Beyond Open Source:
Analyzing Extrinsic and Intrinsic Motivation Types in Closed-Source Software Community Participation

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Abstract

In recent years, user participation has become central to product innovation as companies are increasingly relying on online communities for feedback and idea generation. In open-source software contexts, this collaboration is often driven by intrinsically motivated users who contribute out of enjoyment, problem-solving interest, and a desire to support shared goals. However, the role of motivational framing in encouraging user participation during product ideation tasks remains understudied in closed-source software communities. Therefore, this study aimed to examine how intrinsic and extrinsic motivational framings, along with professional experience, influence the quantity and quality of user-generated ideas during new product development. To do so, a between-subjects experimental design was implemented via an online survey targeting contributors in the Salesforce Commerce Cloud (SFCC) community on two platforms - Slack and Reddit. Participants (n = 109) were randomly assigned to one of three motivational framing conditions: intrinsic, extrinsic, or neutral (control), and were asked to generate feature suggestions for the SFCC platform (n = 237). Idea quantity and quality were measured, with quality assessed across four dimensions: novelty, usefulness, clarity, and feasibility with the help of an AI model and a SFCC-proficient software engineer. The experimental survey also measured post-task intrinsic/extrinsic motivation and creative self-efficacy. Then, to test the direct and moderated effects of motivational framing and professional experience on participation outcomes, regression analyses were carried out. The results revealed that the hypotheses regarding the effect of motivational framing on overall idea quality and quantity were not supported. However, exploratory analyses suggested that creative self-efficacy was a strong predictor of ideation outcomes, possibly outweighing the impact of motivational framing. Furthermore, a disaggregated analysis of idea quality dimensions showed that intrinsic framing negatively affected clarity among experienced users, while extrinsic framing positively interacted with experience to predict higher feasibility scores. These dimension-specific effects suggest that the influence of motivation may be contingent on both user traits and the idea quality composites. The findings of the present study indicate that in the context of closed-source software communities, brief motivational framings alone may not be sufficient to drive participation. Instead, individual traits, particularly creative self-efficacy and domain experience, may play a more central role.

KEYWORDS: *product development, user community, closed source, extrinsic motivation, intrinsic motivation*

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1. Introduction

In recent years, user insights have proven instrumental in developing both physical and digital products. Examples include Dell's IdeaStorm, Starbucks' My Starbucks Ideas, and Adobe Lab Ideas, where companies invite customers to propose, discuss, and refine potential product innovations (Zhou et al., 2023, p.8901). From a managerial perspective, user involvement in new product development (NPD) can reduce potential risks by ensuring that products align with market expectations and resources are strategically allocated to validated ideas (Rautela et al., 2020, p. 2096). Furthermore, customers can oftentimes contribute with unique ideas or knowledge that the organisation has failed to produce internally. As a result, extensive research has demonstrated that customer participation, particularly in the ideation stage, not only streamlines the operationalization of new product ideas but also drives innovation by introducing diverse perspectives and fostering creativity (Chang & Taylor, 2016, p. 49).

While the benefits of user participation in traditional product development are well-documented, the software service context demands further investigation. Unlike physical products where iterations inspired by user feedback are managed by the producer, software services enable a more dynamic, continuous feedback loop. The inherent flexibility of software allows for quick iteration and deployment, oftentimes blurring the lines between producer and consumer as users actively contribute to innovation and even commercialise their solutions within online communities (Bogers et al., 2010, p. 870). From a business perspective, focusing on the ideation stage where user involvement is found to be most effective, allows companies to identify unmet needs, innovative use cases, and potential pain points early in the NPD process (Schemmann et al., 2016, p. 1145; Chang & Taylor, 2016, p. 60). This user-centric approach ultimately leads to reduced costs and improved user satisfaction.

The societal relevance of this issue is increasingly evident. As digital products become deeply embedded in daily life, from education and healthcare to public services and financial transactions, the consequences of overlooking user needs can be profound. Product missteps not only lead to economic losses but also to public distrust and disengagement. Recent events underscore the importance of incorporating user feedback into the process of software NPD. In May 2024, Sonos, an enterprise manufacturer of audio equipment, introduced a new application aimed to facilitate users to seamlessly control their devices. However, the app was stripped down of many essential features that were previously available. Following a significant customer backlash, the company suffered from major revenue losses with a decrease of 12% in their stock prices, resulting in layoffs and the step-down of their CEO - Patrick Spence (Singh, 2025). This case illustrates how inadequate user involvement during the ideation stage in new product development of closed-source software can lead to product failures and serious business consequences, even for big and well-established companies.

On a broader scale, fostering meaningful user participation in innovation offers societal benefits that extend far beyond corporate profit. As Von Hippel (2005) argues, it democratizes innovation by shifting the locus of idea generation and product design from centralized departments to the actual users of products (pp. 1-6). This decentralization allows for the development of technologies that better reflect the diverse needs, preferences, and values of different user segments, rather than being shaped solely by corporate priorities. Involving users from varied backgrounds can further mitigate systemic biases in product design, leading to more inclusive, accessible, and customized solutions that enhance user satisfaction and promote social equity. Moreover, Von Hippel (2005) emphasizes that collaboration between individuals and companies cultivates learning opportunities tied to digital literacy, problem-solving, and creative thinking, essential skills that are increasingly vital in the digital economy (p. 61).

As the landscape of product development undergoes a significant transformation with companies increasingly recognizing the value of user participation in the innovation process, it becomes fundamental for companies to understand the motivating factors behind user participation, the specific product stages in which motivation framings prove to be most effective, and how to leverage them in the context of their business needs (Chang & Taylor., 2016, p. 61; Wang et al., 2021, p. 500). From a user perspective, previous studies have conceptualised motivation drivers of participation within user communities as intrinsic (e.g., altruism, skill development) and extrinsic (e.g., monetary rewards, reputation). However, the focus in previous studies is primarily on product-based or open-source software communities and the nuances of closed-source software contexts are often overlooked (Paulson et al., 2004, p. 246). Open-source user communities typically foster intrinsic motivation factors, since participants are driven by altruistic desires to contribute to the community and derive personal satisfaction from solving complex technical issues. In contrast, closed-source user communities are more likely to utilize extrinsic motivational elements, since participants rely on professional advancement opportunities, such as reputation building and career development, alongside community contribution (Bogers et al., 2010, p. 862). Even though user communities foster real-time global collaboration, tech companies need to further understand the specific interplay between intrinsic and extrinsic motivators behind user participation in order to keep users active and their contributions relevant.

Therefore, this study aims to advance academic understanding of user participation dynamics in digital innovation by examining *how intrinsic and extrinsic motivation factors influence the idea quality and quantity within closed-source software online communities*.

From a theoretical perspective, this study contributes to the ongoing scholarly discourse on user innovation by specifically addressing participation motivation within the understudied context of closed-source software development (Kugler, 2019, p. 16). To do so, this study builds on self-determination theory (Deci et al., 2017, p. 20), offering insights into how external incentives interact with internal motivations in shaping participation outcomes. It also compliments work by

Boudreau and Lakhani (2013), who emphasize that the success of user-driven innovation depends on well-designed governance and incentive structures (p. 66). By focusing on ideation within a structured, closed-source software community, this paper adds specificity to otherwise broad models of user participation, helping to refine theoretical understandings of how participation evolves under different institutional constraints.

The findings may hold significant practical relevance as they illuminate how organizations can effectively harness collective knowledge sharing within user communities while ensuring mutual value creation for their contributing users, particularly those operating within proprietary ecosystems. Companies such as IBM, Intel, and P&G increasingly rely on user communities not only for product support and adoption but also for ideation and early-stage validation (Piller & West, 2014, p. 33). Understanding what motivates users to contribute valuable input, especially in environments where participation is not inherently voluntary or socially driven, enables companies to design more effective feedback systems, incentive structures, and product development practices. This paper therefore focuses on the Salesforce closed software user community where a homogenous participant group discusses platform offerings, while sharing interests and expertise.

2. Theoretical Framework

This chapter aims to outline the theoretical foundation for studying user motivation in closed-source software ideation. It begins by contrasting open- and closed-source NPD environments to highlight key differences in user participation. Then, Self-Determination Theory is introduced to explain and hypothesize the roles of intrinsic and extrinsic motivation, followed by a discussion on how career stage moderates these effects. Lastly, creativity is addressed as a covariate to clarify its role in ideation without overshadowing motivational influences.

2.1 New Product Development in Open-Source vs. Closed-Source Settings

Driven by the varying needs of customers and the increased complexity behind software innovation, many high-tech enterprises start utilising open innovation, gathering both internal and external ideas to advance their technology. As highlighted by Jin et al. (2019), nowadays companies in different industries put a lot of emphasis on customer knowledge and customisation of New Product Development in order to achieve "the perfect match between market demands and the company resources" (p. 7). Within software communities, user knowledge sharing is found to be specifically useful during the ideation stage of new product development as it contributes to faster development cycles and improved user satisfaction of software services (Chang & Taylor, 2016, p. 53).

