers to time spent on playing game and not equal to gaming expertise, which refers to game play competency (Chesney, Chuah, Hoffmann, Hui, & Larner, 2013). Bittner and Schipper (2014) found that consumers who have more gaming experiences tend to have a higher level of purchase intention after seeing advertisement that is integrated with Gamification. This is because their gaming experiences have accustomed them to game elements such as Badges and Points. From Nolan (2017), frequent gamers who spend four hours or more per week playing games have also been found to respond better to Gamification. Therefore, this study also takes these factors into consideration as non-frequent gamers and people with less gaming experiences can result in Non-responding and Satisfying Behaviors.

2.5 Researches on Gamification and Online Questionnaires.

Gamification is expected to provide online questionnaire surveys with positive experiences including Challenging, Relevant, and Rewarding experiences. These positive experiences result in positive psychological behaviors when answering online questionnaires; in other words, surveys become more engaged, collaborative, and entertained. Gamification helps lessen the feeling of burden and increase cooperation from surveys (Keusch & Zhang, 2017). Adoption of Gamification in online questionnaire is also in line with the concept of Gamification provided by Hamari, Koivisto, and Sarsa (2014).

Cechanowicz, Gutwin, Brownell, and Good fellow (2013) did a research on effects of Gamification on data collection for digital marketing. The research divided its samples into three groups: one group without Gamification, the second group with part of Gamification (only Game Mechanic), and the last group with a complete gamification. The research found that the more Gamification components that were incorporated with the data collection, the better the responses regardless of age, gender, or gaming experience. Jia, Xu, Karanam, and Volda (2016) studied Motivational Affordances and found that, if Gamification elements such as Points, Levels, Badges, Avatars, and Rewards, did not align or appear incongruous with the tasks at hands or the nature of the missions, they would be viewed as Lack of Value. Harms et al. (2015) found that Badge had a positive effect on surveys of online questionnaires who felt more entertained while answering; however, there was no significant difference between those who answered questionnaires with and without Gamification.

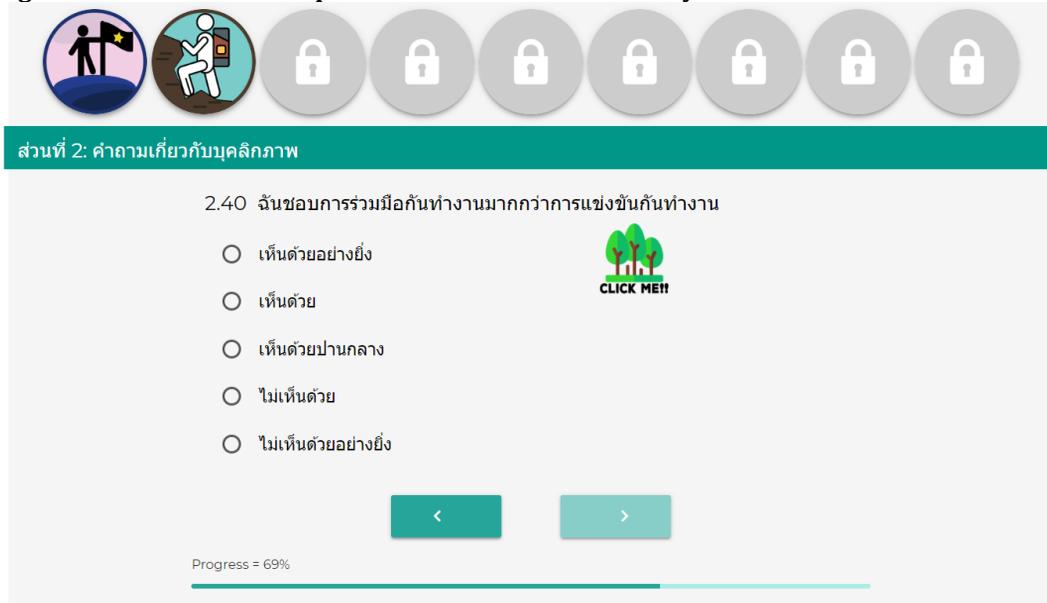
Evidently, almost all the aforementioned researches employed several Gamification components in their studies, and there have not been enough studies on the effect of a single element of Gamification on behavior of surveys. Hence, this study is aimed to use only one game element for gamification, Badges, to study how and if it will affect none responding and Satisfying behaviors and improve data collection. Gender and Gaming Experience are also factored into this study as well.

