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GAMIFICATION MEASUREMENT SCALE (GMS) IN ONLINE SHOPPING ENVIRONMENT: CONSTRUCTION AND VALIDATION

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Abstract
Gamification is applying game design elements in non-gaming context to entertain and to engage the users as well. Therefore, understanding the game design mechanism is vital due increasing use of it in every sphere of life. In this study, researcher describes the development and validation of Gamification Measurement Scale (GMS) based on four factor structure. Two different studies were conducted for construction and validation of gamification measurement scale. First study was conducted with 397 participants from Delhi/NCR region of India. Exploratory Factor analysis technique was conducted for extraction of factors by using SPSS 26.0. Second study was conducted on 514 respondents from Haryana state of India for validating the measurement scale. The validation of scale has done through Confirmatory factor analysis (CFA) technique by using SPSS AMOS 26.0 version. Data is collected from 514 young participants from India to validate the developed scale. Researcher extracted the four vital gaming elements i.e., Points, Leaderboard, Countdown timer & Rewards in online shopping environment. This scale showed good reliability and validity for measuring the gaming elements in online shopping environment.

Keywords: Gamification, Game Design, Online shopping, Scale construction and Scale validation.

1. Introduction

Games have always been a vital facet to humankind. Videogames or digital games have become latest phenomena due to the advent of technology and they impact all the spheres socially and culturally (Muriel & Crawford, 2018).Recently digital games have renowned for entertainment in all over the world. Thus, gaming industry is grooming day by day throughout the world. The value of gaming industry in India was approximately two billion dollar in 2021 and projected to grow up to seven billion dollar by 2026 (Statistica.com). Digital games have influenced the leisure, culture and socialization among people thus it has preferred by children, adolescents and adults as well (Feiyang, 2020).

Now-a-Days, digital games are grabbing the attention of marketers because it is helpful in brand building among customers. The evolution in mobile apps and digital games has created a new trend among marketers to engage customers through gamification because it helps in enhancing the experience of users (Rodrigues, Oliveira, & Costa, 2016) by creating the game mechanism or design according to the user's requirement. Gamification is a latest and well known marketing strategy of

marketers, it is not a full fledge game but uses engaging and emotional qualities of game to influence the users (Eppman et. al., 2018). Previous researches also proved that game designing is necessary because it fulfill the needs of numerous users (Merilampi et al, 2018), as well as it fulfill the psychological and social needs of customers by using digital games (Granic et. al., 2014). Gamification uses gaming elements in non gaming context to enhance gameful experience (Deterding et. al., 2011; Huotari & Hamari, 2017) and to modify the behaviour of users. Using game like elements is a way to engage customers to brand and to increase customer loyalty towards brand and finally lead them to purchase a product. Thus, gamification becomes the latest technology trend among marketers and practitioners (Deloittee, 2013).

Researchers start taking interest to show the benefits of gamification in the field of marketing through enhancing the gameful experience (Muller-Stewens et. al., 2017) & also showed gamified interaction between consumer and brand effectively increase engagement with brand (Berger et. al., 2017). Mobile Marketing effectiveness is also increased with implementation of game design elements (Hofacker et. al., 2016). However, gamification is trending topic but still there is no proper measuring scale for gaming elements of gamification. After considering this gap this research is conducted to identify the vital elements of gamification. Before adopting the various gaming elements, it is necessary to understand the interaction between users and the game design for effective implementation of gamification. Therefore, current research is being carried out on customize game designs and gamification according to the need of users. Rather, customization of game design is challenging task as it should consist playful or entertaining activities so that players enjoyed and get involved within the apps. Gamification is implementing in every sphere including in online shopping as well for engaging the shoppers towards specific brand.

When implementing playful activities, it must be considered that not all application users will be motivated only to win, but some users have some other interest within the game experience like cooperation, earning rewards, collecting items, exploring and socialization etc. The experience of user with a gamified app can be much more extensive than those users who have a tradition interactive system. It is important to identify and recognize the distinct interests and motivations of users which help in creating the engaging environment within the applications. Identifying and recognizing the different needs of customers helps in developing the gaming elements, mechanics and dynamics that are more encouraging for the users to participate in the gaming activities. This study aims to construct and validate the four factor survey measure by conducting factor analysis and replicate the structure by conducting confirmatory factor analysis.

2. Material and Method

2.1 Study 1- Scale construction

Participants

The sample of the study was 397 participants belongs from Delhi/ NCR between the age group 18 – 35 with 280 Male (69.8%) and female117 (29.2 %), who were used online applications such as Amazon, Flipkart, Myntra, Meesho and Snapdeal for shopping. Judgmental and Snow ball sampling techniques were used to select the sample for the study.

