*Online Appendices to*

**Gamified Monetary Reward Designs: Offering Certain versus Chance-Based Rewards**

# **A Literature Review on Monetary Reward Designs in IS Research**

We reviewed articles from IS journals within the “basket of eight” (https://aisnet.org/page/SeniorScholarBasket) covering the topic of monetary rewards and identified ten central articles, which we present in Table A1 below. The majority of IS research on monetary rewards has been conducted in the application fields of various forms of online contributions (e.g., user registration, information disclosure, online reviews, online referrals) as well as e-commerce platforms. Monetary rewards under investigation have mainly been cash incentives, with rewards such as free or discounted product samples being used less frequently. Motivation theories, including self-determination theory, are commonly drawn upon in monetary reward research, but we also note publications without grounding in theoretical basis.

**Table A1.** Literature review on monetary rewards in IS research

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Study** | **Study design & context** | **Application field** | **Monetary reward design (MRD)** | **Theoretical basis** | **DV** | **MRD Type** |
| **Monetary reward objects** | **Monetary reward mechanics** | **Monetary reward principles** |
| Chen et al. (2019) | Analyses of articles and comments posted on investment-related social media website (Seeking Alpha) between 2009 and 2012 | Online investor communities | Monetary reward of $10 | Reward earned by contributors per 1,000 page views of their articles | Monetary reward is made up of ad revenue shared by platform owners with platform contributors |   | Amount of content output and community interest generation  | Non-gamified MRD |
| Hann et al. (2007) | Conjoint analysis (trade-off situations) experiment with 268 university students | E-Commerce platforms (financial, healthcare, and travel industries)  | Monetary reward of $5, $10, or $20  | Reward earned in return for personal information |   | Information-processing theory of motivation (i.e., expectancy theory) | Information disclosure, user registration  | Non-gamified MRD |
| Hong et al. (2017) | Set of controlled lab experiments (study 1: 480 subjects, study 3: 796 university students, study 4: 420 university students) and randomized field experiment (study 2) with 986 randomly selected customers of an online ticket retail company | Online social referral systems | Referral bonus of $10 (currencies varied depending on the study), final lab experiment used free cloud storage space as reward instead of monetary reward | Reward earned for sending referral to others | Three different design principles: (1) only referral proposer receives reward, (2) only referral responder receives reward, (3) equal division of reward between proposer and responder | Ultimatum game theory | Performance of online referral systems (i.e., proposer sending offer, responder accepting said offer)  | Non-gamified MRD |
| Hui et al. (2007) | Field experiment with 600 business students  | Website privacy statements | Check in the amount of 1 to 9 Singapore dollars | Reward earned for information disclosure in website survey | Reward value not communicated in a priori email, only once on website  | Contemporary choice theory | Information disclosure  | Non-gamified MRD |
| Khern-am-nuai et al. (2018) | Natural experiment through panel data analyses (treated platform: large American retailer, control platform: Amazon) | Online reviews on e-commerce platforms | 25 loyalty points  | Reward earned in return for each submitted review, reward points exchangeable for certificates to make purchases  | Maximum reward is capped at eight reviews compensated with points per year (i.e., overall potential to earn up to 200 loyalty points)  | Theory of information cascade, motivation theory | Quantity and quality of reviews | Gamified MRD with certain rewards |
| Kuang et al. (2019) | Quasi-natural experiment with archival data set from online knowledge exchange platform Zhihu.com, which implemented paid knowledge sharing feature | Online knowledge exchange platforms  | Participant fee paid to contributor | Reward earned during real-time online session |   | Self-determination theory, equity theory | Information disclosure  | Non-gamified MRD |
| Luo et al. (2020) | Randomized field experiment with >11,200 department store customers  | E-Commerce platforms  | 2,000 reward points with an equivalent monetary value of 20 RMB | Reward earned for purchasing any product on company's e-commerce platform | Points are awarded within visitors' loyalty membership accounts  |   | Online purchase behavior | Non-gamified MRD |
| Qiao et al. (2020) | Empirical analyses of large Amazon review data set | Online review communities | Free product sample or product discount | Reward earned in return for writing customer review |   | Self-determination theory | Userreviews, sentiment | Non-gamified MRD |
| Qiao et al. (2021) | Series of randomized experiments, 3 x 3 design (monetary incentive: None, small, or large, i.e., 0 percent, 50 percent, and 100 percent of payment given; implemented strategies: None, goal-setting, and challenge-seeking)  | Online information systems (e.g., Q&A forums, science communities, review websites) | 0 percent, 50 percent, or 100 percent of the session payment  | Reward earned for completing additional transcriptions  |  | Self-perception theory, goal-setting theory | Signing up for and engaging in voluntary contributions  | Non-gamified MRD |
| Wu and Lu (2013) | *Meta-analysis* | Utilitarian, hedonic, and dual-purposed IS usage | Out of 303 studies considered in meta-analysis, only 3 used rewards as motivator for system usage and behavioral intentions | Self-determination theory | Information systems usage/engagement  | Non-gamified MRD |
| *Our presented work* | Randomized field experiment with 651 website visitors and online experiment with 330 participants | E-Commerce platform | Monetary reward (i.e., up to 20% discount), visual components (e.g., crane, ball with discount reward) | Reward based on completed user registration and in the gamified MRDs additionally on in-game performance | Reward is not chance-based (non-gamified and gamified MRD with certain rewards) or chance-based (gamified MRD with chance-based rewards) | Self-determination theory, cognitive evaluation theory | User registration  | Non-gamified MRD; gamified MRDs with certain or chance-based rewards |

