

Examining the Boundary Condition of Customer Co-Creation: Customer Engagement

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This study addresses two questions: (1) How do customers' risk tolerance and relationship age moderate the effect of customer engagement on customer co-creation? (2) How can new product success be influenced by engaging customers in the co-creation process? Based on the current literature, the study develops a framework that links customer engagement, co-creation, customers' risk tolerance, relationship age, and new product success. Data were collected from customers involved in the co-creation process. Structural equation modelling was used to test the study hypotheses. The findings reveal that customer engagement has a significant positive impact on customer co-creation, suggesting that engaged customers are more likely to contribute actively to the development of new products. This relationship is further strengthened when customers demonstrate higher risk tolerance and when their relationship with the firm is longer. Moreover, the results show that customer co-creation significantly enhances new product success, underscoring the value of involving customers in innovation processes to improve performance outcomes. These insights offer important implications for managing customer relationships and designing effective co-creation initiatives.

Keywords: Customer engagement, Customer co-creation, Risk tolerance, Relationship age.

1. Introduction

Growing scholarly attention has been devoted to the importance of customer engagement in value co-creation (Morgan and Anokhin, 2023; Prahalad and Ramaswamy, 2004; Storey and Larbig, 2018; Wei *et al.*, 2021). In today's business environments, customer preferences and needs evolve rapidly (Marco-Lajara *et al.*, 2023; Rahman *et al.*, 2023; Qu and Mardani, 2023). This dynamic poses a significant challenge for firms, as products can quickly become outdated (Rahman *et al.*, 2023), underscoring the need to capture shifts in customer preferences (Bae *et al.*, 2023). To stay relevant, firms must continuously gather and absorb timely customer insights to identify current and future needs (Liang *et al.*, 2022; Qu and

Mardani, 2023). Accordingly, firms are encouraged to promote consumer-driven new product development (NPD) and foster co-creation efforts to enhance their responsiveness (Marco-Lajara *et al.*, 2023; Sonja *et al.*, 2022; Morgan and Anokhin, 2023).

Although research on customer engagement in co-creation has advanced considerably, significant gaps remain. First, the literature provides inconsistent evidence regarding its impact on new product performance. While some studies demonstrate that engaging customers contributes positively to product success (Chang and Taylor, 2016; Feng *et al.*, 2014), others report weak or negative effects (Carbonell *et al.*, 2009; Menguc *et al.*, 2014). This divergence highlights that the mechanisms linking engagement to outcomes are still unclear and may depend on unexamined contextual or individual factors. Second, prior research has often assumed a straightforward relationship between engagement and outcomes, overlooking the possibility that this link is shaped by more complex individual and relational influences. For example, Hoyer *et al.* (2010) and Nambisan and Baron (2009) noted that participation in co-creation is subject to self-selection, suggesting variability in customers' willingness to contribute. Despite this recognition, few studies have examined how and when engagement leads to co-creation. In particular, two potentially important moderators - customers' risk tolerance and relationship age - have been largely overlooked. While some work has shown that relationship age can shape constructs such as trust and commitment (Verhoef *et al.*, 2002; Raimondo *et al.*, 2008), their specific impact on the relationship between engagement and co-creation remains unexamined. Similarly, although risk perception and tolerance are acknowledged as drivers of customer behaviour (Cox *et al.*, 2006; Völckner *et al.*, 2010), their role in shaping co-creation engagement is underexplored. Examining these moderators is theoretically relevant, as they can reveal when and why engaged customers contribute resources to co-creation despite uncertainty, enriching our understanding of the motivational and relational mechanisms underpinning engagement outcomes. Finally, there have been frequent calls for more research integrating relational and psychological dimensions into models of co-creation (Storey and Larbig, 2018; Cui and Wu, 2017). This study integrates customer engagement, risk tolerance, relationship age, and new product success into a single empirical framework. It tests how risk tolerance and relationship age moderate the impact of engagement on co-creation and examines the resulting effect on new product success.

This study advances research on customer engagement and value co-creation by developing a theoretically grounded and managerially actionable framework that explains how, when, and for whom engagement translates into co-creation behaviour and ultimately new-product success. First, the study demonstrates that customer engagement functions as a conditional rather than uniformly beneficial driver of value creation. Early research largely portrayed customer engagement as an inherently positive force that automatically enhanced co-creation and firm performance (Van Doorn *et al.*, 2010; Brodie *et al.*, 2011; Hoyer *et al.*, 2010; So *et al.*, 2016; Storey and Larbig, 2018), reinforcing a “more-engagement-is-better” logic. This long-standing assumption has only recently been challenged by studies revealing that the engagement–outcome relationship can be nonlinear, context-dependent, or even adverse under conditions such as relational fragility, digital platform dynamics, and trust asymmetry (Bidar *et al.*, 2024; Latinovic and Chatterjee, 2024; Albayrak *et al.*, 2024; Abdo *et al.*, 2025). By empirically showing that engagement outcomes vary across these contextual conditions, this study answers recent calls to identify the boundary conditions that determine engagement effectiveness in collaborative innovation (Muruganantham and Kumar, 2025; Zhou *et al.*, 2025; Falchi *et al.*, 2025). It further refines the premises of service-dominant logic (Vargo and Lusch, 2023) by demonstrating that customer participation does not automatically yield superior innovation or relationship outcomes; rather, engagement effectiveness depends on the fit between engagement intensity and contextual readiness - including the psychological, relational, and technological environment in which collaboration unfolds (Pang *et al.*, 2024; Liao *et al.*, 2024; Tuunanen *et al.*, 2024).

Second, the study introduces a dual-moderator framework that integrates customers’ risk tolerance and relationship age as interacting contingencies shaping engagement effectiveness. This framework advances theory by combining psychological and relational perspectives that have rarely been examined together in the customer engagement literature. It shows how customer traits and relationship maturity jointly determine the conversion of engagement into effective co-creation, extending research on the behavioural processes that link engagement to innovation outcomes (Tuunanen *et al.*, 2024; Li and Xia, 2025; Muruganantham and Kumar, 2025; Albayrak *et al.*, 2024). By demonstrating how risk orientation shapes customers’ willingness to co-create under uncertainty and how relational history fosters trust and collaborative depth, the study provides a dynamic explanation of engagement conversion that aligns with recent research emphasizing the relational and contextual foundations of

effective co-creation (Abdo *et al.*, 2025; Pang *et al.*, 2024; Zhou *et al.*, 2025; Falchi *et al.*, 2025).