In open-source settings, Paulson et al. (2004) highlight the effectiveness of user involvement in NPD as contributors have an overview of the entire codebase and can easily spot discrepancies or propose new features (p. 252). However, security concerns push many tech companies to remain closed-source as exposing (part of) the codebase would make the software product more susceptible to vulnerabilities and malicious attacks (Gao, 2019, p. 10). As a consequence, contributors do not have full access to the product, making user engagement in product innovation challenging, yet quite important to ensure product-market fit. In these environments, innovation typically follows a top-down approach, but user feedback loops, especially during ideation, can uncover new use cases and feature gaps that were not initially obvious (Bogers et al., 2010, p. 867). To motivate participants and compensate for the limited technical transparency, closed-source companies must create alternative engagement strategies for user knowledge sharing in NPD. This suggests that motivation design is not just about influencing behavior but actually forms a core part of innovation strategy.

Additionally, more recent research points out that many software ecosystems are actually hybrid in nature, where proprietary cores exist alongside semi-open APIs or developer platforms (West, 2003, p. 1281). These models blur the boundaries of openness, requiring more nuanced motivational approaches that go beyond simple open versus closed categories. Understanding the factors that drive ideation in these limited environments is therefore crucial for maximizing innovation input, particularly from external stakeholders like developers, integrators, or power users who have a vested interest in the platform (Dahlander & Gann, 2010, p. 701)

2.2 Self-Determination Theory Application in Open-Source vs. Closed-Source Settings

To analyse what type of incentives work best within closed-source software development, this paper utilizes SDT's definitions of intrinsic and extrinsic motivators. Self-Determination Theory (SDT) identifies three psychological needs, driving knowledge sharing: autonomy, competence, and relatedness (Wang & Hou, 2015, p. 3). These needs reinforce intrinsic motivation, where individuals autonomously participate in activities for inherent satisfaction rather than external rewards. SDT further examines a controlled motivation spectrum which stimulates task completion through external rewards (Deci et al., 2017, p. 20).

To unravel knowledge-sharing motives in different sectors, researchers have looked closely into the Self-Determination Theory (SDT), which highlights three core psychological needs: autonomy, competence, and relatedness (Yoon & Rolland, 2012, p. 1135). These needs are fundamental to intrinsic motivation, where individuals engage in activities for inherent satisfaction, enjoyment, and personal growth rather than external rewards. SDT further proposes a continuum of motivational regulation ranging from amotivation (lack of intention to act) to intrinsic motivation, with various forms of extrinsic motivation falling between these two extremes, such as external regulation, introjected regulation, and identified regulation (Deci et al., 2017, p. 21).

Arguably, controlled forms of motivation (e.g., external rewards, peer pressure) tend to crowd out intrinsic engagement, especially in settings where autonomy is highly valued. However, more autonomous forms of extrinsic motivation (e.g., recognition or purposeful contribution) can enhance motivation when perceived as meaningful and competence-reinforcing. For instance, research focusing on knowledge-sharing motives within open-source software (OSS) communities highlights that intrinsic motivations, such as altruism, self-development, enjoyment, and intellectual curiosity, are dominant drivers for user participation (Jiang et al., 2022, p. 2177; Nohutlu et al., 2023, p. 536). Extrinsic factors, such as monetary rewards or job opportunities, are often considered secondary and sometimes even counterproductive in OSS contexts due to concerns about undermining intrinsic engagement and the community's collaborative nature (Zhao et al., 2016, p. 71). As Ke and Zhang (2010) underscore, extrinsic motivators like financial incentives do not significantly enhance effort in open-source settings, where contributors are primarily driven by identification with the project's mission and the emotional satisfaction derived from communal success (p. 800). This is consistent with studies emphasizing the "community-identity fit" as a key predictor of sustained engagement in OSS projects (Yoon & Rolland, 2012, p. 1136).

On the other hand, emerging literature suggests that this dynamic shifts significantly in closed-source (proprietary) environments. Closed-source systems often impose stricter participation boundaries, limiting access to core infrastructure, data, or product code, thereby reducing opportunities for self-directed, exploratory engagement. In such settings, extrinsic motivators like monetary rewards, recognition, or exclusive access can become crucial for sustaining user contribution, especially when intrinsic levers are constrained. Users in closed-source communities,

such as enterprise developers or integration partners, may already be invested due to their professional roles but still benefit from targeted incentives to share actionable insights (Zhou et al., 2023, p. 8908).

Unlike open-source environments where contributions are often ideologically or community-driven, closed-source contributors may operate within commercial relationships or under NDAs, where motivation hinges more on transactional or reputational value. Hence, extrinsic motivators act as compensation mechanisms for limited autonomy and transparency, especially when contributors have to work with incomplete knowledge or platform restrictions within proprietary ecosystems (West, 2003, p. 1269; Dahlander & Gann, 2010, p. 704). Moreover, extrinsic rewards play a critical role in activating passive or disengaged users, who may not perceive immediate value from product improvement and are less likely to participate voluntarily. For those users, research shows that performance-based incentives and recognition mechanisms can increase both enjoyment and engagement, especially when tied to clear feedback loops or visible impact (Zhao et al., 2016, p. 73).

In summary, open-source environments thrive on autonomy and identity-based participation, whereas closed-source systems require a more nuanced blend of extrinsic reinforcements to activate and retain user contributions.

2.2.1 Intrinsic motivation

Intrinsically motivated users engage in NPD ideation primarily because they find enjoyment in problem-solving and are motivated by the pursuit of new skills. They are more frequent participants in user communities because the activity itself provides satisfaction regardless of external rewards (Wang et al., 2021, p.489). In closed-source, intrinsic motivations drive frequent knowledge sharing as users feel in control of their work and connected to their colleagues and the company they work for (Wang & Hou, 2015, p.3). Their sense of autonomy, expertise, and connection to the community result in a proactive exchange of suggestions, ultimately leading to a higher volume of contributions (Nohutlu et al., 2023, p.535). This sense is further reinforced when platform operators acknowledge their input or build features based on user suggestions, thereby transforming intrinsic motivation into perceived impact and a feeling of self-efficacy, strong predictors of frequent contribution (Nohutlu et al., 2023, p. 544). As a result, intrinsically driven contributors are expected to generate a more frequent response rate with a larger number of ideas per new product inquiry.

H1: Higher levels of intrinsic motivation are positively associated with idea quantity in closed-source software service communities.

Unlike open-source projects where participation is open to a broad audience with varying skill levels, closed-source communities have higher entry barriers, filtering for more experienced contributors, who are often using the software in professional settings. Intrinsically motivated users tend to invest more cognitive effort in understanding the underlying problems and generating well-informed suggestions. Moreover, prior work has found that intrinsically motivated users are more likely to

engage in exploratory behavior and iterative problem formulation, which are particularly beneficial activities during early-stage innovation (Füller, 2011, p. 263). Driven by curiosity and desire for mastery, they explore problems more thoroughly and consider long-term implications, thereby producing higher quality suggestions.

Additionally, self-determined users are more likely to engage in reflective learning, which not only improves the technical relevance of their ideas but also enhances their awareness of organizational and customer needs (Ryan & Deci, 2017, p. 27). This contributes to the development of holistic solutions that are contextually aligned with platform constraints and strategic priorities. Because these users value personal growth, they also often review peer contributions, provide constructive feedback, and iterate collaboratively, thus improving the overall quality of ideation outcomes within the community (Liu et al., 2022, p. 3602). Hence, intrinsically-driven users are expected to draw upon their extensive closed-source platform experience to generate ideas that consider both technical feasibility and business value.

H2: Higher levels of intrinsic motivation are positively associated with the quality of user contributions in closed-source software service communities.

2.2.2 Extrinsic motivation

Extrinsic motivation encompasses external factors that drive user participation, including tangible rewards, recognition, career development opportunities, and social status within the community. In closed-source software communities, extrinsic motivators play a more prominent role compared to open-source environments, since these communities often operate within a commercial context where professional advancement and networking practices are valued (Zhao et al., 2016, p. 74; Wang et al., 2021, p. 488). Companies may implement a variety of extrinsic strategies such as gamification elements, reward programs, or professional certification opportunities to encourage user participation.

In open-source context, extrinsic factors have been found to jeopardise the collaborative spirit by shifting contributors' focus from shared community goals to individual gain, which may reduce intrinsic motivation and trust among participants (Zhao et al., 2016, p. 90). However, this paper argues that this dynamic may not extend to closed-source environments. Since closed-source contributions are more challenging due to software opacity, monetary rewards and recognition can not only ensure the continuous participation of active users with extensive product knowledge (Jeppesen & Laursen, 2009, p.1582), but also increase the quantity of participation among inactive users through perceived fairness from the immediate benefits (Zhao et al., 2016, p. 91).

