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ORIGINAL ARTICLE

How does gamification affect customer behavior and revenue?

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Abstract

Many e-tailers use gamification to boost engagement across the customer journey, yet it remains unclear how specific gamified actions influence customer behavior and revenue. In this study, we use quantitative methods to explore the impact of various gamification actions, such as subscribing to newsletters, adding items to a wish list, liking, sharing, and commenting on social media. Our field study reveals distinct effects: subscribing to newsletters and writing product reviews shorten the time between purchases but do not increase revenue. Adding items to a wish list is associated with lower purchase frequency and reduced spending. In contrast, liking and sharing content increase purchase frequency and lead to greater spending. These findings highlight the importance of designing gamification strategies to engage customers and support revenue growth.

Keywords E-tailing · Gamification actions · Customer behavior · Revenue · Personal and social value

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1 Introduction

Creating engaging customer experiences is key for a retailer's success. Firms have increasingly gamified such experiences to create awareness, motivation, and strong connections with their customers (Hofacker et al., 2016). The gamification market in the US is projected to reach $37 billion by 2027 and further expand to $89.75 billion by 2031 (Fortune, 2024). Firms are devoting substantial effort to the development and design of efficient gamification practices. For example, with Training Club apps, Nike gamifies workouts, offering badges for completing milestones, challenges, and achievements that users can share with friends. This has created a highly engaging community around fitness and Nike products (Castro-Sloboda, 2024). The Starbucks Rewards program uses a point-based system that encourages repeat visits. Customers earn "Stars" for every purchase, which they can redeem for free items (Park, 2024). Although many companies are successful with their gamified activities, gamification is not universally successful in reaching business objectives, such as increasing revenues (Liu et al., 2017).

Gamification offers an escape from routine (McGonigal, 2011) and can enhance key retail outcomes such as repurchase, customer retention, and in-store engagement (Hofacker et al., 2016). It can be embedded throughout the customer journey, pre-, during, and post-consumption, by incentivizing behavior through points, rewards, and progress (Silva et al., 2023). Past research has primarily investigated the impact of gamification and related interactive features on user behavior and engagement across various digital platforms. Gamification effectiveness is shaped by perceived usefulness, social influence (Yang et al., 2017), value perceptions (Hsu & Chen, 2018), information disclosure, and perceived goal progress (Mou et al., 2025; Eisingerich et al., 2019). Benefits like epistemic, social, and personal integrative value boost engagement (Torres, Augusto, & Neves, 2022; Jang et al., 2018), while co-creation elements such as leaderboards show mixed effects in competitive settings (Leclercq et al., 2018). A growing body of research has begun to examine psychological mechanisms that explain why gamified experiences influence consumer behavior. Several studies highlight competence, autonomy, relatedness, and enjoyment as core psychological drivers in gamified environments (Bitrián et al., 2021; Xu et al., 2020). Additional work emphasizes states like narrative transportation (Vega & Camarero, 2024), flow, as well as perceptions of ease-of-use, particularly in utility-driven applications such as e-banking (Rodrigues et al., 2016) and sustainability platforms (Whittaker et al., 2021). Most prior work has focused on attitudinal outcomes such as user satisfaction, brand loyalty, and behavioral intentions (e.g., Tsou & Putra, 2023; Dzandu, Hamu, & Amegbe, 2022). Blanchard & Palazzolo's (2024) field study adds to this stream by investigating the discontinuation of gamification in financial services and how it affects previously incentivized behaviors in the mobile banking industry. Table 1 shows key contributions on gamification in marketing literature.

Adopting an exploratory approach, we offer a concrete assessment of the impact that gamification actions have on customer behavior and revenues. Specifically, we aim at understanding what kind of gamification actions are more effective in triggering behavioral responses and revenues. Based on our data, we consider gamification actions such as subscribing to the newsletter, adding products to a wish list, writing

Table 1 Most relevant studies on gamification

Authors	Context	Methodology	Theoretical framework	Independent variables	Dependent variables			Main findings
					Attitude and intentions	Actual Behavior	Revenues	
Mou et al. (2025)	E-commerce	Survey-based study	Stimulus-Organism-Response model	Functional rewards, social rewards, information disclosure, perceived goal progress	✓			Functional and social rewards increase user stickiness on e-commerce platforms through self-identification. This effect is stronger when users perceive goal progress and willingly share personal information.
Blanchard and Palazzolo (2024)	E-banking	Natural experiment	None	Reward module (spins of a prize wheel, raffle tickets, scratch cards, or in-app currency or points)		✓		Discontinuing a gamification app led to a 20% drop in logins, an 18% decline in bill payments, and a 31% decrease in on-time loan repayments among its users.
Vega and Camarero (2024)	Websites	Lab experiments	Narrative transportation	Gamified brand storytelling (versus non-gamified storytelling), level of interactivity within the gamified storytelling	✓			Gamified brand storytelling boosts narrative transportation, informativeness, and entertainment, enhancing brand attitudes and word-of-mouth.
Tsou and Putra (2023)	Mobile apps	Survey-based study	Stimulus-Organism-Response model	Rewards, challenges, points, and enjoyment	✓			Challenges, points, and enjoyment in gamification boost customer engagement, which in turn enhances brand love, especially when immersion is high.
Dzandu et al. (2022)		Survey-based study	Social impact theory, customer value theory	Gamified mobile payment	✓			Gamification has a positive relationship with internalization, compliance, and identification, affecting customer value

Table 1 (continued)