Third, the study translates these theoretical insights into managerial design implications. Building on recent evidence that the architecture of co-creation platforms - including participation openness, governance mechanisms, and feedback structures - determines participation quality and innovation yield (Falchi *et al.*, 2025; Zhou *et al.*, 2025), the findings identify for whom such mechanisms are most effective. Firms can use the proposed framework to segment customers based on their risk orientation and relationship stage, enabling the design of differentiated engagement strategies. This segmentation logic allows managers to allocate engagement resources more efficiently, improve the quality of co-created ideas, and minimize value-destroying interactions. Finally, the study provides an integrative contribution that connects theoretical advancement with actionable guidance. By identifying the psychological and relational contingencies under which engagement yields positive co-creation outcomes, it delivers both conceptual precision and managerial relevance. The research moves beyond the simplistic assumption that "more engagement is better," advancing instead a contingency-based, evidence-driven account of how, when, and for whom customer engagement translates into sustained value creation and innovation success.

The paper is structured as follows: it begins with the theoretical background and research hypotheses, then discusses the research methodology and findings, and concludes with managerial implications, limitations, and suggestions for future research.

2. Conceptual model and hypotheses

Figure 1 presents the study's framework. Drawing on service-dominant logic (Vargo and Lusch, 2023) and recent contingency-based engagement theory, the model explains how customer engagement shapes customer co-creation and ultimately new-product success. Engagement, defined as a customer's cognitive, emotional, and behavioural investment in firm-related interactions (Brodie *et al.*, 2011), represents a critical resource in collaborative innovation. However, recent studies have indicated that engagement does not uniformly translate into co-creation across all customers or contexts (Bidar *et al.*, 2024; Latinovic and Chatterjee, 2024; Abdo *et al.*, 2025). Recent meta-analytic evidence also reinforces this view, showing that engagement outcomes vary considerably across contexts, industries, and methodological approaches (Rohit *et al.*, 2025). Together, these findings underscore that

engagement effectiveness depends on alignment between customer characteristics, relational conditions, and organizational capabilities - a contingency perspective largely absent from existing frameworks (Muruganantham and Kumar, 2025; Zhou *et al.*, 2025).

Empirical research has also documented situations where high engagement might fail to yield co-creation benefits. Bidar *et al.* (2024) reveal that misaligned engagement within online collaborative networks can generate value co-destruction; Abdo *et al.* (2025) observe that participation in service recovery sometimes intensifies dissatisfaction; and Zhou *et al.* (2025) note that engagement without adequate governance yields inconsistent innovation performance. These inconsistencies mirror the contextual variability noted by Rohit *et al.* (2025) and point to the need for mechanisms that transform engagement's latent potential into reliable co-creation outcomes. This shift from universality to contingency raises fundamental questions: When does engagement drive co-creation? For whom is engagement most effective? And what conditions enable or constrain this conversion?

This study addresses these gaps by developing and testing an integrated model that examines how psychological readiness (risk tolerance) and relational maturity (relationship age) jointly moderate the engagement-co-creation relationship. By incorporating both individual-level dispositions and dyadic-level relational conditions as simultaneous moderators, this research advances service-dominant logic's understanding of when and for whom customers function effectively as value co-creators. We theorize that engagement serves as latent collaborative capacity requiring activation through complementary psychological and relational assets - a perspective that refines the foundational assumption that engaged customers naturally contribute to innovation.

2.1 Customer engagement and customer co-creation

Customer co-creation refers to the voluntary contribution of ideas, feedback, and evaluations that influence a firm's new-product development (O'Hern and Rindfleisch, 2017). Within service-dominant logic (SDL), value is co-created when customers integrate their operant resources - knowledge, skills, and motivation - with firms' operand resources to create mutual benefit (Vargo and Lusch, 2023). Engagement provides the motivational energy for this integration. Recent SDL scholarship continues to refine this foundational view by incorporating technological, contextual, and motivational mechanisms. Alam (2025) demonstrates that AI-enabled interaction fosters co-creation when customers experience

autonomy and competence, aligning with the motivational underpinnings of SDL. Dretsche *et al.* (2024) similarly show that brand co-creation activities emphasizing brand meaning rather than mere participation elicit deeper digital engagement, echoing SDL's emphasis on operant resources such as knowledge and identity. These advances highlight how engagement mechanisms operate across evolving technological and contextual landscapes.

Recent studies confirm that engagement enhances the quality and originality of collaborative outputs across diverse contexts. Muruganantham and Kumar (2025) find that gratification-driven engagement in augmented-reality retailing stimulates psychological ownership and behavioural intention; Li and Xia (2025) show that engaged gamers and community members supply more innovative contributions; and Falchi *et al.* (2025) demonstrate that engagement intensity in crowdsourcing contests increases idea quality and subsequent purchase intent. Similar patterns appear in B2B and platform settings, where engagement predicts greater participation in knowledge sharing, idea generation, and product refinement (Zhou *et al.*, 2025; Latinovic and Chatterjee, 2024).

Theoretically, engagement transforms customers from passive recipients into resource integrators. Through cognitive focus and emotional attachment, engaged customers allocate attention, creativity, and effort to firm activities beyond transactions (So *et al.*, 2016). Engagement also strengthens identification with the firm, motivating customers to invest scarce resources in co-creation tasks that express personal values and identity (Wallace *et al.*, 2021; Greeff, 2023). Albayrak *et al.* (2024) further show that engagement activates both hedonic and utilitarian gratifications, reinforcing customers' willingness to collaborate. Despite variations across settings, engaged customers contribute more ideas, participate more frequently in design feedback, and exhibit stronger commitment to joint innovation (Pang *et al.*, 2024; Abdo *et al.*, 2025). Accordingly:

H1: Customer engagement is positively associated with co-creation.