In environments where user autonomy is constrained and involving external developers is more challenging, extrinsic motivators compensate by introducing alternative sources of value such as visibility, career advancement, or financial compensation. These rewards validate user effort, which is especially crucial in commercial ecosystems where platform goals may not always align with user values. As contributors come from varying backgrounds, their input is likely incohesive and

inconsistent, established reward systems and structures turn out to be essential for a company to align values, whilst reaping the benefits of diversity (Boudreau & Lakhani, 2013, p. 66).
Moreover, performance-based incentives that are directly tied to user contributions such as idea implementation, feature voting, or innovation contests can serve to legitimize community engagement as a form of productive labor, especially for users who view participation as a professional asset (Liu et al., 2022, p. 3612). This dynamic represents a mutually beneficial exchange as contributors' specialised skills are reciprocated with tangible rewards (Frey et al., 2011, p. 403). The perceived fairness between effort and reward is therefore expected to contribute to a higher number of idea generations.

H3: Higher levels of extrinsic motivation are positively associated with idea quantity in closed-source software service communities.

As Ke and Zhang (2010) highlight, extrinsic motivators in open-source communities do not affect positively the effort users invest into a specific OS project, since the leading driver for contributions is identification with the goal of the collective work (p. 800). However, closed-source communities often operate within a commercial context where users are expected to to meet, or even try to exceed, quality community standards in order to enhance their reputation within their professional network. In such environments, user contributions turn out to be assessed in a similar manner as contributions proposed by organizational members (i.e. company employees), therefore, virtual community rewards can motivate closed-source community members the same way organizational rewards, like bonuses and job security, stimulate regular employees (Zhao et al., 2016, p. 74; Wang et al., 2021, p. 488). Furthermore, the presence of performance-based incentives reinforces commitment to delivering well-reasoned, strategically valuable ideas as it is perceived as a fair cost-benefit exchange (Garbers & Konradt, 2014, p. 120).
Studies have shown that external rewards can improve ideation outcomes when they are contingent on expert review or community endorsement, creating positive reinforcement cycles where users strive to outperform baseline expectations. Originality of idea submissions, for instance, a key dimension in composing idea quality, has been found to be positively associated with monetary rewards (Mehta et al., 2017, p. 549). Additionally, research in organizational behavior finds that goal-oriented contributors respond more positively to reward systems when outcomes are transparent and selection criteria are seen as merit-based, as is often the case in structured innovation communities (Garbers & Konradt, 2014, p. 122). This is especially true when reward systems are tied to quality benchmarks, such as upvotes, expert reviews, or selection by internal product teams. In such cases, extrinsically motivated users are incentivized to focus not just on volume, but on producing ideas that align with business goals and platform constraints. Therefore, extrinsically-driven users are expected to generate higher quality ideas when presented with performance-based incentives.

H4: Higher levels of extrinsic motivation are positively associated with the quality of user participation in closed-source software service communities.

2.3 Career Stage Differences in Response to Intrinsic And Extrinsic Motivators

Early-career professionals often display stronger intrinsic motivation as their drive for skill development and problem-solving aligns with the inherent rewards of community participation (Duarte & Lopes, 2018, p. 758). By contributing they learn from others and enhance their expertise in a low-risk environment. These individuals tend to view community engagement as a learning opportunity, motivated by curiosity, exploration, and the desire to prove their self-efficacy (Eccles & Wigfield, 2002, p. 124-125). Arguably, this makes them more receptive to intrinsic rewards such as feedback, skill mastery, and peer recognition.

On the other hand, experienced professionals with established expertise tend to prioritise tangible career benefits, making them more responsive to extrinsic motivators (Otto et al., 2017, p. 33). Since they have already developed their skills, their motivation shifts toward obtaining concrete rewards, such as financial incentives or professional recognition. Research in expectancy-value theory shows that as individuals gain experience, they become more attuned to cost-benefit calculations, preferring engagement activities that offer strategic value, like public acknowledgment, portfolio building, or high-impact feature contribution (Eccles & Wigfield, 2002, p. 120).
Therefore, this paper hypothesizes developers' career stage as a moderator in the relationship between motivation type and user participation.

H5: Professional experience moderates the relationship between motivation type (intrinsic vs. extrinsic) and user participation (quantity and quality), such that intrinsic motivation has a stronger positive effect for early-career users than for experienced users, while extrinsic motivation has a stronger positive effect for experienced users than for early-career users.

2.4 Creativity as a Covariate in Ideation Research

Creativity has long been recognized as a core element of ideation outcomes across innovation and knowledge-sharing contexts. Amabile (1988, p. 126) emphasizes that creativity is essential for the novelty and usefulness of contributions, which are critical dimensions of idea quality. In user-driven innovation, creative individuals are more likely to engage in exploratory thinking, approach problems from unconventional angles, and generate a higher volume of ideas (Füller, 2011, p. 263). Within digital innovation communities, creativity has also been associated with the ability to synthesize information, bridge user needs with technical constraints, and identify non-obvious improvement opportunities (Runco et al., 2001). Particularly in constrained or closed-source settings, where contributors must ideate with limited access to the product's inner workings, creativity can compensate for informational gaps (Liu et al., 2022, p. 3600).

Given this strong theoretical linkage, creativity is expected to play a facilitating role in both the quantity and quality of user contributions. However, while it is a relevant individual trait influencing ideation behavior, it is not the primary focus of this study. Instead, this research centers on how motivational framing (intrinsic vs. extrinsic) influences ideation outcomes. To avoid conflating the effects of motivation with pre-existing individual differences in creative ability, creativity is statistically controlled for as a covariate. This approach allows for a clearer assessment of how motivational factors function independently of participants' baseline creative capacity. It also reflects the view that while creativity contributes to ideation potential, it does not account for the reason why users choose to engage in the first place as this is more directly shaped by motivational factors (Amabile et al., 1994, p. 952). As displayed in Figure 2.1, creativity is acknowledged as a critical enabler of ideation, but its influence is analytically separated from the motivational mechanisms under investigation.

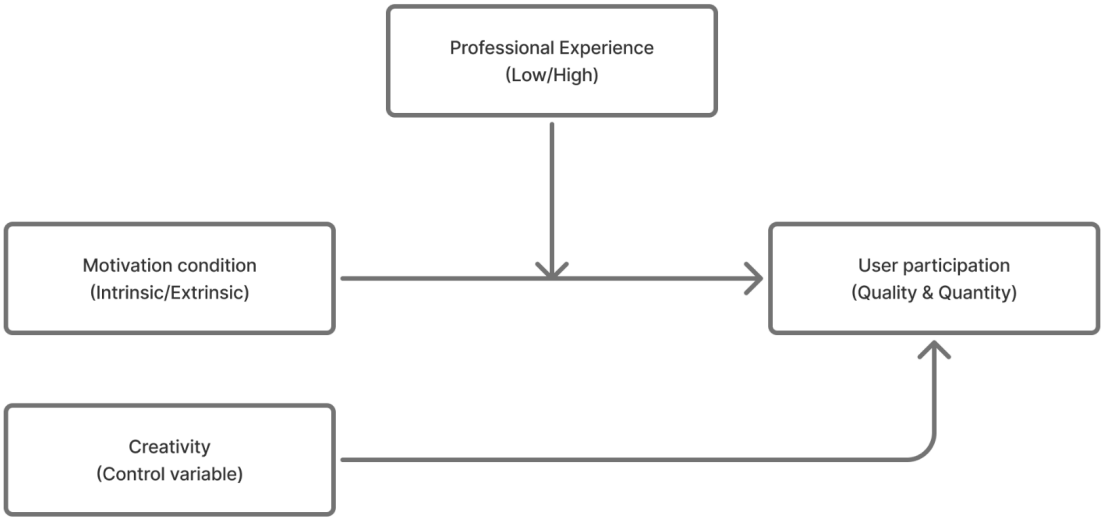

Figure 2.1: *Conceptual Model*

3. Method

3.1 Research Design

This study investigates how intrinsic and extrinsic motivational framings influence the quantity and quality of user contributions during an open ideation task in a closed-source software development context. To examine this relationship, a quantitative between-subjects experimental design was employed. Experimental designs are considered the gold standard for establishing causal relationships, as they allow researchers to systematically manipulate independent variables while controlling for confounding influences (Kirk, 2012, p. 4). The use of online surveys further enables broad and efficient data collection, especially in professional settings such as software developer communities. In the context of digital platforms, this method is particularly useful because it simulates the asynchronous and self-guided nature of online ideation (Malhotra et al., 2017, p. 295). Given the niche and geographically dispersed target audience, which consists of Salesforce Commerce Cloud (SFCC) developers, an online survey-based experiment was the most effective and pragmatic choice for this study. It allowed for rapid data collection across a specialized digital community, where members are accustomed to asynchronous participation.