# **B Randomized Field Experiment - Sample Description and Controls**

Tables A2 and A4 summarize the descriptive statistics. According to our data, 62% of the visitors used a mobile device, 4% reached the website via organic search engine results and 3% via advertised links (e.g., banner, sponsored search advertising, social media).

**Table A2.** Descriptive statistics of controls (Study 1)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| MRD | *N* | Mobile (Binary) l = mobile device, 0 = desktop device | Organic Traffic (Binary)1 = organic, 0 = direct | Referral Traffic (Binary)1 = referral,0 = direct |
|  |  | M | SD | M | SD | M | SD |
| *Gamified MRD with Chance-based Rewards* | 172 | 0.58 | 0.24 | 0.04 | 0.04 | 0.03 | 0.03 |
| *Gamified MRD with Certain Rewards* | 230 | 0.63 | 0.23 | 0.05 | 0.05 | 0.02 | 0.02 |
| *Non-Gamified MRD* | 249 | 0.64 | 0.23 | 0.03 | 0.03 | 0.04 | 0.03 |
| F-value |  | 0.78 | 0.64 | 0.87 |
| *p*-value |  | 0.46 | 0.52 | 0.42 |

Non-response may introduce a bias into statistical analyses and needs, therefore, to be properly handled (Fowler Jr 2013). To address this potential source of bias, we conducted several one-way analyses of variance to compare the distributional properties (e.g. Mobile, Organic Traffic, and Referral Traffic) of the first 25% responses to those of the last 25% responses of all visitors. The results did not indicate any statistically significant differences between these two quartiles (all *p* > 0.1), suggesting that no bias due to non-response occurred.

**Table A3.** Descriptive Statistics and Construct Correlations (Study 1)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Variable | Mean | StD | 1 | 2 | 3 | 4 | 5 |
| 1 |  User Registration | 0.08 | 0.26 | - |  |  |  |  |
| 2 | Gamified MRD with Chance-based Rewards | 0.26 | 0.44 | 0.19\*\*\* | - |  |  |  |
| 3 | Gamified MRD with Certain Rewards | 0.35 | 0.48 | −0.03 | −0.44\*\*\* | - |  |  |
| 4 | Mobile  | 0.62 | 0.49 | −0.26\*\*\* | −0.05 | 0.02 | - |  |
| 5 | Organic Traffic  | 0.04 | 0.19 | 0.03 | 0.01 | 0.04 | 0.01 | - |
| 6 | Referral Traffic | 0.03 | 0.17 | −0.01 | 0.02 | −0.05 | 0.06 | −0.03 |

# **C Randomized Field Experiment - Model-Free Evidence**

The results presented in Table A4 indicate that a *Gamified MRD with Certain Rewards* has a significant higher *Registration Rate* than a *Non-Gamified MRD* does. Likewise, a Gamifi*ed MRD with Chance-based Rewards* has a significant higher *Registration Rate* than a *Non-Gamified MRD* does.

**Table A4**. Model-free evidence (Study 1)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Reward Design | N | Number of Registrations | Registration Rate | F-Statistics of One-Way ANOVAs of the Mean Comparisons |
| *Non-Gamified MRD* as Baseline |
| *Registration Rate* |
| *Gamified MRD with Chance-based Rewards* | 172 | 27 | 15.7% | 4.85\*\*\*\* |
| *Gamified MRD with Certain Rewards* | 230 | 15 | 6.5% | 2.23\*\*\*\* |
| *Non-Gamified MRD*  | 249 | 7 | 2.8% | - |
| Note:\*\*\*p < 0.01 |

We noticed that our final dataset did not have a balanced distribution in sample size across the groups. To demonstrate robustness of our effects, we followed procedures in other IS studies that dealt with similar phenomena (e.g., Lee and Hosanagar 2019). Accordingly, we filled up all groups with dummy data to create balanced groups, whereby we focused on the group non-gamified MRD, which happened to have the highest number of participants. These added dummy data comprised only the decision “no registration,” representing the toughest robustness check as these would decrease the effect size and thus influence the significance of our results the strongest, given that non-gamified MRD is the baseline. The results of this robustness check reveal qualitatively the same effect patterns as in our main analyses, demonstrating the robustness of our findings.