Insert Fig. 1 about here

2.2 Moderating effects of customers' risk tolerance

Innovation co-creation involves inherent uncertainty: outcomes are unpredictable, not all customer ideas receive equal support or development, and expectations may go unmet (Hoyer *et al.*, 2010; Struwe and Slepnirov, 2023; Zhang, 2023). This creates psychological discomfort for participants, as involvement requires investing resources with limited knowledge of consequences (Bilby *et al.*, 2023). Risk tolerance - individuals' willingness to accept risks, uncertainty, and engage in experimental activities (Petersen *et al.*, 2015; Samagaio and Felicio, 2022) - represents a critical individual difference shaping how customers respond to this ambiguity. Those with higher risk tolerance are comfortable challenging belief systems, embracing new initiatives, and viewing uncertainty as opportunity rather than threat (Sharma, 2010; Mandel, 2003).

While engagement reflects customers' cognitive, emotional, and behavioural connection to brands, it does not automatically provide the psychological resources needed to sustain participation when outcomes are ambiguous or uncontrollable. Recent research demonstrates that individual differences in comfort with uncertainty fundamentally condition whether engagement translates into collaborative behaviour (Li and Xia, 2025; Muruganantham and Kumar, 2025). Risk-tolerant customers possess cognitive schemas that reframe co-creation uncertainty as creative opportunity, enabling them to maintain motivation despite potential disappointment. They perceive co-creation as a chance to influence product development and create value, even when success is uncertain (Tuunanen *et al.*, 2024; Pang *et al.*, 2024). In contrast, risk-averse customers - despite strong emotional connections to brands - may experience heightened apprehension about investing effort when co-creation outcomes remain unpredictable. Their engagement may manifest as passive interest rather than active contribution, as fear of potential failure or unmet expectations inhibits behavioural investment (Bilby *et al.*, 2023; Albayrak *et al.*, 2024). This pattern is consistent with emerging findings that contextual and individual factors condition engagement's effect on participation. Alam (2025) shows that willingness to co-create in AI-mediated contexts depends on the perceived trade-off between value and data-sharing risk, while Barrett *et al.* (2024) demonstrate that risk perceptions vary sharply across utilitarian and hedonic service settings. These contextual variations underscore that risk tolerance operates as a universal activation mechanism determining whether engagement results in co-creation or withdrawal. Risk tolerance functions as a psychological activation mechanism: it determines whether affective engagement converts into productive co-creation behaviour or dissipates as latent potential. Building on theories of consumer risk perception and decision-making (Mitchell *et*

al., 1999; Mandel, 2003), we conceptualize risk tolerance as amplifying the engagement-co-creation relationship by enabling customers to act on their motivational states despite inherent ambiguity. Accordingly:

H2: The positive relationship between customer engagement and co-creation is moderated by customers' risk tolerance. This relationship is stronger for customers who are risk tolerant.

2.3 Moderating effects of relationship age

Relationship dynamics theory posits that customer-firm relationships evolve through distinct stages - exploration, build-up, maturity, and decline - each characterized by different perceptions, expectations, and orientations (Palmatier *et al.*, 2013; Kusari *et al.*, 2013; Dagger and O'Brien, 2010). As relationships mature, customers accumulate trust, familiarity, and confidence in firm competence, which reduces perceived vulnerability and strengthens willingness to invest in joint value creation (Eggert *et al.*, 2006; Foroudi *et al.*, 2020; Van Doorn *et al.*, 2010). Moreover, relationship duration enables knowledge accumulation: experienced customers develop deeper product understanding and clearer expectations, equipping them to evaluate information effectively and contribute meaningfully to innovation (Dagger and O'Brien, 2010; Sakiyama *et al.*, 2023).

While engagement theory emphasizes customers' psychological states, it provides limited guidance on how the dyadic context shapes engagement effectiveness. Recent research demonstrates that relational maturity creates enabling infrastructure for co-creation by providing interpretive frames, behavioural scripts, and normative expectations that guide customers in translating motivation into action (Zhou *et al.*, 2025; Falchi *et al.*, 2025; Abdo *et al.*, 2025). Trust-based relationships activate higher-order collaborative motives such as identification and reciprocity, sustaining participation beyond instrumental incentives (Pang *et al.*, 2024; Tuunanen *et al.*, 2024). Empirically, relationship age has been shown to moderate customer outcomes: it strengthens the effect of satisfaction on word-of-mouth (Sakiyama *et al.*, 2023) and amplifies the relationship between relationship quality and value co-creation intensity (Cambra-Fierro *et al.*, 2018).

Relationship age functions as a relational stabilization mechanism that amplifies engagement's effect on co-creation. Longer relationships provide accumulated social capital - shared history, demonstrated reliability, mutual understanding - that reduces the psychological barriers inherent in innovation collaboration (Verhoef *et al.*, 2002; Raimondo

et al., 2008). This relational buffer enables engaged customers to invest cognitive and emotional resources despite uncertainty, as trust in firm competence and benevolence mitigates perceived risk (Li and Xia, 2025). Thus, relationship age does not merely enhance engagement levels but fundamentally alters how engagement converts into collaborative behaviour. We propose:

H3: Relationship age moderates the positive effect of customer engagement on customer co-creation, such that the positive effect is stronger along with relationship age.

2.4 Customer co-creation and new product success

Customer co-creation contributes to new-product success through multiple reinforcing mechanisms. First, direct customer involvement in NPD provides access to tacit, experiential knowledge that formal market research often overlooks (Von Hippel, 2005; Nambisan, 2002). Customers bring contextual understanding of latent needs, use situations, and emergent trends that firms translate into differentiated product features, improving alignment between product attributes and user expectations (Kindermann *et al.*, 2022; Feng *et al.*, 2014). This knowledge integration reduces design uncertainty and the risk of late-stage product failures (Zheng *et al.*, 2021).