The decision to focus on the Salesforce Commerce Cloud (SFCC) community was driven by both strategic relevance and methodological suitability. SFCC represents a well-established, enterprise-level, closed-source e-commerce platform used by global retailers, which makes it a rich environment for user-driven ideation. Its developer ecosystem consists of tech-savvy professionals, including implementation consultants, backend developers, and solution architects who often engage in customizations, feature enhancements, and platform feedback sessions, making them ideal candidates for a study on motivational drivers behind product ideation. Since many of these users work in client-facing or optimization-focused roles, they have first-hand experience with gaps in functionality and emerging user needs, increasing the likelihood that their ideation will be both relevant and actionable.

3.2 Procedure

Participant recruitment took place over a three-week period via two carefully selected digital communities that serve as informal hubs for knowledge sharing and technical support: the SFCC Unofficial Slack channel and the Salesforce subreddit forum.

Prior to starting the experiment, participants were informed that their responses would be anonymized and used solely for the purpose of the academic paper, which aimed to examine user knowledge sharing within software communities. The context of motivation was purposefully omitted to minimise response bias. Upon obtaining written consent, the respondent was randomly assigned to one of three experimental conditions: intrinsic motivation, extrinsic motivation, or a control group with neutral framing. This between-subjects random assignment reduces the risk of order effects, learning bias, and contamination across conditions, which are common limitations in within-subjects

designs (Budiu, 2018, Which Is Better? section). Randomization enhances internal validity by ensuring that any observed differences in ideation outcomes are likely due to the manipulated motivation framing rather than pre-existing differences in participant characteristics (Kirk, 2012, p. 4). Furthermore, including a control condition allows for a clearer interpretation of treatment effects by serving as a reference point against which to compare the intrinsic and extrinsic conditions (Shadish et al., 2002, p. 15).

A distinctive feature of this study's methodology is that motivation tendencies and creativity orientation were assessed after the ideation task rather than before. This decision was made to reduce priming effects and prevent participants' self-perceptions from influencing their ideation behavior. While some studies measure individual differences in advance, doing so may lead participants to anchor their behavior to socially desirable or self-consistent patterns (Podsakoff et al., 2003,p. 898). Instead, participants were asked to complete validated intrinsic and extrinsic motivation scales, as taken from Amabile et al. (1994, p. 956), and a creative self-efficacy scale, adapted from Runco et al. (2001, p. 399), after submitting their ideas. This approach allowed the researcher to capture participants' motivational states post-task, offering a more accurate reflection of how the ideation exercise itself may have shaped their responses.

3.2.1 Ecological validity considerations

Within the domain of innovation studies where contextual realism enhances behavioral authenticity, ecological validity proves to be crucial as it refers to the extent to which research findings generalize to natural environments (Brewer, 2000, p. 21). By conducting the experiment in channels regularly used for real technical discussions, the study reduces artificiality and encourages trust and commitment, which are found to be predictors of active user participation (Vohra & Bhardwaj, 2017, p. 107). For participants to experience the survey as meaningful engagement rather than a hypothetical scenario and mitigate the limitations of conducting an experiment in a fictitious setting (Araújo et al., 2007, p. 71), the survey included a standardized statement indicating that the generated ideas would be compiled into a report and shared with Salesforce Commerce Cloud (SFCC) product representatives. As seen in Appendix 5, the Slack channel also enabled the researcher to get in touch with said product representatives directly as SFCC employees are also active members of the community. Although no formal collaboration with SFCC was in place, this setup intended to foster perceived usefulness and to increase meaningful contribution in online communities (Behringer et al., 2017, p. 17). Prior research shows that contributors are more likely to engage in ideation when they believe their input will be taken seriously, implemented, or acknowledged (Füller et al., 2011, p. 269). By integrating this framing consistently across all experimental groups, the study aimed to replicate the kind of ideation experience users would encounter in corporate-sponsored innovation platforms while maintaining experimental control.

3.3 Sampling

The target population consisted of professional software developers with experience working on Salesforce Commerce Cloud (SFCC) implementations. These individuals are well-positioned to provide relevant feature suggestions and to respond meaningfully to ideation tasks involving technical framing. An expert sampling strategy was used to recruit participants from two developer-centered online communities: the SFCC Unofficial Slack (*#general* channel) and the Salesforce subreddit. These platforms were chosen for their high engagement levels and organic user participation. The unofficial SFCC Slack channel consists of approximately 13,000 members: a mix of Salesforce employees, third-party developers, and enterprise users who engage in peer-to-peer troubleshooting and development-related discussions. Meanwhile, the Salesforce subreddit forum has 91,000 members and ranks in the top 2% of Reddit's largest communities, offering broad reach and visibility among platform users. Unlike corporate-controlled channels that may introduce participation bias or access restrictions, these independent platforms enable direct, unfiltered engagement with a diverse and experienced user base (Salesforce, n.d., Unofficial Slack section). In contrast, communities of other large tech commerce firms such as Microsoft, Adobe, and Oracle tend to be broader or less structured, making them less ideal for targeted research on user participation.

To ensure statistical power for between-subjects comparisons, a minimum sample size of 90 participants was set, with at least 30 in each of the three experimental groups, in line with recommendations for medium effect sizes in between-subjects experimental designs (Kwak & Kim, 2017, p. 145). Ultimately, 109 valid responses were retained after data cleaning. Data cleaning included the removal of incomplete submissions, responses from participants without software development experience, and speeders (i.e., those completing the survey significantly faster than the expected time). This final sample exceeds the recommended threshold and provides sufficient power for regression analyses and subgroup comparisons (Green, 1991, p. 508).

3.4 Operationalization

3.4.1 Independent variables

The primary independent variable in this study is motivational framing, operationalized through a between-subjects manipulation embedded in an open ideation task adapted from the Alternate Uses Task (AUT) (Guilford, 1967). While the original AUT evaluates divergent thinking through abstract object-use generation, this study extends the format to a domain-specific ideation context, asking participants to propose new features or improvements for the Salesforce Commerce Cloud (SFCC) platform. This applied AUT adaptation aligns with previous research that contextualizes creative ideation tasks for real-world problem-solving scenarios (Silvia et al., 2008, p. 71). Idea output from this task was subsequently used to operationalise ideation performance in terms of quantity and quality, making it both the delivery mechanism for the experimental condition and the idea generation context for the dependent variables.

To improve clarity across participants, the ideation prompt was narrowed in scope to focus specifically on search and navigation functionality within SFCC. This decision was made for several reasons. First, search and navigation are core components used in all e-commerce implementations, regardless of industry vertical or storefront complexity. This universal application ensures that all participants possess a baseline understanding of the domain regardless of their specific project or company background. Therefore, interpretation differences are minimized and conceptual variety in idea quality is reduced. Second, the limited scope of the task avoids introducing ambiguity that may arise if participants were invited to suggest ideas across the entire SFCC architecture, which includes multiple complex modules like pricing, inventory, and integrations. A focused direction for idea generation ultimately strengthens the internal consistency of responses and enhances the construct validity of subsequent quality assessments (Rietzschel et al., 2014, p. 189).

As previously noted, participants were randomly assigned to one of three motivational framing conditions: intrinsic, extrinsic, or neutral. Each group received a version of the ideation prompt designed to activate a corresponding motivational orientation. As seen in Table 3.1, the intrinsic condition emphasized personal expertise and contribution to the community; the extrinsic condition emphasized the potential for monetary reward and public recognition; and the neutral prompt provided no motivational cue beyond a general request. These prompts were grounded in validated constructs from the literature on knowledge sharing and community-based ideation (Wasko & Faraj, 2005, p. 48; Garaus et al., 2024, p. 3708). The prompts preserved the AUT's open-ended structure while anchoring the task in a real-world technical domain, allowing for both creative divergence and contextual relevance.

Table 3.1

Experiment Motivation Framings and Task Instructions

Condition	*Message*
Intrinsic framing	Hey SFCC innovators! **Your expertise on the platform makes a real difference in shaping its future.** Now is your chance to share your creative product ideas to **enhance** Salesforce Commerce Cloud B2C Commerce functionality. We're especially interested in ideas related to improving the ***search and navigation*** capabilities offered by SFCC. Your contributions **have the potential to directly help fellow users and strengthen the community!** **This is your chance to be an inspiration and drive the entire community forward, share your best product ideas below!** Feel free to list as **many** new SFCC search and navigation feature ideas as you wish. Please adhere to the following format: Name of Feature - Short Description ***Example***: Smart redirects - Directs users to relevant category pages based on common search terms (e.g., "sneakers" → Footwear Collection).
Extrinsic framing	Hey SFCC innovators! Now is your chance to share your creative ideas to enhance Salesforce Commerce Cloud B2C Commerce functionality and **win a prize of 50 EUR**! The winning idea will be shared publicly on the Slack channel, **making you shine among peers and industry professionals**. We're especially interested in ideas related to improving the ***search and navigation*** capabilities offered by SFCC! **This is your chance to stand out as an innovator, share your best ideas below!** Feel free to list as **many** new SFCC search and navigation feature ideas as you wish. Please adhere to the following format: Name of Feature - Short Description; ***Example***: Smart redirects - Directs users to relevant category pages based on common search terms (e.g., "sneakers" → Footwear Collection).