Instrument

The instrument for this study was developed by using statements related to gaming elements from previous studies and the item statements were modified as per the requirement of the study. Some item statements were self-constructed by researcher according to the need of study. The initial scale consisted of 19 Likert type items from a range of 1 to 5 (1= strongly Disagree, 2= Disagree, 3= Neutral, 4= Agree and 5 = Strongly Agree). The face validity of the scale was reviewed by two experts of marketing and gamification. The various meetings have been conducted with these experts to discuss and reviewed the statements of different items.

Procedure

The data was collected from different educational institutes, organizations and others, who used applications for shopping. The survey questionnaire created on Google forms was sent through Whatsapp and E-mails. Before forwarding the questionnaire to all participants, it was tested on small group of people to check the clarity of items of questionnaire. The researcher was presented at the time of questionnaire was filled by small group of participants so that all doubts have arrived can be resolved during the process and respondents filled the questionnaire honestly. This process has taken approximately 20 minutes on each respondent.

Data Analysis

To test the reliability and validity of gamification scale, its psychometric properties were analyzed. Over all reliability of scale was checked with cronbach alpha. The value of cronbach alpha for thirteen item statement was .803. To explore the gamification components, Factor Analysis was performed and four factors were identified via EFA (Exploratory Factor Analysis). Exploratory factor analysis is a statistical technique to discover the latent factors by investigates the covariances of set of variables.

Results

The data set was appropriate for factor reduction was proved by KMO (Kaiser's Meyer-Olkin) and Bartlett's Test of Sphericity. The value of KMO was .767 (Kaiser, 1970) and p = .000 i.e. significant. Researcher conducted Exploratory Factor Analysis by implementing principal component analysis in SPSS 26.0. Varimax rotation method was used and four factors extracted, whose Eigen value was more than 1. Together, all four factors constitute 67.305 percent to the variance. Below mentioned Table 1 represents the rotated component matrix.

Table 1 : Rotated Component Matrix[a]

	Component			
	Countdown Timer	**Reward**	**Leaderboard**	**Point**
The way points are received on shopping application when purchasing products is understandable.				0.648
Feel good when I redeem my Points				0.756
The Presence of Points make me feel more likely to do actions to obtain				0.845

them				
The ranking of top reviewers reflects my status when I comment			0.890	
The ranking that can be obtained reflect the good work done as a reviewer			0.840	
My efforts to give review on products are perfectly reflected in the reputation			0.683	
Countdown timers on shopping application grab my attention towards a product	0.813			
Countdown timers create urgency to buy a product	0.795			
Countdown timers arouse desire or willingness to purchase desirable products	0.745			
Countdown timers create sense of "Fear Of Missing Out" a product	0.777			
Win interesting rewards (gifts/ special discounts/ vouchers/ coupons etc.) by playing game/contests on this application		0.802		
Getting rewards on shopping applications enhance my shopping experiences.		0.679		
Make me feel that I need to play more games/ contests to get extra rewards.		0.829		
% of Variance	**15.81**	**14.701**	**16.288**	**20.456**

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.[a]

a. Rotation converged in 5 iterations.

Table-2:

Nomenclature of Factors of Gamification and values of cronbach's alpha

Item Statements	Variable	Cronbach's Alpha
The way points are received on shopping application when purchasing products is understandable.	Point	**0.728**
Feel good when I redeem my Points		
The Presence of Points make me feel more likely to do actions to obtain them		
The ranking of top reviewers reflects my status when I comment	Leaderboard	**0.745**
The ranking that can be obtained reflect the good work done as a reviewer		
My efforts to give review on products are perfectly reflected in the reputation		
Countdown timers on shopping application grab my attention towards a product	Countdown Timer	**0.823**
Countdown timers create urgency to buy a product		
Countdown timers arouse desire or willingness to purchase desirable products		
Countdown timers create sense of "Fear Of Missing Out" a product		
Win interesting rewards (gifts/ special discounts/ vouchers/ coupons etc.) by playing game/contests on this application	Reward	**0.720**
Getting rewards on shopping applications enhance my shopping experiences.		
Make me feel that I need to play more games/ contests to get extra rewards.		

The rotation matrix shows that four factors such as points, leaderboard, reward and countdown timer was extracted via factor reduction method. All factor loadings are above o.6 which shows good factor loadings. The cronbach alpha for each construct was 0.823 for countdown timer, 0.720 for reward, 0.745 for leaderboard and finally 0.728 for points.