Second, from a resource-based perspective, customer-derived inputs constitute valuable, rare, and difficult-to-imitate resources that foster product differentiation (Prahalad and Ramaswamy, 2004; Fuchs and Schreier, 2011). The heterogeneous knowledge, creativity, and contextual experience customers contribute are particularly beneficial for complex or technology-intensive offerings, where bridging the gap between design assumptions and real-world use is critical (Bidar *et al.*, 2024). Because the social and cognitive processes underlying these collaborations are firm-specific and difficult for competitors to replicate, co-creation yields sustained competitive advantage (Storey and Larbig, 2018; Abdo *et al.*, 2025).

Third, customer involvement in co-creation strengthens market reception through psychological and relational pathways. Customers who participate in product development often develop psychological ownership and perceive co-created products as more authentic and personally relevant (Füller *et al.*, 2008; Wallace *et al.*, 2021; Greeff, 2023). These perceptions foster stronger attachment and loyalty at product launch, expanding the customer base for diffusion and improving sales performance (Li and Xia, 2025; Pang *et al.*, 2024). Additionally, visible participation signals firm responsiveness and openness to customer

needs, enhancing brand credibility and consumers' willingness to adopt the resulting innovations (Zhou *et al.*, 2025).

Recent empirical work reinforces these mechanisms. In digital and platform-based innovation contexts, co-creation enables iterative feedback loops that accelerate organizational learning and improve development agility (Latinovic and Chatterjee, 2024; Muruganantham and Kumar, 2025). Studies document that products emerging from collaborative development processes exhibit higher success rates due to superior differentiation, reduced development risk, and stronger customer identification (Falchi *et al.*, 2025; Zhou *et al.*, 2025; Abdo *et al.*, 2025). Integrating these knowledge-based, resource-based, and psychological perspectives, customer co-creation enhances the probability that new products will achieve commercial and performance success. Accordingly:

H4: Customer co-creation is positively associated with new product success.

In summary, the conceptual model proposes that customer engagement serves as a driver of customer co-creation behaviours, reflecting the extent to which customers actively participate in NPD activities. This core relationship is theorized to be moderated by two customer characteristics: risk tolerance and relationship age, such that higher levels of each strengthen the positive impact of engagement on co-creation. Furthermore, the model posits that increased co-creation contributes positively to new product success by enhancing product-market fit, reducing development uncertainty, and fostering psychological ownership among customers.

3. Research methods

The jewellery industry was selected for three main reasons. First, jewellery purchases typically involve substantial financial and emotional investment, which increases the relevance of studying customer engagement and co-creation. Second, customers often perceive high risk and uncertainty in such purchases due to the long-term significance and personalization required, making this context particularly suitable for examining the moderating role of risk tolerance as well as the influence of relationship age, since customers frequently develop enduring relationships with their preferred jewellers over time. Third, the jewellery industry frequently involves customization and co-creation opportunities, where customers actively collaborate with firms to design unique pieces, making it an ideal setting to explore the dynamics of customer co-creation. The emotional attachment and trust

developed through these interactions align closely with the study's focus on how customer engagement, moderated by risk tolerance and relationship age, influences co-creation and new product success. By focusing on the jewellery industry, this study leverages a context where customer involvement is pronounced, providing rich insights into the mechanisms of engagement and co-creation that may be less evident in lower-involvement product categories.

The survey was tested by two marketing academics and two jewellers. Based on their feedback, minor changes were included to improve the survey's wording and clarity. We pretested and refined an initial draft of the questionnaire. Data were collected online to access remote locations and participants and enhance the response rate (Panda *et al.*, 2022). Data collection took place over a four-week period between March and April 2024.

A convenience sampling method was employed in this study due to its accessibility and practicality, allowing the researcher to recruit participants via social media platforms such as Instagram, WhatsApp groups, and Facebook pages (Dörnyei, 2007; Wright, 2005). Convenience sampling is a nonprobability sampling type where individuals meet practical standards, such as being available at a given time or willing to participate (Dörnyei, 2007). To ensure the data collected was relevant, the survey was sent through social media platforms. A screening question was included at the beginning of the survey to confirm participants' eligibility. "Have you ever participated in jewelry co-creation activities such as designing or customising jewellery with a jeweller?" Only participants who answer yes were allowed to continue with the survey. This approach allowed the study to target respondents with meaningful experience while maintaining efficiency in data collection. It also helped to exclude ineligible participants, thereby ensuring the validity and relevance of the data. A total of 250 usable responses were collected from customers who had participated in the jewellery co-creation process.

Since the data for this study were collected through self-reported responses from a single source at a single point in time, there is a potential risk of common method bias (Podsakoff *et al.*, 2003). This bias may lead to inaccurate representations of the relationships between variables, not due to actual associations, but because of the way the data were collected. To reduce this risk, several procedural measures were adopted. The survey was designed to preserve participant anonymity and to separate questions related to different constructs and including, screening question to minimise response fatigue and reduce bias. To statistically

assess this issue, Harman's one-factor test was conducted. The results showed that the first factor accounted for 28.74% of the total variance, which is below the recommended threshold of 50% (Podsakoff et al., 2003). Therefore, common method bias is unlikely to be a serious concern in this study.

The sample characteristics are described using descriptive statistics. These characteristics are related to the customers in the jewellery sector. Respondents' ages ranged from 18 to over 65 years, with 38.8% identified as male and 61.2% female. 15.6% reported being high school graduates, over 50% had a bachelor's degree and more than 10% had higher education. The results show that the largest percentage of the sample is female. This is potentially due to the nature of jewellery making and selling depends on the female population as main consumers.