Neutral framing	The aim of this survey is to gather new feature ideas for Salesforce Commerce Cloud B2C Commerce. We're especially interested in ideas related to improving the ***search and navigation*** capabilities offered by SFCC. Feel free to list as **many** new SFCC search and navigation feature ideas as you wish. Please adhere to the following format: Name of Feature - Short Description ***Example***: Smart redirects - Directs users to relevant category pages based on common search terms (e.g., "sneakers" → Footwear Collection).

To assess participants' motivational tendencies independently of the experimental manipulation, this study employs a two-stage measurement approach. Baseline motivation tendencies are measured retrospectively upon the completion of the experimental phase to avoid priming effects or influencing participant's behaviour. Within the same survey, participants responded to a validated scale adapted from Amabile et al. (1994, p. 956), using 5 items per construct rated on a 7-point Likert scale. Example items include *"I have to feel that I'm earning something for what I do."* (extrinsic) and *"No matter what the outcome of a project, I am satisfied if I feel I gained a new experience."* (intrinsic).

In addition to motivational tendencies, participants' creative orientation was measured to account for individual differences in divergent thinking capabilities, which could influence ideation outcomes regardless of experimental condition. Creativity was assessed using a validated creative self-efficacy scale adapted from Runco et al. (2001, p. 399), which captures an individual's belief in their ability to generate novel and useful ideas. Measuring creative self efficacy was essential to examine whether participants with higher creative confidence generated more frequent or higher-quality ideas and to control for creativity, ensuring that observed effects were attributable to motivational framing rather than baseline creative ability. The scale included five items (e.g., *"I often get excited by my own new ideas"*; *"I am good at combining ideas in ways that others have not tried"*), rated on a 7-point Likert scale.

3.4.2 Dependent variables

The two primary dependent variables discussed in this study are idea quantity and idea quality, which together provide a comprehensive measure of ideation performance across the three motivational framing conditions.

Idea quantity is operationalized as the number of unique idea suggestions submitted by each participant during the open task. This measure captures the volume of idea output and reflects participants' level of engagement. The count of ideas per participant, generated under the perception of meaningful contribution, was recorded and analyzed as a continuous variable, in line with prior

creativity research that uses idea count as a representative metric for fluency in divergent thinking (Kudrowitz & Wallace, 2013, p. 132; Silvia et al., 2008, p. 76). Quantity was chosen as one of the central outcomes as previous research has shown that motivation, especially intrinsic motivation, can significantly affect the volume of generated ideas in innovation tasks (Amabile, 1988, p. 161).

Additionally, idea quality was assessed on four well-established dimensions: *novelty, usefulness, clarity, and feasibility*. These criteria were selected because they represent essential characteristics of creative output in product development contexts, aligning both with theoretical and applied literature in innovation and design research (Dean et al., 2006, p. 648; Rietzschel et al., 2014, p. 186). To ensure comparability, the quality assessment scale was adapted from Kudrowitz and Wallace (2013), who originally implemented a 3-point Likert evaluation method for each dimension (p.129). For the purposes of this study, the scale was expanded to a 7-point Likert format to allow for greater nuance in evaluator responses, ranging from 1 (*very low*) to 7 (*very high*).

The evaluation of idea quality followed a two-step rating procedure involving an AI model, ChatGPT 4o namely, as the main rater, and a professional software engineer, working closely with the Salesforce suite as a second rater.[1] ChatGPT was found to be a suitable alternative to a human rater due to several reasons outlined in previous studies. Chiang & Lee (2023) highlight that AI-based evaluation enhances reproducibility, provides scores that are independent of contextual bias, and ultimately saves resources such as time and costs (p. 15615). Unlike human raters, whose evaluations are often influenced by personal interpretation and are difficult to replicate exactly, language model evaluations can be reliably reproduced by specifying the model version, prompt structure, and output parameters. Another benefit of language models is that they do not require time to calibrate their judgments across multiple submissions since the assessment considers each sample in isolation, without memory of prior items. Lastly, considering the scope of this study, recruiting and coordinating expert software engineers would be resource-intensive and time-consuming, therefore, ChatGPT offers a scalable solution by processing and scoring large volumes of qualitative input within minutes and at a fraction of the cost. Importantly, all idea data shared with the AI model was fully anonymized, ensuring that no personal or identifiable information was exposed during evaluation, thereby upholding research ethics and participant confidentiality.

To ensure objectivity and assess the agreement between AI and human ratings, an initial subset of 49 ideas was rated by the software engineer, recruited by the researcher. Then ChatGPT was used to rate the same sample of ideas based on prompt-specific criteria (see Appendix 6). The goal of this step was to evaluate the inter-rater reliability of the AI scoring mechanism against expert human judgment. To test this, a two-way random-effects intraclass correlation coefficient (ICC) was computed, as recommended by Koo and Li (2016, p. 157). This model is appropriate when raters are considered randomly drawn from a broader population of qualified evaluators, which in this case

[1] Contact information can be provided from the researcher upon request.

included both domain professionals and trained AI tools. The resulting ICC for feasibility (as well as the other dimensions) indicated fair to good reliability (Cicchetti, 1994, p. 286), supporting the use of the AI system to rate the full set of 237 ideas. According to Bujang and Baharum (2017), when using two raters, a sample size of just 22 items is sufficient to detect a moderate ICC value of 0.5 with 80% statistical power (p. 7). Given that this study included more than double that number, the sample size is adequate for obtaining reliable estimates of inter-rater agreement. This approach enabled efficient scaling of the evaluation process while maintaining acceptable levels of consistency and validity in scoring.

Finally, in line with Hypothesis 5, professional experience was included as a continuous moderator in the analysis of both idea quantity and idea quality. Rather than grouping participants into experience categories (e.g., Junior, Advanced, Expert), the study captured experience as the self-reported number of years each respondent had spent within the domain of software development. Treating this variable as continuous preserves the granularity and statistical power of the data, allowing for more accurate estimation of how experience interacts with motivational framing. This approach enabled the study to test whether the influence of intrinsic or extrinsic motivation on ideation outcomes varied depending on the respondent's level of professional experience as supported by prior literature on motivational sensitivity and domain expertise (Eccles & Wigfield, 2002, p. 124; Otto et al., 2017, p. 33).

3.5 Validity and Reliability

3.5.1 Pre-test

To validate the manipulation of motivational framing, a pre-test was conducted prior to full deployment of the experiment. A small group of five individuals, unfamiliar with the study's purpose, were shown the ideation prompts and were asked to classify each according to the type of motivation it was intended to evoke. All five participants correctly identified the intrinsic, extrinsic, and neutral conditions, suggesting a high level of construct validity in the manipulation. Manipulation checks of this kind are crucial in experimental research to ensure that the independent variable is interpreted by participants as the researcher intends (Perdue & Summers, 1986, p. 318). By confirming that participants naturally associated each prompt with the correct motivational type, the study strengthened the reliability of its experimental design.

3.5.2 Pilot study

In addition to the pre-test, a pilot study was conducted to test the overall structure, clarity, and statistical feasibility of the full experimental procedure. Pilot studies are particularly important when adapting validated scales to new contexts, as they reveal practical issues that may not emerge in theoretical planning (Malmqvist et al., 2019, p. 3). This pilot, administered during the Easter weekend, yielded a limited sample of 12 responses and 30 ideation entries. To conduct the pilot, the survey was distributed via two Slack channels within the Salesforce Commerce Cloud (SFCC)

developer community: *#b2b-commerce-general* (approximately 500 members) and *#random* (approximately 1,700 members). These channels were selected to reach a relevant but diverse group of participants while preserving the largest and most targeted audience for the main experimental study. The *#b2b-commerce-general* channel was chosen due to its thematic alignment with the survey content and its moderate size, meanwhile the *#random* channel, known for its mixed-topic nature, was used to further increase pilot reach. The *#general* channel serves as the platform's largest and most active developer group chat and was intentionally excluded from the pilot in order to preserve it as the primary target pool for the deployment of the main experiment. This strategic sampling approach allowed for preliminary validation of the survey instrument without overexposing and overwhelming the intended core audience.

Despite being small in scale, the pilot served multiple purposes: identifying any technical issues within the Qualtrics platform, testing the distribution and completion time of the survey, assessing whether scale items needed rewording or removal, as well as to assess the quality and variability of idea ratings provided by the two raters along the four key dimensions (usefulness, feasibility, novelty, and clarity). All analyses were conducted in IBM's SPSS (version 28).