Authors	Context	Methodology	Theoretical framework	Independent variables	Dependent variables			Main findings
					Attitude and intentions	Actual Behavior	Revenues	
Bitrián et al. (2021)	Mobile apps	Online survey, partial least squares regression	Self-system model of motivational development	Achievement-, progression-, social-, immersion-oriented game elements	✓			Gamification enhances user engagement through competence, autonomy, and relatedness. User engagement positively influences continued use intention, WOM intention, and app rating.
Sreejesh et al. (2021)	Advertising	Lab experiments	Uses and Gratifications theory, Media richness theory, Flow experience	Access platform Gaming device Elaboration likelihood	✓			The access platform and gaming device influence brand memory and brand attitude, with cognitive elaboration improving memory and flow experience mediating the effects on brand attitude.
Torres, Augusto, & Neves (2022)	Websites	Qualitative analysis, structural equation modeling	Perceived value theory	Utilitarian, hedonic, and social value	✓			Brand love is crucial for brand loyalty but may not be as important for positive WOM. Different combinations of perceived value dimensions of gamification can lead to the desired outcomes.
Whittaker et al. (2021)	Sustainable behavior	Field study	Gamification and Value-in-Behavior	Flow	✓			Flow influences customer engagement and value-in-behavior, with customer engagement partially mediating the relationship. Customer engagement enhances the creation of value-in-behavior and indirectly influences behavioral intentions for app replay and sustainable energy behavior.
Xu et al. (2020)	Online shopping website	Survey-based study, structural equation modelling	Cognitive Evaluation Theory	Game rewards, Absorption, Autonomy	✓			Game rewards, absorption, and autonomy of gamification positively enhance the sense of enjoyment, meeting psychological needs, and ultimately affecting online purchase intention.

Table 1 (continued)

Authors	Context	Methodology	Theoretical framework	Independent variables	Dependent variables			Main findings
					Attitude and intentions	Actual Behavior	Revenues	
Eisingerich et al. (2019)	Health apps, dating service	Semi-structured interviews	None	Social interaction, Sense of control, goals, progress tracking, rewards, prompts	✓			Hope is more strongly associated with customer engagement than compulsion.
Hsu and Chen (2018)	Online bookstore	Web-based survey Partial Least Squares	User experience, perceived benefit, value, Brand equity	Hedonic value, utilitarian value	✓			Gamification has an impact on utilitarian and hedonic features, which influence user experience, perceived benefits, value, brand loyalty, positive WOM, and resistance to negative information.
Jang et al. (2018)	Body exercise app	Multiple regression model, longitudinal data	Uses and gratifications model	Epistemic, social integrative, personal integrative benefits, age, experience, exercise duration, habit, variety		✓	✓	Gamified customer benefits, including epistemic, social integrative, and personal integrative benefits, positively influence exercise engagement and purchase behaviors. The effects of these gamified benefits on marketing outcomes vary by age and experience of the users.
Leclercq et al. (2018)	Co-creation community	Laboratory, field experiment	Equity theory	Competition, cooperation mechanics, losing a contest	✓			Losing a contest in gamified settings can have detrimental effects on customer experience and engagement.

Table 1 (continued)

Authors	Context	Methodology	Theoretical framework	Independent variables	Dependent variables			Main findings
					Attitude and intentions	Actual Behavior	Revenues	
Yang et al. (2017)	Chocolate cookie	Survey-based study, structural equation modeling, confirmatory factor analysis	Technology Acceptance Model, social influence, theory of reasoned action	Perceived usefulness, ease of use, social influence, enjoyment	✓			Perceived usefulness positively influences customers' intention to engage in gamification and their brand attitude, while perceived ease of use is not a relevant predictor. Perceived social influence is only associated with positive brand attitude. Perceived enjoyment is the strongest predictor of intention to engage and brand attitude. Engagement mediates the effect.
Rodrigues et al. (2016)	E-banking	Online survey	Technology Acceptance Model	Gamification, socialness	✓			Gamification and social cues have a positive impact on bank customers' intention to use gamified e-banking applications, with a focus on ease-of-use, usefulness, and enjoyment as psychological drivers of the positive relationship.
This research	E-tailer	Field study	Personal and Social Value	Gamified actions: Newsletter subscription, wish list, product reviews, liking, commenting and sharing		✓	✓	Gamified actions related to the wish list lowers revenue. While referrals and newsletter subscriptions do not impact revenue directly, they do shorten interpurchase time. Actions such as liking and sharing with others online increase both purchase frequency and spending.

product reviews, liking, commenting and sharing content with others. Decomposing these gamification actions enables us to isolate their individual effects and offer practical guidance on which actions warrant greater investment to optimize gamification efforts.

Responding to calls for more field-based research on the revenue impact of gamification (e.g., Morganti et al., 2017), we anchor our conceptual approach in established marketing literature that distinguishes between personal and social value (Hamari & Koivisto, 2015; Yang et al., 2017; Ciuchita et al., 2023). Personal value arises from cognitive benefits such as learning, skill development, and information acquisition, which help users build expertise with a brand, product, or service. Social value, on the other hand, emerges through interpersonal dynamics such as recognition, appreciation, and reciprocity. Although our study does not directly test these value types, our field data reflects actions consistent with both. Therefore, we use this distinction as a guiding lens to interpret how different gamification actions contribute to value creation. This approach enhances the clarity of our findings and provides a foundation for future theory development, while offering practical insights into how gamification can drive meaningful customer behavior and revenue outcomes.

We examined four key customer responses: interpurchase time, purchase frequency, spending per purchase occasion, and total spending. Through a partnership with a European e-tailer, we analyzed data from 4,896 users over two years using a propensity score matching (PSM) approach. Based on our findings we make the following contributions to past literature.

First, we find that activities such as subscribing to a newsletter reduces interpurchase time, encouraging quicker returns after a purchase. Users who write product reviews also show a reduction in interpurchase time, though this socially motivated activity does not impact purchase frequency or spending. Surprisingly, adding products to a wish list has a negative effect on purchase frequency and spending. Our work contributes to research on the effectiveness of online wish lists by presenting a nuanced perspective. Past research shows that adding a product to a wish list fosters anticipation of ownership, enhancing its evaluation and increasing the likelihood of purchase (e.g., Groening, Wiggins, & Raoofphana, 2021). However, we demonstrate that this is not always the case. When wish lists are gamified, where consumers add products to earn rewards, the anticipated ownership effect may be undermined, potentially resulting in no conversion to actual purchases.