3. Research Methodology

The study is a field experiment to compare none response ratio, unanswered question and internal consistency between 2 types of online questionnaire: gamified online questionnaire and conventional online questionnaire. The only different between 2 types of these questionnaires is

that one has badge implemented and another does not. The badge using in this study is designed to be a reward of completing questionnaire by linking to progress and each step of questionnaire completion. The badge visual signifier is designed to be simple and understandable and will be displayed when its completion logic is completed. However, the survey still can click to read the badge information when it is still locked, to learn about detail of each badge.

Figure 1: Gamified online questionnaire used in this study



The content of the questionnaire has 2 parts: (1) Personal and game behavior, (2) Personality question. The questionnaire adopted Big Five inventory (BFI) of Benet-Martínez and John (1998) due to the length of questionnaire (60 questions) and positive and negative questions used which fit to the experiment design.

The population of this study is those who can access to the internet. The questionnaire has been posted to web boards on well-known Thai websites with high traffic (www.sanook.com, www.dek-d.com, www.pantip.com). The questionnaire type is automatically assigned to survey that starts the questionnaire with odd number order. Conventional online questionnaire is assigned to survey that starts the questionnaire with even number order.

4. Finding and Discussion

There are 712 samples participating in this study by starting the questionnaire (clicking on the link to open the questionnaire page). The descriptive analysis shows that 32.4% of total sample did not specify gender while 45.1% of total sample did not specify gaming experience. (Shown in Table 1 and Table 2)

Table 1: Number of samples by gender

Gender	Gamified online questionnaire	Conventional online questionnaire	Total
Male	119 (33.4%)	137 (33.3%)	256 (36.0%)
Female	101 (28.4%)	124 (28.2%)	225 (31.6%)
Undefined	136 (38.2%)	95 (38.4%)	231 (32.4%)
Total	356 (100%)	356 (100%)	712 (100%)

Table 2: Number of samples by gaming experience

Gaming experience	Gamified online questionnaire	Conventional online questionnaire	Total
Frequent gamer	106 (29.8%)	117 (32.9%)	223 (31.3%)
Infrequent gamer	77 (21.6%)	93 (26.1%)	170 (23.9%)
Undefined	173 (48.6%)	146 (41.0%)	319 (44.8%)
Total	356 (100%)	356 (100%)	712 (100%)

4.1 None response ratio

None response ratio had been calculated using the following formula: Number of none responder / Number of total responder. Gamified online questionnaire has none response ratio at 0.8652 (308 no responders), while conventional online questionnaire has none response ratio at 0.8455 (301 none responders). The comparison between these 2 rates using statistical Z test for comparing 2 proportions is calculated. The Z score = 0.7458 (p-value = 0.456) shows that they are not significantly different at 0.05 significant level.

Taking gender into consideration, for male, Gamified online questionnaire has none response ratio at 0.8151 (97 none responders), while conventional online questionnaire has none response ratio at 0.8467 (116 none responders). The comparison between these 2 rates using statistical Z test for comparing 2 proportions is calculated. The Z score = 0.6743 (p-value = 0.500) shows that they are not significantly different at 0.05 significant level. Female Gamified online questionnaire has none responsive ratio 0.7426% (75% none responders), while conventional online questionnaire has none response ratio at 0.7258% (90% none responders). The comparison between these 2 rates using statistical Z test for comparing 2 proportions is calculated. The Z score = 0.2829 (p-value = 0.777) shows that they are not significantly different at 0.05 significant level.

Taking gaming experience into consideration, for frequent gamer, Gamified online questionnaire has none response ratio at 0.7453 (79 none responders), while conventional online questionnaire has none response ratio at 0.7094 (83 none responders). The comparison between these 2 rates using statistical Z test for comparing 2 proportions is calculated. The Z score = 0.6003 (p-value = 0.548) shows that they are not significantly different at 0.05 significant level. Infrequent gamer, Gamified online questionnaire has none response ratio at 0.7200 (54 none responders), while conventional online questionnaire has none response ratio at 0.7717 (71 none responders). The comparison between these 2 rates using statistical Z test for comparing 2 proportions is calculated. The Z score = 0.7665 (p-value = 0.443) shows that they are not significantly different at 0.05 significant level.

4.2 Unanswered question

The comparison of unanswered question using non-parametric statistic (Mann-Whitney U Test) between gamified online questionnaire and conventional online questionnaire shows that significant value = 0.024 which supports that unanswered question between 2 types of questionnaire are significantly different at 0.05 significant level. The result shows that unanswered question of gamified online questionnaire is higher.

Taking gender into consideration, considering only male, significant value is 0.265 which implies that unanswered question between 2 types of questionnaire are not significantly different at 0.05 significant level. Considering only female, significant value is 0.626 which implies that unanswered question between 2 types of questionnaire are not significantly different at 0.05 significant levels.