Internal consistency was assessed using Cronbach's alpha. The extrinsic motivation scale, consisting of five items, demonstrated excellent reliability ($\alpha = .96$). The intrinsic motivation scale showed good reliability ($\alpha = .82$), while the creativity in ideation scale demonstrated excellent reliability ($\alpha = .93$). Corrected item-total correlations ranged from .796 to .971 for the extrinsic motivation scale and from .715 to .947 for the creativity scale, indicating strong internal consistency. Within the intrinsic motivation scale, two items (Q6_2 and Q6_3, as seen in Appendix 1) showed comparatively lower item-total correlations, respectively, .488 and .496. However, removing either item did not result in a meaningful improvement in overall reliability, and all items were retained for the main study.

Descriptive statistics indicated sufficient response variability across the four idea quality dimensions. The mean scores were highest for usefulness ($M = 5.73$, $SD = 1.31$) and lowest for novelty ($M = 4.80$, $SD = 1.47$). All standard deviations exceeded 1.0, suggesting appropriate item dispersion and the absence of ceiling or floor effects. Furthermore, inter-rater reliability was assessed using a two-way random-effects model with absolute agreement to evaluate the consistency between human and AI-generated ratings across the four idea quality dimensions: usefulness, feasibility, novelty, and clarity. Intraclass correlation coefficients (ICCs) were calculated for both single measures and average measures (i.e., the mean of the two raters). For usefulness, the single-measures ICC was .665, 95% CI [.399, .827], $F(29, 29) = 5.48$, $p < .001$, indicating good agreement. The average-measures ICC was .799, suggesting that mean scores across raters were highly reliable. For feasibility, the single-measures ICC was .525, 95% CI [.204, .743], $F(29, 29) = 3.14$, $p = .001$, reflecting fair agreement. The average-measures ICC was .688, indicating acceptable reliability when ratings are averaged. For novelty, inter-rater agreement was lower, with a single-measures ICC of

.407, 95% CI [.071, .664], $F(29, 29) = 2.41$, $p = .010$, suggesting fair to poor reliability. The average-measures ICC was .579, below the commonly accepted threshold for strong agreement. For clarity, the single-measures ICC was .651, 95% CI [.390, .816], $F(29, 29) = 4.78$, $p < .001$, indicating good agreement. The average-measures ICC was .789, again supporting strong reliability when the scores of both raters are combined.

Taken together, these results suggest that the rating rubric was generally effective as per thresholds introduced by Cicchetti (1994, p. 286). Usefulness and clarity were showing the strongest inter-rater reliability, while novelty ratings were less consistent, likely due to the more subjective nature of the construct. All dimensions demonstrated statistically significant rating consistency ($p < .05$), justifying the use of averaged scores in subsequent analyses.

In summary, the pilot results suggested that no major revisions were necessary, indicating that the survey was structurally sound and appropriately targeted. The instruments were therefore considered suitable for deployment in the main experiment without further modification.

4. Results

4.1 Data Cleaning and Preparation

Prior to analysis, the dataset was cleaned to ensure content validity and internal validity of responses. Content validity was supported by removing entries that were incomplete or submitted by participants without any prior development experience, as they did not meet the criteria necessary for meaningful engagement with the ideation task. Additionally, to strengthen internal validity, responses identified as "speeders", participants who completed the survey significantly faster than the average completion time, were carefully reviewed.

Insights from the pilot study indicated that survey completion times ranged from approximately 4 to 8 minutes, depending on how much time participants spent on the creativity task. This benchmark served as a general guideline rather than a strict exclusion criterion for the main dataset. Rather than applying a rigid time cutoff, each submission was evaluated on a case-by-case basis to determine whether the response demonstrated thoughtful engagement. To be specific, some entries completed in less than 4 minutes were retained if the content suggested prior familiarity with the topic or a concise but relevant ideation process. Conversely, submissions exceeding the 8-minute mark were also preserved if they included multiple or highly detailed ideas, indicating a sustained cognitive effort (Shepherd, 2022, p. 6).

Finally, responses collected during the pilot phase were included in the final dataset. Given their consistency in structure and quality with the main study data, and the absence of any systematic deviations, their inclusion was deemed appropriate to strengthen the statistical power of the findings.

Prior to conducting the main analyses, the dataset was also screened for univariate outliers using boxplots and standardized z-scores for all key variables. Boxplots revealed several mild outliers on the lower end of the idea quality and creative self-efficacy check distributions. No extreme outliers (values beyond 3x the interquartile range) were identified in any variable. Standardized z-scores were also examined, with all values falling within the acceptable range of ±3.29 (Field, 2009, p. 26). The lowest z-score observed was -3.17 for one case in the creative self-efficacy check, which was retained due to its proximity to the threshold and its theoretical plausibility. Overall, no data points met criteria for exclusion, and all cases were retained for subsequent analyses, utilizing IBM’s Statistical Package for the Social Sciences (SPSS v28) program.

4.2 Sample Characteristics

The final sample consisted of 109 participants who completed the experimental task, generating 237 ideas in total. As displayed in Table 4.1, the age distribution was relatively balanced, with the largest group falling within the 26-30 age range (33%), followed by 31-35 (23.8%), 20-25 (19.2%), 36-40 (14.6%), and 41-45 (9.1%). In terms of gender, 61.4% identified as male, 34.8% as female, and 3.6% preferred not to disclose their gender, while no participants identified as non-binary. Regarding professional experience with software development or related domains, 33.9% had 0-5 years of

experience, 41.2% had 6-10 years, 15.6% had 11-15 years, and 9.1% had more than 16 years. Participants were randomly assigned to one of three motivation conditions: extrinsic (34.8%), intrinsic (33.9%), and control (31.1%). This distribution ensured a relatively even representation across experimental groups, suitable for comparative analysis.

Table 4.1

Sample Characteristics (n = 109)

Characteristic	Frequency in sample	Percentage of sample
Age distribution		
20-25	21	19
26-30	36	33
31-35	26	24
36-40	16	15
41-45	10	9
Gender distribution		
Male	67	61
Female	38	35
Prefer not to say	4	4
Experience in software development or use (years)		
1-5	37	34
6-10	45	41
11-15	17	16
16-20	10	9
Motivation manipulation		
Extrinsic condition	38	35
Intrinsic condition	37	34
Control group	34	31

4.3 Construct Validity and Reliability

For the assessment of the internal consistency and construct validity of the motivation and creative self-efficacy scales, reliability and exploratory factor analyses were conducted. A principal component analysis (PCA) with Varimax rotation revealed a four-factor structure. The Kaiser-Meyer-Olkin (KMO) measure was .794, and Bartlett's test of sphericity was significant, $\chi^2(105) = 2781.79$, $p < .001$, indicating sampling adequacy (Kaiser, 1974, p. 35). Four components with eigenvalues greater than 1 emerged, explaining a combined 77.7% of the total variance. Items from the extrinsic motivation scale loaded strongly on the first component (loadings = .729 to .930), creativity items on the second (loadings = .782 to .884), and intrinsic motivation items predominantly on the third (with some cross-loading of Q6_2 and Q6_3 on the fourth, = .437 and .574 respectively).

Cronbach's alpha was excellent for the extrinsic motivation scale ($\alpha = .93$), good for the creative self-efficacy scale ($\alpha = .85$), and acceptable for the intrinsic motivation scale ($\alpha = .77$). While three of the intrinsic motivation items showed corrected item-total correlations above .60, item Q6_2 *"No matter the outcome of a project, I am satisfied if I gained a new experience"* and item Q6_3 *"The more difficult the problem, the more I enjoy trying to solve it"* fell below conventional thresholds, with Q6_3 in particular yielding a low correlation of .09 (see Appendix 2). Furthermore, in the factor analysis, these two items showed cross-loadings on a separate fourth component (.437 and .574, respectively), suggesting that they may reflect a slightly different latent dimension such as problem-focused engagement or growth orientation. Despite these limitations, both items were retained in the scale. This decision was guided by the theoretical alignment of all five items with the broader construct of intrinsic motivation as defined by Amabile et al. (1994) and the observation that there was no meaningful increase in Cronbach's alpha upon item removal.

Overall, the results provide strong evidence for the conceptual distinction among extrinsic motivation, intrinsic motivation, and creative self-efficacy as separate constructs. Full item wording, factor loadings, and reliability coefficients are presented in the Appendix 2.