Second, our research demonstrates that activities such as liking and sharing content online, positively impact key purchase outcomes, including purchase frequency, spending per occasion, and total spending. We advance theoretical understanding of social influence in digital environments (Hsieh & Tseng, 2018). Specifically, we contribute to the literature on social commerce by showing how interactive behaviors in a gamification context drive tangible financial performance for e-tailers. These insights provide a foundation for further exploration of how social dynamics in online retail contexts can amplify consumer spending behaviors, offering a nuanced view of the relationship between gamification actions that involve multiple users and economic value in digital environments.

2 Literature review

Building on prior research, we define gamification as the incorporation of game design elements into non-game contexts to enhance customer value and stimulate value-creating behaviors (Huotari & Hamari, 2017; Hofacker et al., 2016). To achieve these goals, firms can adjust various components of their gamification strategies, such as the mechanisms employed, the types of rewards offered, or the nature of the tasks presented (Hammedi et al., 2023).

A growing body of literature has identified key psychological mechanisms that support engagement in gamified environments. For instance, gamification mechanisms that satisfy users' needs for competence, autonomy, and relatedness have been shown to significantly increase engagement (Bitrian et al., 2021). However, not all gamification strategies yield positive outcomes. Leclercq et al. (2018) found that competitive mechanisms that result in users losing contests can have negative effects on customer attitudes and behavioral intentions, underscoring the importance of careful design choices.

Other studies highlight how rewards, both functional and social, can drive deeper user engagement. Mou et al. (2025) demonstrate that such rewards promote user stickiness on e-commerce platforms by fostering self-identification with the platform. Similarly, Xu et al. (2020) show that game rewards can enhance enjoyment and fulfill psychological needs, thereby increasing online purchase intentions. In a related domain, Blanchard and Palazzolo (2024) documented a significant decline in user activity, including logins, bill payments, and on-time loan repayments, following the discontinuation of a gamified app. The absence of previously available actions (e.g., spinning prize wheels, entering raffles, or scratching cards) led users to disengage, revealing the extent to which gamified features can support routine behaviors.

Extending this stream of research, we focus on how users create value through specific gamified actions such as subscribing to newsletters, adding products to wish lists, liking content, commenting, and sharing with others. These behaviors, often embedded into customer journeys, represent key opportunities for firms to generate both personal and social value through gamification.

Despite the popularity of gamification in practice, academic research offers mixed evidence regarding its overall effectiveness (Seaborn & Fels, 2015), especially in terms of the kinds of value it generates. While some studies emphasize the benefits and motivational power of gamification (Tanouri et al., 2019; Hammedi et al., 2023), others highlight potential drawbacks and unintended consequences. Much of the existing literature has focused on engagement with traditional gamification elements such as leaderboards, points, and badges, often neglecting the broader social dynamics of gamified actions. In particular, the social dimension of gamification, how actions like commenting and sharing influence behavior and revenue, remain underexplored. Incorporating these social behaviors into the study of gamification may offer a more nuanced understanding of what makes certain actions more engaging and effective.

In the following sections, we review the literature on personal and social value in gamification and empirically investigate the distinct effects of a range of gamified

actions (e.g., subscribing to a newsletter or sharing content with peers) that map onto these two categories of value.

2.1 Personal and social value in gamification

Several design elements can be used to motivate customers to engage in gamified activities. One the one hand, there are activities, such as creating an account or subscribing to a newsletter, that customers perform individually with consequences or benefits that are enjoyed personally. On the other hand, there are activities such as social media sharing that create a sense of cooperation while other activities such as earning badges or leaderboards that trigger competition among customers. In the latter case, perceived value depends on how others respond to one's gamified actions.

Past research has explored the epistemic and personal benefits of gamification, yielding mixed findings. Some studies report positive effects of gamified individual activities on learning outcomes (e.g., Armstrong & Landers, 2017), user motivation (e.g., Landers et al., 2017), behavior (e.g., Rodrigues et al., 2016; Ruiz-Alba et al., 2019), and engagement (e.g., Eisingerich et al., 2019). Conversely, other research has found no significant effects of gamification on personal value creation (e.g., Imlig-Iten & Petko, 2018). Furthermore, empirical evidence highlights potential negative outcomes associated with individual gamified activities, including excessive participation (Hammedi et al., 2017), stress (Yang & Li, 2021), and disengagement (Leclercq et al., 2018).

Similarly, gamifying socially relevant activities has been shown to yield both positive and negative effects. Social gamification can encourage community engagement and promote word-of-mouth by leveraging users' intrinsic motivations to connect and compete with others (e.g., Hamari & Koivisto, 2014). For example, leaderboards, team challenges, and social sharing features can encourage collaboration and friendly competition, enhancing the overall user experience and driving greater engagement with the brand (Hsu & Chen, 2018). However, negative effects can arise when these activities lead to excessive competition or social comparison. Studies have shown that such dynamics may result in decreased user satisfaction, stress, or disengagement, particularly when participants perceive the gamified environment as overly competitive or unfair (Sailer et al., 2017). Furthermore, users who fail to achieve desired social recognition may feel excluded, undermining the inclusive nature of the brand community (Tobon et al., 2020). Owing to the heterogeneity and, at times, contradictory nature of findings in the extant literature, it is not possible to establish a clear or univocal pattern of effects. Accordingly, we deem it more appropriate to formulate research questions that align with the particular dimensions under examination in this study.