2.2 Study 2: Validating the Measurement scale

Participants

For the study-II 514 Participants was sample, belongs from Haryana state of India between the age group 18 – 35. The sample includes 340 Male (66.1%) and 173 female (33.7%), who were used online applications such as Amazon, Flipkart, Myntra, Meesho and Snapdeal for shopping.

Judgmental and Snow ball sampling techniques were used to select the sample for the study II also.

Instrument

The variables extracted in Study-I was validated in study-II by using confirmatory factor analysis. All the items' statements under different variables are validated in different region via CFA. The scale consisted of 19 Likert type items from a range of 1 to 5 (1= strongly Disagree, 2= Disagree, 3= Neutral, 4= Agree and 5 = Strongly Agree).

Procedure

To collect data for study-II, different educational institutes, organizations and others, who used applications for shopping, were targeted. Google form was used to make survey questionnaire and forwarded to people through Gmail and WhatsApp. It takes approximately 4 months to collect the responses from the participants of Haryana.

Data Analysis

Confirmatory factor analysis is a statistical technique to compare the fitness of the data with the factor model that is specified by the researcher and it is opposite of the Exploratory Factor Analysis. We conducted confirmatory Factor Analysis to verify the nineteen items four Factor Structure with SPSS Amos 26.

Results

In the specified CFA model, four gamification factors were considered as latent variables. Maximum Likelihood estimation was used for the analysis. The adjustment indices of the model: $X^2 = 1358.339$, $X^2/df = 9.304$, $p = .000$, GFI= .742, RMR= .080, CFI= .682, NFI= .659, AGFI=.664, PGFI= .570, RMSEA= .127. However, after analyzing the standardized residual matrix, researcher considered observable improvements in factor structure. Four items was removed from the factor structure whose standardized residual value associated more than 2.00

Thus, after removing the four items, the model fit indices were: $X^2 = 381.808$, $X^2/df = 5.378$, $p = .000$, GFI= .892, RMR= .049, CFI= .880, NFI= .858, AGFI=.840, PGFI= .603, RMSEA= .092. Therefore, after observing above data, researcher proceeded towards the standardized regression estimates of item statements. Two more items, whose regression weights were less than .5, were removed from the factor structure Further, the improved model fit indices were $X^2 = 278.167$, $X^2/df = 4.967$, $p = .000$, GFI= .924, RMR= .043, CFI= .914, PGFI= .568, RMSEA= .088.

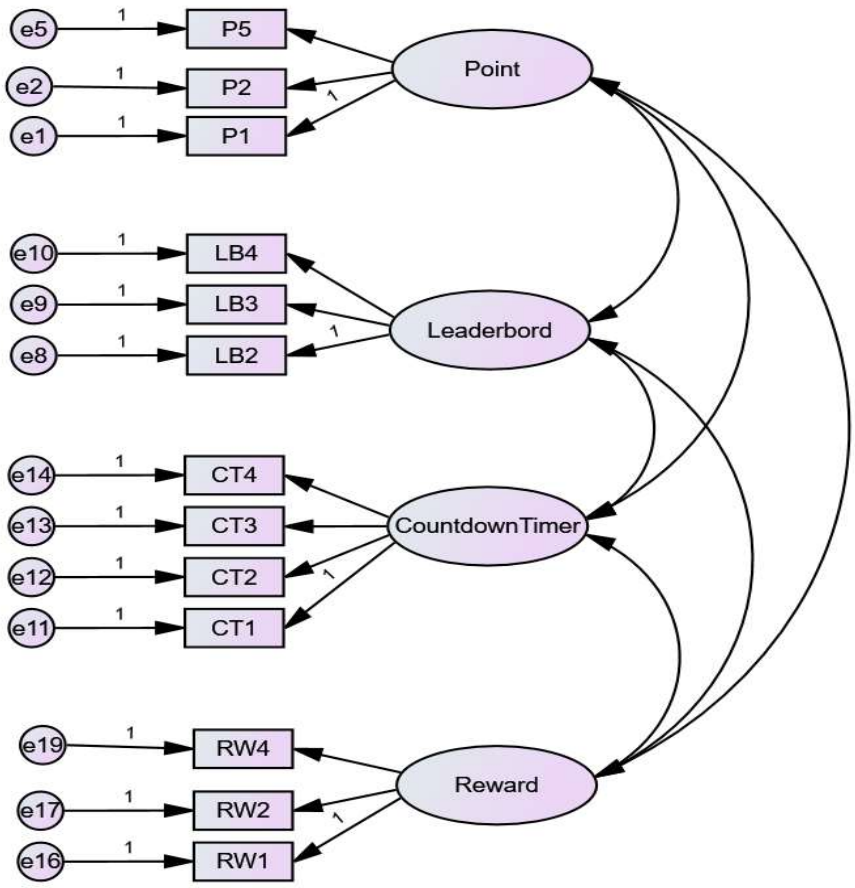

Figure 1: Confirmatory Factor Analysis of Gamification Elements

Table 3: Model Fit Indices

Sr. No	Fit Index	CFA Model	Suggested Value and References
1	Chi-square	0	P>0.05
2	Relative Chi-square	4.967	<5 Schumacker and Lomax (2004) <2 or 3 Carmines and Mclver (1981) <3 Kline (1998)
3	RMSEA	0.088	≤0.05 Good fit 0.05 < RMSEA≤0.08 Adequate fit 0.08<RMSEA≤0.10 Mediocre fit