The survey included multi-item measures developed by prior literature. The research model includes five constructs: customer engagement, co-creation, customers' risk tolerance, relationship age, and new product success. The measurements were adopted to capture the customer perspective, and all items were modified to fit the research purposes. Following previous studies (e.g., So *et al.*, 2016), we measured customer engagement as a multi-item scale consisting of five dimensions: identification, enthusiasm, attention, absorption, and interaction. Customer co-creation was measured using the scale developed by Khanagha *et al.* (2017). A seven-point Likert agreement scale was used. Following Dohmen *et al.*, (2011), we measured customers' risk tolerance using six items to measure customers' willingness to take risks in general, as well as in career, financial matters, sports, health and car driving. The measurement was conducted on a scale ranging from 0 to 10, where 0 indicates "Not at all willing to take risks" and 10 indicates "Very willing to take risks." Relationship age was measured by asking respondents how long they have been customers of the firm (Bell *et al.*, 2005). Following Tseng and Chiang (2016), we measured new product success as a multi-item scale consisting of two dimensions: performance quality (3 items) and customer performance (3 items).

4. Findings

The assessment of normality revealed that the skewness and kurtosis critical ratios (c.r.) for all variables were within the acceptable range of ± 1.96 , except for relationship age (skewness c.r. = 3.448) and customer co-creation (kurtosis c.r. = -2.763), which slightly exceeded the

threshold, indicating minor deviations from normality at the univariate level. However, the multivariate skewness (-1.293) and multivariate kurtosis (-1.222) critical ratios fell well within the ± 1.96 range, suggesting that the data satisfy the assumption of multivariate normality (Byrne, 2010). Therefore, the overall distribution of the dataset can be considered approximately normal for subsequent SEM analysis.

Structural equation modeling (SEM) and confirmatory factor analysis (CFA) were conducted using AMOS 25 software, which provides robust parameter estimation and model fit indices (Arbuckle, 2016). SEM was employed to assess the overall model fit and examine the relationships among latent variables (Anderson and Gerbing, 1988; Kline, 2011), whereas CFA was utilized to evaluate the measurement model by defining the associations between observed indicators and their corresponding latent constructs (Hair *et al.*, 2010). The CFA results show that all indicators loaded significantly on their corresponding latent constructs. Additionally, the measurement model demonstrated overall acceptable fit, although some fit indices (e.g., SRMR and TLI) were close to commonly recommended thresholds (CMIN/df = 2.431, SRMR = 0.096, IFI = 0.90, CFI = 0.90, TLI = 0.88, GFI = 0.87, RMSEA = 0.076). RMSEA further indicated acceptable model fit, with a 90% confidence interval of [0.062, 0.090], which falls below 0.10. While the model fit is not perfect, the overall pattern of results supports the adequacy of the measurement model (MacCallum *et al.*, 1996). Within the confirmatory factor analysis, composite reliability was assessed. As shown in Table 1, the composite reliabilities for the scales ranged from 0.85 to 0.96, exceeding acceptable levels for construct reliability. To assess the validity of the measurement model, different indicators were examined: unidimensionality, convergent and discriminant validity (Hair *et al.*, 2016; Lomax and Schumacker, 2004). As shown in Table 2, the square root of the average variance extracted for each construct (diagonal values in the table) was greater than its correlation with other constructs, indicating that the model achieved a satisfactory level of discriminant validity (Guo *et al.*, 2011). Convergent validity which evaluated the relationships between the observed variables and the constructs, was assessed using the Average Variance Extracted (AVE) for each construct. Table 1 showed that the AVE was greater than or equal to 0.50 for all items (Hair *et al.*, 2010).

After confirming the appropriateness of the measurement model, we employed structural equation modelling to test our hypotheses. The effect of customer engagement on customer co-creation was positive and statistically significant ($\beta = 0.220$, $p < 0.001$), providing support

for Hypothesis 1. Additionally, customer co-creation demonstrated a significant positive effect on new product success ($\beta = 0.162$, $p < 0.001$), thus supporting Hypothesis 4.

To test the moderating effects of risk tolerance and relationship age on the relationship between customer engagement and customer co-creation, a multi-group analysis was conducted using AMOS. The median was used to split the moderators into low ($<$ median) and high ($\geq$ median) groups, as recommended by Hair et al. (2010) and Byrne (2010). The median split method has been widely adopted in marketing research and is considered a suitable approach for testing moderation effects (e.g., Jaworski & MacInnis, 1989).

A critical ratio difference test was applied to assess the significance of differences between the two groups. The critical ratio represents a Z-score (Byrne, 2010), and structural weights are considered significantly different if the test indicates statistical significance, suggesting that the paths are not equivalent across groups (Hair et al., 2010). The Z-score was calculated by dividing the regression weight estimate by its standard error. According to Byrne (2010), a chi-square test with one degree of freedom yields equivalent results to a Z-test for differences between proportions.

To facilitate the multi-group CFA computation, the Stats Tools Package (STP) was used in this method. The output box "critical ratio for difference" is selected to determine the Z-score for every variable in the database. In other words, the Z-score can be obtained from the critical ratio difference outcome in Amos and then imported into STP. A critical ratio greater than 1.65 indicates significance at the 90% confidence level ($p < 0.10$), 1.96 corresponds to 95% ($p < 0.05$), and 2.58 represents 99% ($p < 0.01$) significance levels.

Measurement invariance was first assessed to ensure meaningful comparisons between groups. Configural invariance ($\chi^2/df = 2.16$, CFI = 0.95, RMSEA = 0.04, TLI = 0.92, SRMR = 0.04) and metric invariance ($\Delta CFI = 0.006$, $\Delta TLI = 0.005$, $\Delta RMSEA = 0.001$) were supported, confirming that the factor structure and loadings are equivalent across groups and that the path comparisons are reliable.

Critical ratio (Z) difference tests indicated that both moderators affect the relationship between customer engagement and co-creation.