2.2 Research questions

The existing literature on gamification antecedents highlights the importance of distinguishing between personal and social values generated through gamified activities to better understand user responses to gamification strategies. Most of these studies focus on attitudinal outcomes (e.g., brand attitude, engagement) and behavioral

intentions (e.g., purchase intention, word-of-mouth) with minor emphasis on their effects on revenue. Our study builds on prior contributions by adding a concrete layer of analysis that assesses the impact of specific gamification actions on customer behavior and revenues. Jang et al. (2018) adopt a related approach, examining how epistemic, social, and personal-integrative benefits affect exercise engagement and purchase behavior. Their findings show that age and user experience moderate the effects of these gamified benefits on marketing outcomes. In contrast, our study takes a more granular approach by leveraging activity-level data from a real-world e-tailer, focusing on specific gamification actions rather than broader conceptual categories.

From a managerial perspective, this approach offers practical insights into how common gamification elements can be strategically organized and deployed. However, not all actions among those that we consider, that is, adding products to the wish list, writing product reviews, subscribing to the newsletter, liking, commenting and sharing content, may contribute equally to customer behavior and revenue. This leads us to our central research question: Should firms expect different gamified actions to have varying effects on customer behavior and revenue? If so, what are the differential impacts of these actions across the two outcome dimensions?

To answer these questions, we use an exploratory, empirically driven approach (Golder et al., 2023) enabled by the analysis of an extensive and detailed dataset from a leading European e-tailer that implemented the above-mentioned range of gamified actions to engage customers throughout their shopping journey. The dataset provides valuable insights into how the different gamified actions, each falling in the distinctive dimensions of personal and social value, impact customer behavior and revenue. Activities like subscribing to the newsletter, adding products to the wish list, and writing reviews are primarily individual actions, while liking, commenting, and sharing involve greater social interaction among users. By analyzing these actions across various customer touchpoints, our study aims to offer practical recommendations for marketers seeking to optimize gamification strategies to enhance customer behavior (i.e., interpurchase time, purchase frequency) and drive revenue (i.e., spending per occasion, total spending).

3 Methodology

This study has the main objective of investigating whether gamification activities such as newsletter subscription, adding products to the wishlist, writing a product review, liking and commenting about content and sharing content with others decrease interpurchase time, and/or increase user's purchase frequency and spending.

3.1 Data and sample description

A large European e-tailer that sells household goods, electronics, and grocery products through the firm's website and mobile app provided the data of our field study. Registration on the online community and mobile app was purely voluntary and no financial incentives were given to users to sign up. We were able to monitor the behavior of a sample of 4.896 users for about two years (May 2012 - July 2014).

Users show an average participation in the e-tailer's gamification program of more than one year (M = 411.5 days; SD = 162.8, min = 70 days, max = 773 days).

3.2 Description of the gamification program

The e-tailer's gamification program was based on a reward system, consisting of badges, i.e., visual identifiers that reward users' achievements, that users could collect in several ways. When registering to the e-tailer's online community and app, users were provided with a welcome badge and could start to collect points and badges through the completion of missions. These badges were awarded when users completed missions (a set of specific actions that each user could perform at different levels). For example, when sharing the wish list via email, the user could win the "Passionate badge". Sharing the wish list twice granted the "Lover" badge, while four shares of the wish list allowed the user to obtain the "Devoted" badge. Similarly, writing product reviews weekly granted access to the "Jedi" badge (one review per week), "Obi One Kenobi" badge (two reviews per week), or "Joda" badge (six reviews per week). When the user reached a specific status (e.g., he/she completed all the available missions in a specific week) he/she could obtain additional badges (e.g., World Champion). Each badge corresponded to a certain number of points that could be converted into vouchers that varied in their monetary value (e.g., voucher of 5 euro for 50 points, voucher of 10 euro for 100 points, voucher of 150 euro for 1.000 points). Figure 1 shows examples of badges awarded to users.

3.3 Data preparation and descriptive analysis

We were able to track each activity that was completed by users since their registration to the online community. We obtained detailed information on the activities

Fig. 1 Examples of the visual badges awarded to users

and performance measures. Table 2 shows descriptives of the gamified actions and performance measures regarding the e-tailer's gamification program. Although we acknowledge that the gamified actions examined in this study do not encompass all potential strategies, our analysis is based on the actions captured by the e-tailer's data. Regarding the outcome variables measuring revenue, namely, total euros per purchase occasion and total euros spent, these figures include only the amount spent and exclude any value associated with rewards from gamified activities.

Subscription to the newsletter is the activity chosen most frequently (54.9%) followed by liking and commenting on social media platforms (25.1%), adding products to the wish list (19.9%), writing product reviews (5.8%), and sharing on social media (4.7%). On average each user purchased every 4 months (116 days), spent about 60.11 euro in each purchase occasion, purchased 1.35 times and spent a total of 96.66 euro in the observation time interval (May 2012 - July 2014).

3.4 Model specifications

We use propensity score matching (PSM) (Garnefeld et al., 2013; Gensler et al., 2012) to tackle the selection bias problem that arises when focusing on a subsample of respondents who participated in the gamification program. PSM allows us to create a matched sample of respondents who did not participate in any gamification activities. This method helps us achieve unbiased estimates of treatment effects. Specifically, we can assess whether users who participate in gamification generate more revenue than they would have if they had not taken part in this initiative. Furthermore, we can assess the differential impact of the specific gamification actions, that is, different activities that participants are asked to undertake to obtain badges (e.g., social media activities, reviews). In sum, we will use propensity scoring to calculate

Table 2 Descriptives of gamification actions, customer behavior and revenue measures

Gamification actions	Value	Frequency
Subscribing to newsletter	Personal	54.9%
Liking and commenting content	Social	25.1%
Adding products to wish list	Personal	19.9%
Writing product reviews	Social	5.8%
Sharing content with others	Social	4.7%
Other		1.4%
Customer behavior and revenue		**Mean, 25%, median, 75%**
Interpurchase time		116 days (25% = 41, median = 86, 75% = 157)
Frequency of purchase		1.35 (25% = 1, median = 1, 75% = 2)
Total euro per purchase occasion		60.11 euro (25% = 32.70, median = 40.85, 75% = 68.78)
Total euro spent		96.66 euro (25% = 40.60, median = 54.90, 75% = 102.90)

the treatment effect on the treated (TT) which consists in assessing whether customers who participate in gamification overall generate more revenues than they would have if they had not taken part in this initiative. Second, we will also use PSM analysis to assess what the differential impact of the specific gamification actions are, that is, the actions that participants are asked to undertake to obtain badges (e.g., social media activities, reviews, etc.).