			Schumacker and Lomax (2004) ≤0.06 Hu and Bentler (1999)
4	CFI	0.914	≥0.90 Bentler (1990) ≥0.95 Hu and Bentler (1999)
5	RMR	0.043	<0.05 Joreskog and Sorborn (1989) ≤0.08 Hu and Bentler (1999)
6	GFI	0.924	>0.90 Joreskog and Sorborn (1996)
7	PGFI	0.568	>0.50 Mulaik et al. (1989)

All the values fall within the range of good model fit as per good recommendation. Goodness of model fit indices provides a significant assessment.

3. Conclusion

Gamification refers to use gaming elements in non-gaming context to enhance gameful experiences. Although gamification is trending topic in research and management practices but there is no scale is existed for measuring the gameful experience (Huotari&Hamari, 2017). To address the above gap, researcher develops a scale for gaming elements in online shopping environment. As a result of validity and reliability analysis of 19 items extracted from previous extant literature related to gaming elements i.e. gamification, a new measurement scale comprising 13 items was developed given in (Appendix-1). Gamification measurement scale is a measuring tool for identifying gaming elements based on their preferences while doing shopping on gamified applications. The scale provides statements that draw out choices within four dimensions Points, Leaderboard, Countdown timer & Rewards to measure gaming experience in online shopping environment. This scale showed good reliability and validity for measuring the gaming elements in online shopping environment.

4. Managerial Implications

Gamification Measurement Scale (GMS) is a tool to measure the consumer experience while shopping on gamified application. GMS is also beneficial for managers because it is helpful for them to understand consumer experience in gamified environment. Through GMS, managers can identify the vital elements of gamification they need to consider while designing gamified applications. Gartner (2011) has suggested that most of the gamified applications failed due to poor implementation and wrong selection of gamification elements. Thus, it is necessary for manager to consider GMS before designing gamification measurement scale (GMS). Finally, the items used in GMS are easy to understand and don't require any complex experience of gamified application so it is easy for practitioners to assess the consumer experience by GMS. It is easy for practitioners to use and implement the GMS in different contexts as well.

5. Limitations and Future Research

Now- a- Days, gamified applications are predominately existing in digital world. Thus, researcher focused on scale construction and validation in digital environment. Though, gamification was used in non-gaming contexts from decades ago. For example, badges were given to students in their notebooks to motivate or to encourage the students. Another best example is Volkswagen, a car manufacturer used piano staircase to encourage their employees to use stairs instead of lift (Bates, 2009). Hence, the main limitation of this study is that Gamification Measurement Scale (GMS) tested only in digital environment. The future research must be in a way to check that Gamification Measurement Scale (GMS) is equally appropriate for measuring the experience of user in gamified non digital environment. This is also necessary to test the appropriateness of Gamification Measurement Scale (GMS) in another gamified digital setting because GMS was tested only on gamified shopping applications.

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Appendix 1: Item statements for measurement scale

S.No.	Items	Sources
1	The way points are received on shopping application when purchasing products is understandable.	Raman 2020; Jurado et al., 2018
2	Feel good when I redeem my Points	
3	The Presence of Points make me feel more likely to do actions to obtain them	
4	The ranking of top reviewers reflects my status when I comment	Raman 2020; Jurado et al., 2018
5	The ranking that can be obtained reflect the good work done as a reviewer	
6	My efforts to give review on products are perfectly reflected in the reputation	
7	Countdown timers on shopping application grab my attention towards a product	Self Constructed
8	Countdown timers create urgency to buy a product	
9	Countdown timers arouse desire or willingness to purchase desirable products	
10	Countdown timers create sense of "Fear Of Missing Out" a product	
11	Win interesting rewards (gifts/ special discounts/ vouchers/ coupons etc.) by playing game/contests on this application	Hogberg et al., 2019; Lee & Jin 2019
12	Getting rewards on shopping applications enhance my shopping experiences.	
13	Make me feel that I need to play more games/ contests to get extra rewards	