The results indicate that risk tolerance marginally moderates the effect of customer engagement on co-creation ($Z = 1.67$, $p < 0.10$), reflecting a marginal significance and thus requiring cautious interpretation, with somewhat stronger effects for customers with high risk tolerance. By contrast, relationship age significantly moderates the effect ($Z = 2.33$, $p < 0.05$), with stronger effects for customers in longer relationships. Overall, these findings suggest that higher levels of risk tolerance and longer relationship duration enhance the influence of customer engagement on co-creation.(see Table 3)

To examine the mediating effect of customer engagement (CE) on new product success through customer co creation (CCO), a bootstrapping procedure with 5000 resamples and a 95% bias- corrected confidence interval was employed to test the significance of mediation effects (DiCiccio & Efron, 1996). The results presented in table 4 indicate that CCO significantly mediates the relationship between CE and NPS ($\beta = 0.067$, 95% bias-corrected CI [0.06, 0.13]), whereas the direct effect of CE on NPS was non-significant ($\beta = 0.0621$, 95% CI [-0.04, 0.17]). These results indicate an indirect only mediation, whereby customer engagement influences new product success primarily through customer co- creation. The total effect of CE on NPS was 0.129 (95% CI [0.02, 0.15]). Table 4 summarizes the direct, indirect and total effects

5. Discussion

This study addresses a critical gap in customer engagement research by moving beyond the assumption that engagement uniformly benefits innovation outcomes. We theorized and empirically demonstrated that engagement operates as a conditional resource whose conversion into co-creation depends on customers' psychological readiness and relational history with the firm. By integrating individual-level risk tolerance and dyadic-level relationship age as simultaneous moderators within a single framework, this research establishes when and for whom engagement translates into productive collaboration and ultimately innovation success.

The confirmation of H1 provides empirical support for the foundational premise of service-dominant logic that engaged customers function as resource integrators in value creation (Vargo and Lusch, 2023). However, the significant moderating effects documented in H2 and H3, reveals that engagement intensity alone is insufficient to predict co-creation outcomes. This pattern challenges the implicit assumption in much of the engagement literature that

higher engagement universally yields greater value (Harmeling *et al.*, 2017; Kumar and Pansari, 2016). Instead, our findings align with recent work demonstrating that engagement effectiveness depends on fit between engagement initiatives and contextual conditions (Bidar *et al.*, 2024; Latinovic and Chatterjee, 2024; Abdo *et al.*, 2025; Muruganantham and Kumar, 2025; Zhou *et al.*, 2025). Theoretically, this shifts the conceptualization of engagement from a main effect driver to a potential resource requiring activation through complementary psychological and relational resources. Engagement does not automatically convert into co-creation behaviour; rather, it represents latent collaborative capacity that must be channelled through appropriate cognitive-affective states (risk tolerance) and social structures (relationship maturity). This finding extends service-dominant logic by demonstrating that customer operant resources (skills, knowledge, motivation) only become productive when matched with appropriate operand conditions (relational infrastructure, psychological fit). Recent research similarly emphasizes that engagement outcomes are nonlinear and context-dependent, with adverse effects emerging under misaligned conditions (Bidar *et al.*, 2024; Latinovic and Chatterjee, 2024; Abdo *et al.*, 2025).

The confirmation of H2 establishes that customers' risk tolerance amplifies the conversion of engagement into co-creation, revealing that psychological dispositions toward uncertainty function as activation mechanisms for collaborative behaviour. In innovation contexts characterized by ambiguous outcomes and delayed feedback, customers' comfort with uncertainty determines whether affective engagement translates into sustained behavioural contribution or dissipates as passive interest. This finding extends personality-engagement research (Li and Xia, 2025) by demonstrating that dispositional traits do not merely influence engagement levels but fundamentally condition its behavioural consequences. Theoretically, this contributes to a contingency-based model of engagement effectiveness. While prior research has examined how engagement dimensions (cognitive, emotional, behavioural) interact with one another (Hollebeek *et al.*, 2019), our findings demonstrate that individual differences in psychological readiness create differential returns to engagement. Risk-tolerant customers possess cognitive schemas that reframe uncertainty as opportunity rather than threat, enabling them to maintain motivation and contribute meaningfully despite the inherent ambiguity of innovation processes (Tuunanen *et al.*, 2024; Pang *et al.*, 2024). In contrast, risk-averse customers may experience engagement as a heightened state of emotional connection that nonetheless fails to overcome cognitive barriers to action. This mechanism aligns with recent work showing that engagement effectiveness depends on psychological

congruence between the customer and the collaborative task (Li and Xia, 2025; Muruganantham and Kumar, 2025; Albayrak *et al.*, 2024). This finding advances engagement theory by introducing psychological fit as a boundary condition. Service-dominant logic emphasizes that value emerges through resource integration, but it provides limited guidance on which customer characteristics enable effective integration. Our results demonstrate that psychological dispositions function as integration capabilities that govern whether engagement-based motivation converts into co-creation behaviour. This extends the concept of customer readiness beyond mere willingness or ability to participate (Payne *et al.*, 2008) to include cognitive-affective orientations that shape participation effectiveness.

The confirmation of H3 establishes that relationship age strengthens the engagement-to-co-creation link, demonstrating that relational maturity provides the social infrastructure through which engagement is converted into collaborative behaviour. This finding extends relationship marketing theory (Palmatier *et al.*, 2013) by showing that the temporal dimension of customer-firm relationships does not merely enhance trust but fundamentally alters the behavioural consequences of engagement. In mature relationships, accumulated trust, shared norms, and repeated interactions create a relational buffer that reduces perceived vulnerability and enables customers to invest cognitive and emotional resources in co-creation despite inherent uncertainty (Cambra-Fierro *et al.*, 2018; Raimondo *et al.*, 2008; Verhoef *et al.*, 2002). Theoretically, this contributes to understanding engagement as a relationally embedded phenomenon. Our findings demonstrate that engagement effectiveness depends critically on the dyadic context in which it occurs. Relational history provides interpretive frames, behavioural scripts, and normative expectations that guide customers in translating affective commitment into productive action (Zhou *et al.*, 2025; Falchi *et al.*, 2025; Abdo *et al.*, 2025). This aligns with recent work showing that relational depth activates higher-order collaborative motives such as identification and reciprocity, which sustain co-creation beyond instrumental incentives (Pang *et al.*, 2024; Tuunanen *et al.*, 2024; Li and Xia, 2025).