Taking gaming experience into consideration, considering only frequent gamer, significant value is 0.916 which implies that unanswered question between 2 types of questionnaire are not significantly different at 0.05 significant level. Considering only infrequent gamer, significant value is 0.640 which implies that unanswered question between 2 types of questionnaire are not significantly different at 0.05 significant levels.

4.3 Internal consistency

Internal consistency has been compared by calculating and comparing Cronbach’s alpha of each personality trait between 2 types of questionnaire.

Table 3: Cronbach’s alpha comparison

Personality trait	Cronbach’s Alpha Coefficient	
	Gamified online questionnaire	Conventional online questionnaire
Neuroticism	0.864	0.835
Extraversion	0.857	0.812
Openness to Experience	0.590	0.512
Agreeableness	0.663	0.630
Conscientiousness	-0.063	-0.006

Table 3 shows that gamified online questionnaire have slightly higher internal consistency. A very low internal consistency of the Conscientiousness personality trait, which is the last 12 questions of the questionnaire, in both types, shows that responders may be tired with answering long questionnaire and lose the ability to answer question properly, in another word, satisfying occurred.

Table 4: Cronbach’s alpha comparison for male responders

Personality trait	Cronbach’s Alpha Coefficient	
	Gamified online questionnaire	Conventional online questionnaire
Neuroticism	0.795	0.757
Extraversion	0.817	0.833
Openness to Experience	0.494	0.632
Agreeableness	0.433	0.429
Conscientiousness	0.065	-0.072

Table 4 indicates that, for male, gamified online questionnaire has slightly lower internal consistency. A few badges can possibly to be achieved during the middle part of the questionnaire. Lower internal consistency of Openness to Experience in gamified online

questionnaire may be caused by male responders who started to play the game element rather than focusing on answering questions.

Table 5: Cronbach's alpha comparison for female responders

Personality trait	Cronbach's Alpha Coefficient	
	Gamified online questionnaire	Conventional online questionnaire
Neuroticism	0.898	0.859
Extraversion	0.876	0.812
Openness to Experience	0.652	0.217
Agreeableness	0.766	0.711
Conscientiousness	-0.366	0.084

Table 5 shows that, for female, gamified online questionnaire has slightly higher internal consistency. Game element seems to have more effect on female. Female may have more focus on answering questions when they are closed to achieve the badges during the middle part. However, in the late part, when game element in this study lost the ability to hold responders' focus, females start to lose focus and do stronger satisfying, just to get the badge as their reward. This results in lower internal consistency of Conscientiousness of gamified online questionnaire.

Table 6: Cronbach's alpha comparison for frequent gamer responders

Personality trait	Cronbach's Alpha Coefficient	
	Gamified online questionnaire	Conventional online questionnaire
Neuroticism	0.899	0.828
Extraversion	0.877	0.717
Openness to Experience	0.615	0.312
Agreeableness	0.610	0.627
Conscientiousness	0.016	-0.017

It is found from Table 6 that, for frequent gamer, gamified online questionnaire has higher internal consistency. This may be caused by frequent gamer is familiar with game element which allows them to focus more when they are closed to collect the badge.

Table 7: Cronbach's alpha comparison for infrequent gamer responders

Personality trait	Cronbach's Alpha Coefficient	
	Gamified online questionnaire	Conventional online questionnaire
Neuroticism	0.798	0.840
Extraversion	0.818	0.876
Openness to Experience	0.547	0.679
Agreeableness	0.668	0.588
Conscientiousness	-0.191	0.031

Table 7 shows that, for infrequent gamer, gamified online questionnaire has slightly lower internal consistency. This may be caused by infrequent gamer may not understand how game element works and choose to ignore the badge condition. When badges start to lose ability to hold responder focus in late part, infrequent gamer may perceive badge as a burden and choose to do stronger satisfying just to complete the questionnaire.

5. Conclusion and Recommendation

5.1 Conclusion

The result of the study shows that implementing badge alone on online questionnaire does not provide enough benefit in term of none response ratio. The behavior of sample in this study shows that gamified online questionnaire has higher unanswered question. This may occur because using gamification on online questionnaire is new to Thai responders. They may perceive gamified online questionnaire as a game play rather than a survey. Game element and user interface (Badge display/condition page) may be considered as a burden to questionnaire answering, so responder chose to dropout more from the questionnaire. Applying badge to online questionnaire is recommended when the target audience is female or frequent gamer due to gamification can provide more reliable answer. However, badge may cause the negative effect on answer reliability when the female or infrequent gamer start to do satisfying behavior.