4.4 Interrater Reliability for Idea Quality

Regarding idea quality, in order to assess the degree of agreement between the AI-generated ratings and those of a professional SFCC developer, the Intraclass Correlation Coefficient (ICC) was computed using a two-way random-effects model with absolute agreement. The resulting ICC (2,1) for the "usefulness" dimension was .863, 95% CI [.764, .921], $F(48, 48) = 14.462$, $p < .001$, indicating high inter-rater reliability (Cicchetti, 1994, p. 286). This suggests that the AI ratings closely reflect those of a human expert, supporting their use for evaluating idea usefulness in the dataset. The inter-rater agreement for the "feasibility" dimension was .453, 95% CI [.206, .648], $F(48, 48) = 2.727$, $p < .001$, indicating poor reliability. While statistically significant, the relatively wide confidence interval and modest ICC value suggest some divergence in how feasibility was judged across raters. While the inter-rater reliability for the "feasibility" dimension was below the conventional threshold

for moderate agreement, the decision was made to retain this dimension in subsequent analyses. As noted by Koo and Li (2016), interpretation of ICC values must consider not only numerical thresholds but also contextual factors such as the complexity of the construct, rater training, and number of raters (p. 5). Importantly, feasibility judgments often require domain-specific knowledge, and the slightly lower agreement may reflect the inherent subjectivity and complexity involved in evaluating technical implementation potential. Moreover, given the theoretical relevance of feasibility to the construct of idea quality, omitting it would have reduced the conceptual completeness of the quality measure (Kudrowitz & Wallace, 2013, p. 129). Therefore, despite lower inter-rater consistency, the inclusion of feasibility was deemed justified. The resulting ICC (2,1) for the "novelty" dimension was .628, 95% CI [.383, .782], $F(48, 48) = 5.028$, $p < .001$, indicating moderate inter-rater reliability. Finally, in regards to the consistency between AI-generated and expert ratings for the "clarity" dimension, the ICC(2,1) was .728, 95% CI [.562, .837], $F(48, 48) = 6.236$, $p < .001$, indicating good reliability (Cicchetti, 1994, p. 286; Koo & Li, 2016). The results demonstrate that the AI can reliably assess the usefulness, novelty, and clarity of idea descriptions in a manner consistent with expert evaluation.

4.5 Descriptive Statistics

Descriptive statistics revealed that participants submitted an average of $M = 2.17$ ($SD = 1.19$) ideas, with the number of submissions ranging from 1 to 7 (see Table 4.2). The average perceived idea quality was $M = 5.00$ ($SD = 0.83$) on a 7-point Likert scale, indicating generally high-quality contributions. Creative self-efficacy, measured via a self-rated creativity item, averaged $M = 4.86$ ($SD = 1.08$), suggesting moderately high confidence in participants' creative abilities. The intrinsic motivation check yielded a mean of $M = 4.81$ ($SD = 0.98$), whereas the extrinsic motivation check was slightly lower ($M = 4.17$, $SD = 1.46$), indicating that participants generally reported stronger intrinsic than extrinsic motivational tendencies.

To assess the internal structure of idea quality, Pearson correlation coefficients were computed among its four subdimensions: usefulness, feasibility, novelty, and clarity. As shown in Table 4.2, all dimensions were significantly and positively correlated. The strongest associations were observed between novelty and clarity ($r = .28$, $p < .01$), usefulness and clarity ($r = .37$, $p < .01$), and novelty and feasibility ($r = .25$, $p < .01$). These results support the conceptual coherence of the subdimensions and justify their aggregation into an overall idea quality index, consistent with prior research (Kudrowitz & Wallace, 2013, p. 129; Dean et al., 2006, p. 648).

Among the experimental conditions, the intrinsic framing (intrinsic dummy) showed a small but statistically significant negative correlation with idea quality ($r = -.19$, $p < .05$), suggesting that participants in this condition received slightly lower quality ratings for their ideas on average. Additionally, professional experience was negatively correlated with idea quantity ($r = -.29$, $p < .01$), indicating that more experienced participants generated fewer ideas, despite showing a positive correlation with creative self-efficacy ($r = .28$, $p < .01$).

Table 4.2

Descriptive Statistics and Correlations (n = 109)

	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*M*	*SD*
1. Idea quantity	-											2.17	1.19
2. Idea quality	-.10	-										5.00	0.83
3. Creative self-efficacy	.48**	.04	-									4.86	1.08
4. Usefulness	.02	.64**	.07	-								5.01	1.16
5. Feasibility	-.06	.62**	-.00	.16	-							5.03	1.33
6. Novelty	-.17	.69**	.04	.21*	.25**	-						5.08	1.34
7. Clarity	-.02	.68**	-.01	.37**	.16	.28**	-					4.89	1.23
8. Intrinsic check	-.06	.24*	.05	.12	.13	.16	.22*	-				4.81	0.98
9. Extrinsic check	.23*	-.09	.19*	-.06	.06	-.13	-.10	-.34**	-			4.17	1.46
10. Intrinsic dummy	.09	-.19*	-.00	-.05	-.14	-.12	-.18	.30**	-.46**	-		0.33	0.47
11. Extrinsic dummy	.13	.07	.21*	.08	.10	.04	-.04	-.26**	.57**	-.54**	-	0.37	0.48
12. Professional experience	-.29**	-.04	.28**	.01	-.13	-.01	.04	-.14	.33**	-.10	.18	8.14	4.22

**p ≤ .01, *p ≤ .05, (2-tailed)

4.6 Manipulation Checks

To assess the effectiveness of the experimental manipulation, one-way ANOVAs were conducted on intrinsic and extrinsic motivation scores. A significant effect of condition was found for intrinsic motivation, $F(2, 106) = 6.03$, $p = .003$, $\eta^2 = .10$. Levene's test indicated unequal variances ($p = .010$), so Games-Howell post hoc tests were applied. Participants in the intrinsic condition reported significantly higher intrinsic motivation than those in the extrinsic condition ($p = .007$), although differences with the control condition were not significant ($p = .124$), as can be observed in Table 4.3.

A separate ANOVA on extrinsic motivation also showed a significant effect of condition, $F(2, 106) = 29.33$, $p < .001$, $\eta^2 = .36$. Games-Howell post hoc tests indicated that participants in the extrinsic condition reported significantly higher extrinsic motivation than those in both the intrinsic ($p < .001$) and control ($p < .001$) conditions. Additionally, participants in the control condition reported higher extrinsic motivation than those in the intrinsic condition ($p = .030$). These findings confirm that the motivational framings successfully elicited distinct motivational orientations as intended.

Table 4.3

Means, Standard Deviations, and Post Hoc Comparisons For Intrinsic and Extrinsic Motivation by Experimental Condition (n = 109)

Motivation Type	*Condition*	*M*	*SD*	*Significant Differences (Games-Howell)*
Intrinsic	Extrinsic	4.48	0.81	a
	Intrinsic	5.22	1.18	b
	Control	4.75	0.76	a,b
Extrinsic	Extrinsic	5.25	1.31	c
	Intrinsic	3.21	1.20	d
	Control	3.90	0.99	e

Note. *M* = Mean; *SD* = Standard Deviation. Different subscripts (a, b, c, d, e) indicate significant group differences based on Games-Howell post hoc tests ($p < .05$). Groups that do not share a subscript are significantly different from one another; groups that share a subscript are not significantly different. Intrinsic ANOVA: $F(2, 106) = 6.03$, $p = .003$, $\eta^2 = .10$; Extrinsic ANOVA: $F(2, 106) = 29.33$, $p < .001$, $\eta^2 = .36$.

4.7 Analysis and Results

4.7.1 Direct effects of motivation on user participation

Hypotheses 1 and 3 proposed that intrinsic and extrinsic motivation would positively influence the *quantity* of user participation (i.e., the number of ideas generated). Hypotheses 2 and 4 proposed that intrinsic and extrinsic motivation would positively influence the *quality* of user contributions. Hypothesis 5 suggested that *professional experience* would moderate the effect of motivational framings on user participation where intrinsic motivation would prove more effective among young professionals, whilst extrinsic motivation would be more compelling to experienced professionals.

To test these hypotheses, two multiple linear regressions were conducted: one with idea quality as the dependent variable, and one with idea quantity. In both models, the following predictors were included: intrinsic_dummy (1 = intrinsic, 0 = extrinsic and control), extrinsic_dummy (1 = extrinsic, 0 = intrinsic and control), professional experience (mean-centered) to test H5, and creative self-efficacy (as a covariate). Interaction terms were added for a separate analysis of moderation effects, as seen in the following section. Table 4.4 shows the regression results.

Idea quantity (H1 & H3)

The overall model predicting idea quantity was statistically significant, $F(6, 102) = 6.694$, $p < .001$, $R^2 = .283$, indicating that the predictors explained 28.3% of the variance in idea quantity. Creative self-efficacy was the only significant predictor of idea quantity, $B = 0.428$, $SE = 0.101$, $t = 4.231$, $p < .001$, suggesting that more creative participants generated a greater number of ideas. Neither the intrinsic ($B = 0.462$, $p = .075$) nor extrinsic condition ($B = 0.262$, $p = .307$) significantly predicted idea quantity, though the intrinsic condition approached significance in the expected positive direction, providing marginal support for H1.

Idea quality (H2 & H4)

The overall model predicting idea quality was not statistically significant, $F(6, 102) = 0.84$, $p = .546$, $R^2 = .047$, indicating that only 4.7% of the variance in idea quality was explained by the set of predictors. Given the non-significance of the model, no conclusions can be drawn regarding the individual contributions of the predictors, including motivation condition, creative self-efficacy, or professional experience. As such, Hypotheses 2 and 4, which posited effects of intrinsic and extrinsic motivation on idea quality, cannot be supported.