Importantly, the stronger moderating effect of relationship age compared to risk tolerance suggests that relational capital can compensate for psychological risk aversion. Over time, trust accumulated through repeated positive exchanges reduces perceived uncertainty even for naturally risk-averse customers, enabling them to participate effectively in innovation activities they might otherwise avoid. This reveals a substitution mechanism: relational trust

functions as an externally provided resource that supplements or replaces internally held psychological readiness. This finding has important theoretical implications for understanding how firms can broaden co-creation participation beyond psychologically predisposed segments. Rather than limiting engagement to risk-tolerant customers, firms can cultivate long-term relationships that build the confidence necessary for effective collaboration across diverse psychological profiles. This extends recent work on trust as a resilience resource in digital co-creation platforms (Falchi *et al.*, 2025; Tuunanen *et al.*, 2024; Li and Xia, 2025) and demonstrates that relational investments yield cumulative returns in engagement effectiveness.

This study, thus, makes three interconnected theoretical contributions that advance understanding of customer engagement and value co-creation. First, we establish a contingency-based model of engagement effectiveness. While service-dominant logic positions engagement as a value co-creation mechanism, it provides limited guidance on when engagement succeeds or fails. Our dual-moderator framework demonstrates that engagement effectiveness depends on the interplay between customers' psychological dispositions (risk tolerance) and relational history (relationship age). This moves engagement research beyond main effects toward a more nuanced understanding of boundary conditions. By demonstrating that the same level of engagement yields differential co-creation outcomes depending on customer characteristics and relationship context, we challenge the implicit assumption that "more engagement is always better" and instead position engagement as a resource whose value depends on contextual fit. This contribution aligns with and extends recent calls for contingency thinking in engagement research (Muruganantham and Kumar, 2025; Zhou *et al.*, 2025) and provides a theoretical foundation for understanding why engagement initiatives often yield heterogeneous results across customers and contexts.

Second, we theorize and demonstrate a dual-pathway activation mechanism for engagement-driven co-creation. Engagement converts into co-creation through two complementary mechanisms: psychological activation (via risk tolerance) and relational stabilization (via relationship age). Risk tolerance provides the cognitive-affective readiness that enables customers to translate emotional commitment into behavioural contribution despite uncertainty. Relationship age provides the social infrastructure - trust, shared understanding, behavioural scripts - that reduces perceived risk and guides productive collaboration. Importantly, these mechanisms are not merely additive but potentially substitutable:

relational trust can compensate for psychological risk aversion, broadening the pool of customers who can contribute effectively. This dual-pathway model advances engagement theory by specifying how individual-level dispositions and dyadic-level relational assets jointly determine collaborative outcomes. It extends service-dominant logic's emphasis on resource integration by identifying specific customer and relational resources that enable integration effectiveness. Notably, our results are consistent with recent empirical syntheses (Rohit *et al.*, 2025) that highlight the contextual variability of customer engagement outcomes.

Third, we contribute to understanding the organizational contingencies of customer-driven innovation. The moderate magnitude of the co-creation-to-performance relationship, considered alongside the strong moderating effects of risk tolerance and relationship age on engagement-to-co-creation, suggests that innovation success depends not only on mobilizing customer contributions but also on organizational capacity to absorb them. This positions co-creation within a broader system comprising customer readiness, relational context, and managerial capabilities. By demonstrating that co-creation quality (as shaped by psychological and relational moderators) influences its eventual performance impact, we extend absorptive capacity theory to the customer collaboration domain and highlight that firms must develop parallel capabilities in both stimulating and integrating customer input. This contribution connects customer engagement research with the organizational innovation literature and provides a foundation for examining firm-level moderators of co-creation effectiveness.

The theoretical insights developed above translate into a set of design principles for managing customer engagement and co-creation strategically. Firstly, the moderating effects of risk tolerance and relationship age demonstrate that customers differ fundamentally in their readiness for and responsiveness to co-creation initiatives. Firms should therefore adopt a dual-segmentation approach that aligns engagement opportunities with customer characteristics. High-risk-tolerant customers are well-suited for early-stage, exploratory innovation activities such as concept ideation and prototype experimentation, where ambiguity is high and outcomes uncertain. These customers' comfort with uncertainty enables them to contribute productively despite limited structure or delayed feedback. In contrast, risk-averse customers may contribute more effectively in structured, evaluative roles such as feature refinement, usability testing, or product improvement feedback, where

participation rules are clear and outcomes more predictable. Implementing a risk-engagement matrix or analytic dashboard - combining behavioural engagement data with psychographic indicators of risk tolerance - can help managers prioritize collaboration investments (Thakur and John, 2024). This approach transforms SDL's abstract premise of resource integration into actionable guidance for relationship and innovation managers, supporting risk-informed customer portfolio decisions that enhance new-product success (Falchi *et al.*, 2025; Albayrak *et al.*, 2024; Bidar *et al.*, 2024). Similarly, long-tenured customers whose accumulated trust and familiarity enable deeper collaboration can be engaged in resource-intensive, strategic innovation projects, while newer customers should be introduced through lower-commitment activities that build confidence and demonstrate the firm's responsiveness to input.

Secondly, the stronger moderating effect of relationship age compared to risk tolerance suggests that firms can expand co-creation participation over time by building relational capital. Rather than limiting engagement to psychologically predisposed segments, firms should sequence engagement activities to match relationship development. Early interactions should emphasize low-stakes, feedback-oriented tasks that demonstrate the firm's openness to collaboration and build initial trust. As the relationship matures, firms can progressively invite customers into more complex, resource-intensive innovation activities that leverage accumulated relational capital. This developmental approach transforms engagement from a static matching problem (identifying the "right" customers) into a dynamic capability (developing customers' readiness through relational investment). It also mitigates the risk of premature disengagement by ensuring that participation demands align with customers' evolving confidence and commitment. Building on recent evidence, this alignment should also consider contextual, temporal, and technological fit. Timely and personalized interaction is critical (Salonen *et al.*, 2024), as is providing meaningful interpretive activities that foster identity-based engagement (Dretsche *et al.*, 2024). Managers must further ensure that digital co-creation platforms support psychological safety and learning, thereby mitigating perceived risk (Alam, 2025).