# **D Randomized Online Experiment - Sample Description and Controls**

**Table A5.** Descriptive statistics and construct correlations (Study 2)

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Variable/Construct | Mean | StD | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 1 |  Registration Rate | 0.18 | 0.39 | - |  |  |  |  |  |  |  |  |
| 2 |  Gamified MRD with  Chance-based Rewards | 0.34 | 0.48 | 0.15\*\* | - |  |  |  |  |  |  |  |
| 3 |  Gamified MRD with  Certain Rewards | 0.33 | 0.47 | 0.02 | −0.51\*\*\* | - |  |  |  |  |  |  |
| 4 | Competence | 3.20 | 1.54 | 0.33\*\*\* | 0.02 | 0.18\*\*\* | **0.76** |  |  |  |  |  |
| 5 | Autonomy | 3.77 | 1.39 | 0.17\*\*\* | 0.04 | −0.05 | 0.25\*\*\* | **0.69** |  |  |  |  |
| 6 | Sensation | 3.85 | 1.33 | 0.26\*\*\* | 0.09 | 0.03 | 0.52\*\*\* | 0.51\*\*\* | **0.64** |  |  |  |
| 7 | Perceived Value | 4.21 | 1.48 | 0.21\*\*\* | −0.05 | 0.01 | 0.36\*\*\* | 0.44\*\*\* | 0.54\*\*\* | **0.60** |  |  |
| 8 | Age | 0.62 | 0.49 | 0.02 | 0.03 | −0.04 | 0.01 | 0.11\*\* | 0.11\*\* | 0.08 | - |  |
| 9 | Gender (male) | 0.45 | 0.50 | 0.04 | −0.02 | 0.08 | 0.05 | −0.07 | 0.00 | 0.04 | -0.16\*\*\* | - |
| N = 330; \*p < 0.1; \*\*p < 0.05; \*\*\*p < 0.01; StD = Standard Deviation; Square root of AVE (bolded cells) |

|  |
| --- |
|  **Table A6.** Measurement items (Study 2) |
| **Construct** | **Items** |
| Competencea (Sheldon et al. 2001)(⍺ = 0.90; CR = 0.90) | I could have tested a skill of mine on the website. I could have mastered a challenge on the website.The website could have given me feedback on my skills. |
| Autonomya (Sheldon et al. 2001)(⍺ = 0.86; CR = 0.87) | On the website, I felt… ... that my choices would be based on my own interests. ... that I would be free to do things my own way.... that my choices could have expressed my "true self." |
| Sensationa (Deng and Poole 2010; Sheldon et al. 2001)(⍺ = 0.87; CR = 0.88) | The website could have offered me a pleasant activity. I could have felt enjoyment on the website.I could have had a positive experience on the website.I could have experienced a feeling of hope on the website. |
| Perceived Value(Kim and Kankanhalli 2009)(⍺ = 0.81; CR = 0.83) | The discount offered on the website justifies the effort required to register. The offered discount size seemed attractive to me.The discount offered on the website improved the value proposition to customers. |
| Perceived Skill Requirement | Getting a discount on the website would require using my skills. |
| Perceived Luck Requirement | Getting the discount on the website would require getting lucky. |
| *Note: Items were measured using a 7-point Likert-type scale ranging from strongly disagree (1) to strongly agree (7); ⍺ = Cronbach’s alpha; CR = composite reliability.* a *Consistent with previous IS research that adjusted the tense of items (e.g., McKnight et al. 2004), we phrased items to reflect the forgone nature of not actually experiencing the activity and the reward conferral by using the conditional “could have.”* |

# **E Common Method Bias**

We performed several analyses and tests to assess whether any potential CMB occurred. First, high construct correlations indicate CMB (Podsakoff et al. 2003). The highest correlation between measured constructs was 0.54, which is sufficiently lower than the proposed threshold of 0.90 (Bagozzi et al. 1991). Second, a Harman’s single-factor test (Podsakoff et al. 2003) revealed that the majority of the variance could not explained by one particular factor. In particular, neither did one general factor account for more than 50% of the total variance, nor did a single factor result from an exploratory factor analysis (one factor explained, at most, 35.4% of the variance in the data (Podsakoff et al. 2003). Finally, we conducted a full collinearity test, indicating that the VIF for each factor was below 1.4 and did not exceed the suggested threshold of 3.3 (Kock 2015). Overall, the performed analyses do not indicate that CMB is an issue for the results of Study 2.

# **F Randomized Online Experiment - Model-Free Evidence**

The results presented in Table A7 indicate that a *Gamified MRD* *with Certain Rewards* has a significant higher *Registration Rate* than a *Non-Gamified MRD*. Likewise, a *Gamified MRD* *with Chance-based Rewards* has a significant higher *Registration Rate* than a *Non-Gamified MRD* does.

**Table A7**. Model-free evidence (Study 2)

|  |  |  |
| --- | --- | --- |
| Reward Design | *Registration Rate* | F-Statistics of One-Way ANOVAs of the Mean Comparisons |
| *Non-Gamified MRD* as Baseline |
| *Registration Rate* |
| *Gamified MRD with Chance-based Rewards* | 26.5% | 10.14\*\*\* |
| *Gamified MRD with Certain Rewards* | 18.3% | 2.97\* |
| *Non-Gamified MRD*  | 10.1% | - |
| Note: \* p < 0.1 ; \*\*p < 0.05; \*\*\*p < 0.01 |

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