PSM begins with the estimation of a propensity equation that determines whether the customer participated or not to a specific gamification action *j*. Then the propensity (or probability) of each customer to participate is modeled using a probit defined as follows:

$$\text{Prob}\left(\text{GamificationAction}_{\text{i}}^{\text{j}}\right) = \text{Prob}(\alpha + \text{X}_{\text{i}}\beta + \varepsilon_{\text{i}} > 0) \tag{1}$$

where α is a constant, X_i consists of a vector of county-level demographic variables (e.g., average household size, internet access, etc.) and controls for observable differences across customers in our sample[1], β represents the sensitivity to these variables. Then for each customer who selects the gamification action *j*, the propensity matching algorithm finds a non-participating customer with a similar propensity score. If the matching is successful, the groups will be matched on the observed variables that go into the propensity score. We use a kernel-Gaussian matching algorithm, which compares each treated unit with a matched outcome given by a kernel-weighted average of the outcome of all non-treated; higher weights are given to non-treated unstness of our results by replicating the analysis using differentits with scores closer to that of the treated individual[2].

We considered four different outcome variables to assess the value of the gamification strategy: the inter-purchase time, number of purchase occasions, and average amount in euro spent per purchase and, total euro spent). For example, if we focus attention on a specific gamification action *j* (e.g., subscribing to the newsletter) and the inter-purchase time as a dimension of value, TT_{j} can be computed as follows (Verbeek, 2008, pp. 253–257):

$$\begin{aligned}\text{TT}^{\text{j}} =& \text{E}(\text{InterpurchaseTime}_{1\text{i}} - \text{InterpurchaseTime}_{0\text{i}} \mid \\ & \text{GamificationAction}_{i}^{j} = 1)\end{aligned} \tag{2}$$

Where the expectation is overall users who selected gamification action *j*. We define $\text{GamificationAction}_{\text{i}}^{\text{j}} = 1$ if customer *i* selects action *j* (e.g. subscribes to the newsletter); 0 if customer *i* does not select gamification action *j*; $\text{InterpurchaseTime}_{ji}$ = inter-purchase time of customer *i* if that customer selected gamification action *j*; $\text{InterpurchaseTime}_{0i}$ = inter-purchase time of customer *i* if that customer did not select action *j*.

[1] The company provided us a zip code indicating the area of residence of each individual in our database, therefore we were able to collect data from the 2014 National Census County level database. A similar approach was used by Manchanda et al., (2015).

[2] We checked the robu matching approaches (e.g. single nearest-neighbor, Mahanolobis distance). We selected the approach that minimizes the bias.

Equation (2) requires starting at the user level and requires the estimation of the unobserved counterfactual $\mathrm{E}\left[\mathrm{InterpurchaseTime}_{0i}|\mathrm{GamificationAction}_i^j = 1\right]$. We cannot randomly manipulate customers who select gamification action *j* to re-set themselves and not select this gamification action.

We implement the kernel-Gaussian PSM procedure in STATA and begin with the estimation of a probit model that determines the propensity (or probability) that the customer participated in a specific action *j* (e.g., add product on a wish list). The estimation of this model provides the propensity score of each customer. We, therefore, estimated *J* probit models (one model for each gamification action *j*) and tested both the fit and the predictive accuracy of each model through a lift chart analysis. Specifically, we randomly select 50% (2,448 individuals) for in-sample estimation and the remaining 50% for out sample prediction. Figure 2 shows a good lift; for example, in that observed dependent variable (i.e., adding a product on a wish list) declines monotonically by decile, and the top decile is approximately 1.5 times more likely to add a product on a wish list than the average.

In Table 3, we compare means and variances of the X covariates for the "treated" group (i.e., those customers who participated in the gamification program and selected an action *j*), and control group (i.e. the matched composites of non-participating customers). For example, the average percentage of large retailers in the living area of those who selected gamification action *j* is 18.46% and 18.27% for the matched control group. If the propensity matching is successful, the means for the column named "Treated" and "Control" should be equal, since the composites of non-participating customers are supposed to serve as controls for participating customers. T-test analysis of the difference between the two means for each considered variable indicates that there are no significant differences between the treated and control groups (all p-values > 0.10).

Variances for the treated and control group provide details on the distribution of the covariates. When the distribution of a covariate is the same for all treatment levels, the covariate is said to be balanced. Data shows that treated and control groups

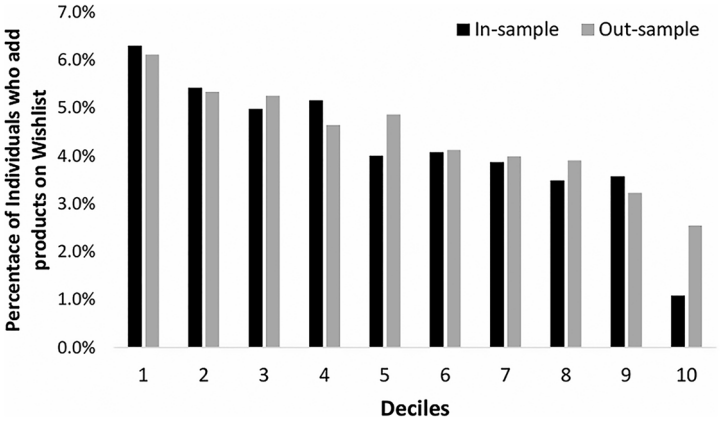

Fig. 2 Illustrative example of lift chart based on adding a product on the wish list