Thirdly, the moderate co-creation-to-performance relationship underscores that stimulating customer contributions is necessary but insufficient; firms must also design organizational systems capable of absorbing and operationalizing input effectively. Recognizing that not all engagement produces positive value, governance mechanisms should be implemented to prevent misintegration of resources and potential value co-destruction (Liljeroos-Cork and

Luhtala, 2025). Effective governance combines transparency (clear criteria for idea evaluation and selection), responsiveness (timely feedback on contributions), and legitimacy (visible incorporation of customer input into product decisions). These mechanisms reduce perceived uncertainty, sustain motivation across diverse customer segments, and strengthen the link between co-creation and innovation outcomes (Falchi *et al.*, 2025; Zhou *et al.*, 2025; Albayrak *et al.*, 2024). Firms should implement visible tracking systems that communicate how customer input influences development decisions, establish regular communication rhythms that maintain engagement momentum, and create balanced coordination mechanisms that preserve both structure and flexibility.

7. Limitations and further research

As the current study has revealed the importance of relationship age and risk tolerance as moderating factors between customer engagement and co-creation, future research should consider other variables that may affect the link between these constructs, such as product category involvement, brand familiarity, and cultural context. Additionally, potential moderating influences on the co-creation process should be further explored to deepen understanding of when and for whom co-creation is most effective.

An important limitation of this research is its cross-sectional design, which restricts the ability to draw causal conclusions about the relationships among customer engagement, co-creation, and new product success. Although structural equation modelling can test associations and provide insights into potential pathways, longitudinal research designs are necessary to observe how these relationships evolve over time and to establish temporal precedence. Future studies could adopt longitudinal approaches to track customer engagement and co-creation behaviours across multiple stages of the new product development process, thereby offering stronger evidence of causality. Experimental studies could also be employed to manipulate specific engagement or co-creation interventions and directly assess their impact on product success outcomes.

While this study focused on engaging customers in the jewellery industry, which provided valuable insights into high-involvement, emotionally significant purchase contexts, the findings may not fully generalize to other sectors. Future research should examine whether the observed relationships hold in different industries, such as technology products, luxury fashion, consumer electronics, or fast-moving consumer goods, to identify boundary

conditions and contextual factors that shape the effectiveness of co-creation strategies. Comparative studies across industries with varying degrees of product involvement, complexity, and purchase risk would help clarify how generalizable the results are and provide more tailored recommendations for managers.

Moreover, integrating firm-level perspectives would enrich understanding of how organizational capabilities, resources, and culture interact with customer characteristics to influence co-creation outcomes. Finally, additional outcome variables - such as customer satisfaction, loyalty, and willingness to pay premiums for co-created products - should be incorporated into future research models to provide a more comprehensive picture of the impact of customer engagement and co-creation efforts

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Tables:

Table 1: Validity and Reliability For Measured Model

	Composite reliability (CR)	AVE
Customer engagement (CE)	.94	.51
Co-creation (CCO)	.85	.50
New product success (NPS)	.88	.61
Customers' risk tolerance (CRT)	.96	.95

Source: Authors own work

Table 2: Inter-correlation Matrix

	CE	CCO	NPS	CRT
CE	.714			
CCO	.584	.708		
NPS	.427	.427	.781	
CRT	.489	-.081	-.057	.974

Diagonal values were the square root of average variance extracted of each construct.

Source: Authors own work

Table 3: Multi-group Analysis Results

Moderator	Group	Estimate	P-value	Z score
Risk Tolerance				1.67*
	High	1.04	0.000	
	low	0.46	0.000	
Relationship Age				2.33**
	High	0.85	0.000	
	low	0.40	0.000	

** *p-value* < .05 (highly significant); * *p-value* < .10 (significant)

Source: Authors own work

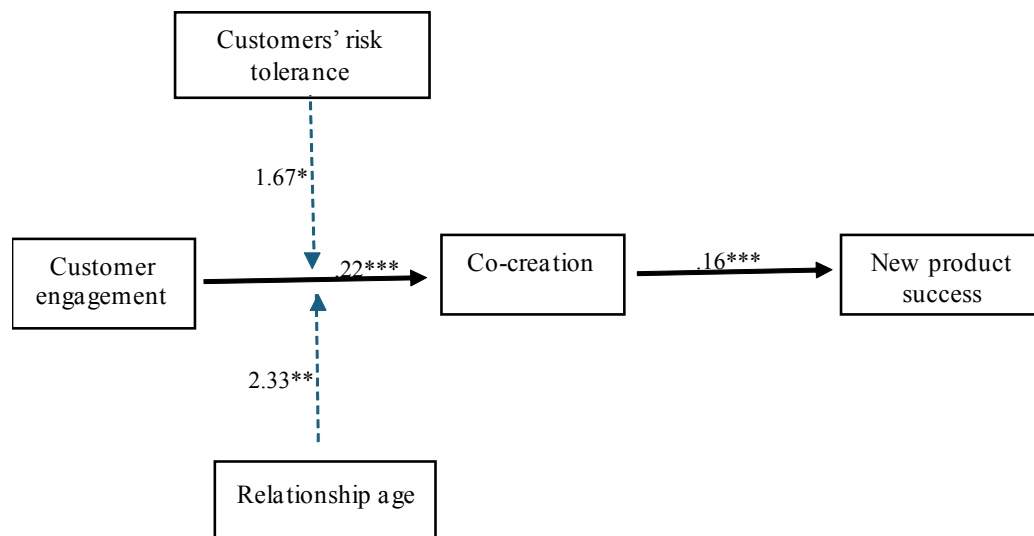
Table 4: Mediation Analysis Results: Direct, Indirect, and Total Effects

Effect	path	Estimate (β)	95% bias corrected CI
Direct effect	CE $\rightarrow$ NPS	0.0621 (ns)	[-0.04, .17]
Indirect	CE $\rightarrow$ CCO $\rightarrow$ NPS	0.067	[0.06, .13]
Total	CE $\rightarrow$ NPS	0.129	[0.02, .15]

ns = non- significant direct effect

Source: Authors own work

Figure 1: Research Model



Notes: *** $p < 0.001$; ** $p < 0.05$; * $p < 0.10$