5.2 Future research

However, one of these study limitations is that badge design and completion logic is designed by researcher to use in this particular study. Future research, different badge design and completion logic are encouraged to be explored more concerning effect of implementing badge on online questionnaire none responding and satisfying behavior. While this study has mainly focused on behavioral outcome of implementing badge alone, a future research should be done to have more understanding on psychological outcome, in order to in-depth analyze the gamification effect.

Reference:

- Benet-Martínez, V., & John, O. P. (1998). Los Cinco Grandes across cultures and ethnic groups: Multitrait-multimethod analyses of the Big Five in Spanish and English. *Journal of Personality and Social Psychology*, 75(3), 729-750. doi:10.1037/0022-3514.75.3.729
- Bittner, J. V., & Schipper, J. (2014). Motivational effects and age differences of gamification in product advertising. *Journal of Consumer Marketing*, 31(5), 391-400. doi:10.1108/JCM-04-2014-0945
- Bosnjak, M., & Tuten, T. L. (2001). Classifying Response Behaviors in Web-based Surveys. *Journal of Computer-Mediated Communication*, 6(3). doi:10.1111/j.1083-6101.2001.tb00124.x
- Cechanowicz, J., Gutwin, C., Brownell, B., & Goodfellow, L. (2013). *Effects of gamification on participation and data quality in a real-world market research domain*. Paper presented at the Proceedings of the First International Conference on Gameful Design, Research, and Applications, Toronto, Ontario, Canada.
- Chesney, T., Chuah, S.-H., Hoffmann, R., Hui, W., & Larner, J. (2013). A study of gamer experience and virtual world behaviour. *Interacting with Computers*, 26(1), 1-11.
- Chou, C., & Tsai, M.-J. (2007). Gender differences in Taiwan high school students' computer game playing. *Computers in Human Behavior*, 23(1), 812-824. doi:https://doi.org/10.1016/j.chb.2004.11.011
- Falkner, N. J. G., & Falkner, K. E. (2014). "Whither, badges?" or "wither, badges!": a metastudy of badges in computer science education to clarify effects, significance and influence. Paper presented at the Proceedings of the 14th Koli Calling International Conference on Computing Education Research, Koli, Finland.
- Hamari, J. (2017). Do badges increase user activity? A field experiment on the effects of gamification. *Computers in Human Behavior*, 71, 469-478. doi:10.1016/j.chb.2015.03.036
- Hamari, J., & Eranti, V. (2011). Framework for Designing and Evaluating Game Achievements.
- Hamari, J., Koivisto, J., & Pakkanen, T. (2014). Do Persuasive Technologies Persuade? - A Review of Empirical Studies. In A. Spagnoli, L. Chittaro, & L. Gamberini (Eds.), *Persuasive Technology: 9th International Conference, PERSUASIVE 2014, Padua, Italy, May 21-23, 2014. Proceedings* (pp. 118-136). Cham: Springer International Publishing.
- Hamari, J., Koivisto, J., & Sarsa, H. (2014). *Does Gamification Work? -- A Literature Review of Empirical Studies on Gamification*. Paper presented at the Proceedings of the 2014 47th Hawaii International Conference on System Sciences.
- Harms, J., Seitz, D., Wimmer, C., Kappel, K., & Grechenig, T. (2015). *Low-Cost Gamification of Online Surveys: Improving the User Experience through Achievement Badges*. Paper presented at the Proceedings of the 2015 Annual Symposium on Computer-Human Interaction in Play, London, United Kingdom.
- Jia, Y., Xu, B., Karanam, Y., & Voids, S. (2016). Personality-targeted Gamification: A Survey Study on Personality Traits and Motivational Affordances.
- Jurado, J. L., Fernandez, A., & Collazos, C. A. (2015). *Applying gamification in the context of knowledge management*. Paper presented at the Proceedings of the 15th International Conference on Knowledge Technologies and Data-driven Business, Graz, Austria.
- Keusch, F., & Zhang, C. (2017). A Review of Issues in Gamified Surveys. *Social Science Computer Review*, 35(2), 147-166. doi:10.1177/0894439315608451
- Koivisto, J., & Hamari, J. (2014). Demographic differences in perceived benefits from gamification. *Computers in Human Behavior*, 35(Supplement C), 179-188. doi:https://doi.org/10.1016/j.chb.2014.03.007
- Krosnick, J. A. (1991). Response strategies for coping with the cognitive demands of attitude measures in surveys. *Applied Cognitive Psychology*, 5(3), 213-236. doi:10.1002/acp.2350050305
- Krosnick, J. A., Narayan, S., & Smith, W. R. (1996). Satisficing in surveys: Initial evidence. *New Directions for Evaluation*, 1996(70), 29-44. doi:10.1002/ev.1033
- Nolan, E. (2017). The Effects of Collaborative Gameplay on Flow Experience and Mood.