Table 3 Variable matching analysis for newsletter subscription

Variable names[a]	Description	Mean		Variance	
		Treated[b]	Control[c]	Treated[b]	Control[c]
Large retailers	% of large retailers in the area	18.46%	18.27%	0.0019	0.0019
Internet access	% of households in the area with good internet access in the area	65.71%	65.53	0.0015	0.0016
Online banking	% of households with online banking services	39.49%	39.46%	0.0040	0.0041
Online purchase of groceries	% of households purchasing groceries online	6.29%	6.34%	0.0001	0.0001
Mobile web access	% of households with web access	44.08%	43.76%	0.0023	0.0023
Online purchase of goods	% of households purchasing household goods online	25.52%	25.57%	0.0007	0.0006
Online purchase of travel and holidays	% of households purchase travel and holidays services online	39.50%	39.34%	0.0038	0.0037
Posting on social media	% of people posting on social media	59.70%	59.50%	0.0018	0.0018
Street vendors area	Average presence of street vendors	23.97	23.74	52.12	48.13
Household size	Household size	2.35	2.36	0.0132	0.0164
Relationship duration	Duration of the relationship in days	516.23	521.00	28,098	29,787

[a] county-level statistics.

[b] represents the group of individuals who selected the gamification action *j*

[c] represents the matched composite group of individuals who did not select the gamification action *j*

are similar also in terms of variance. The matched sample results indicate that matching on the estimated propensity score balanced the covariates. This suggests that the weighting produces composites of non-participating customers who are equivalent in terms of both average and variance to participating customers.

Figure 3 reports the percentage of bias of the matched and unmatched control groups and shows that the percentage of bias of the matched control group is negligible. For illustrative purposes and because results are consistent across our gamified actions, we report results for the newsletter subscription only.

4 Findings

Using the Kernel-Gaussian PSM procedure, $E[InterpurchaseTime_{1i} | GamificationAction^{j}{}_{i}=1]=127.09$, and $E[InterpurchaseTime_{0i} | GamificationAction^{j}{}_{i}=1]=107.65$. From Eq. (2), the average treatment effect on the treated (TT^{j}) is, therefore 127.09–107.65 = -19.44. Thus, the average inter-purchase time for users selecting action *j* is 19.44 days shorter compared to if they had not selected action *j*. TT^{j} is statistically different from zero (SE = 8.15, $t=-2.38$, $p<.001$). Table 4 reports the estimate of TT showing the overall TT for participation in the gamification program. Each user

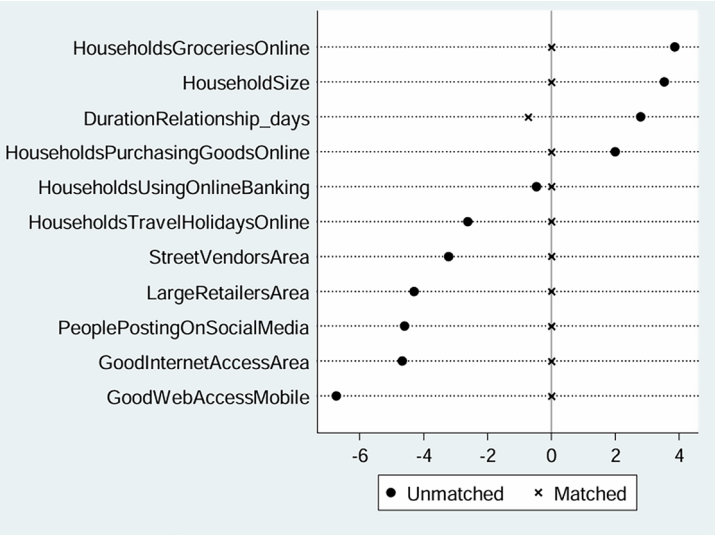

Fig. 3 Percentage of bias of unmatched versus matched groups

Table 4 Overall participation in the gamified program

Gamified actions	Customer behavior				Revenues			
	Interpurchase time		Frequency of purchase		Total euro per purchase occasion		Total euro spent	
	TT (days)	*t*	TT	*t*	TT (euro)	*t*	TT (euro)	*t*
At least one gamified action	−13.59	−1.41	−0.01	−0.23	−2.68	−1.21	−3.50	−0.84
At least two gamified actions	1.45	0.15	0.01	0.30	−1.28	−0.62	1.41	0.32
At least three gamified actions	−3.86	−0.32	0.05	0.78	1.81	0.54	7.89	1.20

Sig.: $^{**}p < .05$, $^{*}p < .10$

included in our sample is enrolled for the gamification program because we have data on customers who registered with the online community and received a welcome badge. After registration, users can decide to undertake specific "missions" to obtain badges and points. 75% of our sample completed at least level 1 of a mission and received an additional badge. Table 4 shows that there is no difference in terms of interpurchase time, the amount spent per purchase occasion and frequency of purchase between those who participated having at least one badge and those who did not. Similarly, no significant TT is observed for those who obtained at least two badges or three badges. These results provide preliminary indication that the gamification program *overall* did not contribute to substantive revenues growth for the firm and that this effect did not vary with the intensity of the participation.

However, when considering gamified actions individually rather than collectively, the results show that consumers' differing levels of participation in specific gamified activities produced distinct outcomes (see Table 5).

Table 5 Results of gamified actions on customer behavior and revenues

Gamified actions	Customer behavior				Revenues			
	Interpurchase time		Frequency of purchase		Total euro per purchase occasion		Total euro spent	
	TT (days)	*t*	TT	*t*	TT (euro)	*t*	TT (euro)	*t*
Subscribing to newsletter	**−19.44****	**−2**.38	0.01	0.23	0.03*	−0.26	1.81**	0.51
Adding products on Wishlist	17.15**	0.72	**−0.16****	−3.46	**−10.40***	−1.72	**−13.16****	−1.91
Writing product reviews	**−31.31****	**−2**.79	0.18**	1.65	7.46*	−0.97	22.39**	1.63
Commenting	**−1**1.25**	**−0**.55	0.09**	−0.51	5.93*	−0.57	6.73**	0.54
Liking	**−1**5.25**	**−1**.09	0.09**	1.06	**8.95***	−1.88	**17.49****	1.91
Sharing	−7.20**	**−.3**9	**0.21****	1.85	**9.51***	−1.83	**26.07****	2.38

Sig.: $^{**}p < .05$, $^{*}p < .10$

Most gamified actions significantly contribute to generating higher revenues for the company. Specifically, subscription to newsletters significantly contributes to shortening the inter-purchase time (β = -19.44, $p < .05$). This means that customers who earn points after subscribing to the newsletter will return about 20 days earlier to repurchase. Similarly, writing a product review on the website reduces the average interpurchase time even further (β = -31.31, $p < .05$), meaning that customer will return about a month earlier after the previous purchase.

Concerning social media engagement, liking and sharing content have both a positive and significant effect on euro spent per purchase occasion ($\beta_{Liking} = 8.95$, $p < .10$; $\beta_{Sharing} = 9.51$, $p < .10$) and total euro spent by customers ($\beta_{Liking} = 17.49$, $p < .10$; $\beta_{Sharing} = 26.07$, $p < .05$). Adding products to the wish list, which is an activity that we define as personally oriented as it does not involve competition or cooperation with other customers involved in the gamification program, presents surprising counter-intuitive effects. Asking customers to add a product to the wish list to obtain points seems to lengthen the time for repurchase (β = -19.44, $p < .05$), and significantly decrease both the frequency of purchase ($\beta = -0.16$, $p < .05$) and amount spent per purchase occasion (β = -13.16, $p < .10$).

These findings suggest that managers should carefully design gamified actions to effectively influence customer behavior and drive revenue growth. In particular, our results highlight the importance of prioritizing socially-oriented gamified activities, such as writing reviews or sharing content, which are consistently associated with more frequent purchasing and higher spending. These actions likely foster a sense of community, visibility, and commitment, leading to deeper engagement and greater financial returns. In contrast, more individualized or passive actions, such as wishlisting, may not translate into meaningful commercial value and could even indicate disengaged browsing rather than intent to purchase. We further elaborate on the managerial and theoretical implications of these insights, along with key limitations and directions for future research, in the following section.

5 General discussion

This research investigated the effect of gamified actions on customer behavior and revenue. Gamification was implemented by the e-tailer through a reward system based on badges that customers could earn based on their participation in the gamification program. Observing customers' behavior across a two-years interval, we were able to assess the effectiveness of the gamified actions on four key performance measures: Interpurchase time, frequency of purchase, total amount spent per occasion, total amount spent. In the next paragraphs, we detail the managerial and theoretical implications of this work and identify limitations and future research directions that could further advance literature on gamification effectiveness.

5.1 Theoretical implications

This research contributes to the literature on gamification and consumer behavior in e-commerce by offering nuanced insights into how gamified actions influence customer behavior and revenue outcomes. First, we contribute to the debate on the contrasting findings related to gamified activities that entail personal and social value (e.g., Hsu & Chen, 2018; Hammedi et al., 2017). Past research provides evidence on the positive and negative effect of gamification based on the distinction between individual and social benefits that drive customer's motivation to engage in gamification programs. Most of these studies which focus on customer's attitudinal and behavioral responses are based on qualitative methods (e.g., semi-structured interviews; Eisingerich et al., 2019) or quantitative methods (e.g., surveys and lab experiments; Bitrián et al., 2021). Using field data by a European e-tailer, we show that activities that generate personal and social value exert differential effects on customer behavior and revenue measures. For example, our findings reveal that actions such as adding a product to the wish lists can have unintended negative consequences on revenue, challenging the assumption that all gamification strategies are inherently beneficial.

Second, by demonstrating how gamified actions influence customer behavior and revenue, our research contributes to the literature on customer journey management and customer experience, which recognize the importance of sustained engagement and touchpoint optimization over time (Lemon & Verhoef, 2016). Our findings highlight the differential impact of gamified actions on various aspects of the customer journey. While some actions, such as referrals and newsletter subscriptions, may not directly increase revenue, they contribute significantly to customer retention by shortening interpurchase intervals. This insight broadens existing theoretical models of gamification by incorporating temporal effects and recognizing indirect pathways through which gamified behaviors create customer and firm value.

Finally, the observed positive effects of gamified actions such as liking and sharing on purchase frequency and customer spending underscore the pivotal role of social dynamics in gamification. By identifying social media engagement as a significant driver of financial outcomes, this study contributes directly to the social commerce literature (Yadav et al., 2013), which examines how social interactions within online platforms influence consumer purchasing behavior. Our findings extend this body of work by empirically demonstrating how gamification mechanisms that encourage

social participation amplify network effects and social influence, ultimately enhancing monetary outcomes in e-commerce settings. This integration refines current theoretical perspectives on gamification's role in consumer behavior by highlighting the necessity of strategically aligning the nature of the gamified social value with the firm's targeted business outcomes.

5.2 Managerial implications

This study offers empirically grounded insights for managers seeking to leverage gamification as a strategic tool to enhance revenue outcomes in e-commerce contexts. The findings demonstrate that gamified actions can differentially affect key performance metrics, such as purchase frequency, inter-purchase time, and customer spending, underscoring the importance of aligning gamification design with specific business objectives.

First, managers should exercise caution in promoting personally oriented gamified actions that do not directly encourage transactional behavior. In particular, incentivizing customers to add products to wish lists was found to have counterproductive effects, significantly delaying repurchase and reducing both purchase frequency and average spending. These findings suggest that such actions may inadvertently foster browsing without conversion. As such, firms should either redesign the wish list feature to promote purchase (e.g., through targeted reminders or time-sensitive offers) or deprioritize it within their gamification architecture.

Second, the results highlight the strategic value of socially oriented actions, such as liking and sharing content, which significantly enhance both per-purchase expenditure and total customer spend. These findings support the integration of social engagement mechanisms within gamification programs, particularly when aiming to increase customer lifetime value. Managers are advised to develop intuitive user interfaces and provide meaningful incentives for content interaction to amplify these effects.

Third, certain contribution-based actions, specifically newsletter subscriptions and product reviews, emerge as effective in shortening inter-purchase intervals, prompting earlier return visits. While these actions may not immediately increase spending per occasion, they play a vital role in sustaining engagement and stimulating purchase frequency. Firms may consider coupling these actions with personalized campaigns or exclusive loyalty rewards to further encourage conversion.

Finally, given the heterogeneous effects of different gamified actions, firms should implement systematic tracking mechanisms to monitor both behavioral engagement and corresponding financial outcomes. Rather than assuming that all gamified features generate value uniformly, managers should establish KPIs tied to key business metrics (e.g., frequency, average basket size, time to next purchase) and continuously evaluate the financial impact of each gamified element. This iterative assessment allows for timely recalibration of gamification strategies to ensure alignment with evolving revenue and retention goals.

Collectively, these findings underscore the need for a nuanced and data-driven approach to gamification, one that differentiates among action types and links them to targeted performance outcomes. By carefully balancing the design of personal and

social gamified activities, and by continuously monitoring their effects on customer behavior and firm performance, managers can more effectively harness gamification not only as a tool for engagement but also as a lever for sustained revenue growth.

5.3 Limitations and future research

This study offers valuable insights into the revenue implications of gamified actions in e-commerce, yet several limitations provide opportunities for future research. First, the study relies on field data from a specific e-tailer context, which may limit the generalizability of the findings across different industries or cultural settings. Future research could explore how gamified actions impact revenues in other sectors, such as services or offline retail, as well as in diverse cultural contexts where consumer preferences and behaviors may differ.

Second, in this work we adopted PSM to control for self-selection bias. Notably, although PSM enhances causal inference relative to simple observational analyses, it cannot definitively rule out reverse relationships, particularly in the presence of unobserved variables.

Third, while the study distinguishes between personal and social value in gamification, it does not empirically examine the impact of these two higher-order constructs. Furthermore, potential moderating factors, such as consumer personality traits or the level of customer familiarity with the brand are not considered in this work. Future research could investigate how individual differences or brand loyalty influence the effectiveness of gamified actions on engagement and revenue outcomes.

Fourth, this research focuses on direct and temporal revenue effects but does not account for longer-term outcomes, such as customer lifetime value or brand advocacy. Future studies could adopt longitudinal approaches to assess how gamification strategies shape sustained consumer relationships and overall profitability.

Finally, given that this study was a field experiment, testing potential mediators was not feasible. However, future research should prioritize examining psychological mechanisms to better understand why certain gamification effects occur. For instance, while actions like subscribing to newsletters and writing product reviews shorten the time between purchases, they do not necessarily lead to increased revenue. These actions may boost consumer engagement, leading to more frequent visits and quicker repurchasing, but without increasing spending per transaction. This could be explained by habit formation, where consumers buy more frequently out of routine but not necessarily spend more. Additionally, regular exposure to marketing messages can trigger emotional responses that prompt quicker, impulsive purchases, but these may lead to more frequent, smaller purchases rather than larger ones. Furthermore, we find that adding items to a wish list is associated with lower purchase frequency and reduced spending, which is consistent with the research by Popovich and Hamilton (2021). Their study suggests that when consumers add products to a wish list, they initially assign greater importance to certain attributes, but this emphasis diminishes when they later decide to make a purchase, thereby reducing the likelihood of buying. While Popovich and Hamilton (2021) conducted experiments in a non-gamified context, our study extends their findings to a real-world gamified setting, employing objective measures such as revenue.

Table 6 Future research questions

Dimension	Future research questions
Psychological mechanisms	• Which psychological mechanisms explain why certain gamified behaviors, such as newsletter subscriptions or product reviews, lead to shorter repurchase intervals but not necessarily increased spending per transaction? • How do personal versus social value perceptions mediate consumer responses to different gamified actions?
Individual and brand-related moderators	• How do consumer personality traits moderate the effectiveness of gamified actions on engagement and revenue? • What role does customer familiarity or brand loyalty play in shaping the impact of gamification on purchasing behaviors? • What role do impulsivity and self-control play in moderating spending behavior in response to gamified incentives?
Customer journey and long term-effects	• What are the long-term effects of gamified actions on customer lifetime value and brand advocacy? • How do gamified actions influence distinct phases of the customer journey, from awareness to advocacy? • How do synergistic effects emerge when multiple gamified actions are combined within a customer journey framework?
Contextual generalization	• How do gamified actions impact revenue outcomes across different industries beyond e-commerce, such as services or offline retail? • To what extent do cultural differences influence consumer responses to gamification strategies in diverse markets?

As gamification evolves and is applied to an increasingly diverse array of contexts, its potential to influence consumer behavior, foster engagement, and improve marketing effectiveness becomes more evident. This expanding body of research offers a valuable opportunity for future studies to investigate the psychological mechanisms, contextual factors, and long-term effects of gamified strategies. Our study contributes to this effort by examining multiple gamification actions alongside a variety of outcome variables, thereby highlighting the importance of adopting both a piecemeal approach, focusing on the specific underlying mechanisms driving each gamified action, and a gestalt perspective that considers how these actions and their related key performance indicators (KPIs) interact synergistically within a broader strategic framework. Such an integrative approach is crucial for advancing a more nuanced understanding of the multifaceted relationships underpinning gamification's impact on consumer behavior and firm outcomes. To facilitate this, in Table 6, we propose several research questions aimed at guiding future investigations.

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Declarations

Ethical approval This research did not involve any identifiable human participants, and no informed consent was required.

Conflicts of interest The authors declare that there are no conflicts of interest.

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