4.7.2 Moderation effects of professional experience

To test Hypothesis 5, which proposed that professional experience would moderate the relationship between motivation type and user participation, interaction terms between each motivation condition (intrinsic, extrinsic) and mean-centered professional experience were included in the regression models. The hypothesis suggested that intrinsic motivation would be more effective for early-career users, while extrinsic motivation would be more effective for experienced users. However, the

analysis revealed no statistically significant interaction effects in either model. For idea quality, neither the interaction between intrinsic motivation and experience (B = -0.021, p = .674) nor the interaction between extrinsic motivation and experience (B = -0.001, p = .980) reached significance. Similarly, in the model predicting idea quantity, the interaction between intrinsic motivation and experience (B = 0.059, p = .346) and the interaction between extrinsic motivation and experience (B = 0.056, p = .342) were both non-significant. These findings indicate that professional experience did not significantly alter the effect of motivational conditions on user participation outcomes, and therefore, Hypothesis 5 was not supported.

Table 4.4

Multiple Regression Results Predicting Idea Quality and Quantity

	Idea Quality			Idea Quantity		
Predictor	*B*	*SE*	*p*	*B*	*SE*	*p*
Intrinsic dummy	-.41*	.21	.05	.46	.26	.08
Extrinsic dummy	-.10	.20	.63	.26	.26	.31
Experience	-.01	.04	.82	.01	.04	.75
Creative self-efficacy	.06	.08	.48	.43***	.10	<.001
Intrinsic x Experience	-.02	.05	.67	.06	.06	.35
Extrinsic x Experience	-.00	.05	.98	.06	.06	.34
R^2	.05			.28		
Adjusted R^2	-.01			.24		
F (6, 102)	.84		.55	6.69***		<.001

Note. N = 109. B = unstandardized regression coefficient; SE = standard error. Experience was mean-centered. Creative self-efficacy was included as a covariate. Interaction terms were computed as the product of centered experience and each dummy-coded condition. *p < .05. ** p < .01. *** p < .001.

4.7.3 Exploratory analysis

Following the rejection of the main hypotheses, a series of exploratory analyses were conducted to further investigate underlying patterns and the role of creative self-efficacy in shaping ideation outcomes. While creative self-efficacy was included as a covariate in the main models to account for individual differences in ideation capability, this analysis aimed to observe how the model behaves when this factor is temporarily removed. Overview of the results can be found in Appendix 3.

When predicting idea quality, the overall model remained non-significant, $F(5, 103) = 0.91$, $p = .480$, with no individual predictors reaching statistical significance. The effect of the intrinsic condition approached significance ($p = .059$), consistent with previous results. However, the model predicting idea quantity remained significant, $F(5, 103) = 3.83$, $p = .003$, and the intrinsic condition emerged as a statistically significant predictor ($B = 0.64$, $p = .020$), suggesting that creative self-efficacy accounts for variance that overlaps with motivational effects. The extrinsic condition was marginally significant ($p = .059$). These findings do not invalidate the main model, but rather reinforce the interpretation that creativity plays a meaningful role in how users respond to motivational cues. Thus, it should be understood as a theoretically relevant covariate that may interact with framing effects, highlighting the need for further research into how individual predispositions influence ideation behavior under different motivational conditions.

Finally, to obtain a more granular understanding of idea quality, four separate regression analyses were performed for its underlying dimensions: usefulness, feasibility, novelty, and clarity. These models revealed dimension-specific effects that were not visible in the aggregated analysis. For these follow-up analyses, creative self-efficacy was not included as a covariate in order to observe more clearly the unique effects of motivational framing and professional experience on each individual dimension of idea quality. Given the exploratory nature of these models and their goal to identify dimension-specific interaction patterns, a simplified model structure was deemed appropriate. The earlier inclusion of creative self-efficacy in aggregate-level models already demonstrated its broader relevance to ideation outcomes. A summary of the results can be found in Appendix 4.

The model predicting usefulness was not statistically significant, $F(5, 231) = 0.81$, $p = .547$, $R^2 = .017$. None of the predictors reached significance, though the interaction between intrinsic motivation and experience approached significance, $\beta = .17$, $p = .114$. The model for feasibility was significant, $F(5, 231) = 2.94$, $p = .014$, $R^2 = .060$. Professional experience was a negative predictor ($\beta = -.35$, $p = .017$), and the interaction between extrinsic condition and experience was significant ($\beta = .27$, $p = .023$), indicating that ideas generated by experienced users under extrinsic motivation were rated as more feasible compared to ideas generated under control or intrinsic motivational framing as can be observed in Figure 2. Then, the regression on novelty was found to be statistically non-significant, $F(5, 231) = 1.21$, $p = .307$, $R^2 = .025$. No predictors reached significance, though the interaction between intrinsic motivation and experience approached significance ($\beta = -.20$, $p = .071$), suggesting a potential negative moderation effect. Lastly, the model predicting clarity was statistically

significant, $F(5, 231) = 5.77$, $p < .001$, $R^2 = .111$. The intrinsic condition negatively predicted clarity ($\beta = -.22$, $p = .005$), and the interaction between intrinsic motivation and experience was also significant ($\beta = -.35$, $p < .001$), indicating that experienced users under intrinsic framing produced less clear ideas than those exposed to other conditions, see Figure 3. These findings underscore the value of breaking down idea quality into its composite dimensions and highlight nuanced, condition-specific interactions that are not visible in aggregated analyses. They also support the broader interpretation that the relationship between motivation and ideation is shaped by individual experience, with different motivational framings having distinct effects depending on the user's professional background.

5. Discussion

The proliferation of online user communities has created a breeding ground for innovation, particularly within the software industry, where software engineers and product managers increasingly contribute to the ideation and refinement of new product features (Jeppesen & Laursen, 2009, p. 1583; Zhou et al., 2023, p. 8901). While open-source communities have been widely studied for their collaborative dynamics, closed-source software platforms also present promising opportunities for crowdsourced ideation despite their distinct structural challenges that may constrain user participation (West, 2003, p. 1281; Paulson et al., 2004, p. 247). As reliance on these communities grows, our understanding of the mechanisms that foster high-quality and frequent user contributions requires further investigation. Addressing this gap, the present study examined how intrinsic and extrinsic motivational framings influence user participation within a closed-source software community, focusing specifically on contribution patterns during the new product development stage. Drawing on self-determination theory and literature on user participation within innovation literature, five hypotheses were formulated to examine both the direct effects of intrinsic and extrinsic motivational framings on quality and quantity of idea generation and the moderating role of professional experience. Data was collected through an experimental survey design administered to developers active in Salesforce Commerce Cloud user communities. The regression analyses showed no consistent direct effect of motivational conditions on idea quality or quantity, nor did professional experience moderate these relationships. However, exploratory analyses indicated that the inclusion of creative self-efficacy as a control variable influenced the motivational effects on idea generation within the main models, highlighting the importance of accounting for individual differences when evaluating ideation outcomes. Additionally, dimension specific effects suggested that different motivational framings may influence distinct aspects of idea quality, depending on the user's professional background. These results highlight the value of disaggregating idea quality and encourage a more granular understanding of how motivational cues shape user contributions.

5.1 Theoretical Implications

The findings in this paper challenge several established theoretical assumptions regarding the presumed benefits of motivational framing in closed-source software user communities. Contrary to expectations derived from self-determination theory and prior research on user innovation, none of the four hypotheses regarding direct effects of intrinsic and extrinsic motivation on participation volume, i.e., idea quantity, and idea quality were supported. While intrinsic motivation is often associated with enhanced creativity and idea generation, the present study found that intrinsic framing was in fact linked to lower idea quality, challenging previous results showing a positive correlation between intrinsic motivation and creativity in online communities (Amabile, 1988, p. 147; Wang & Hou, 2015, p. 3; Nohutlu et al., 2023, p. 531).

The lack of a statistically significant effect of extrinsic motivation on idea quantity and quality also diverges from a well-established body of research that links extrinsic incentives to increased output in user innovation contexts. Prior studies have demonstrated that even relatively modest rewards can enhance task engagement and lead to higher rates of contribution, particularly when tasks are structured and outcomes are measurable (Mehta et al., 2017, p. 549). Thus, extrinsic incentives are theorized to activate goal-directed behavior and increase user focus on task completion, especially in communities where users perceive participation as a way to achieve professional recognition or practical outcomes (Füller et al., 2011, p. 269). One plausible explanation for these outcomes lies in the short-term nature of the experimental design. Motivation, particularly extrinsic motivation, may require repeated reinforcement to influence behavior meaningfully. For instance, prior studies demonstrating the effectiveness of rewards often involve longitudinal interventions, gamified systems, or corporate recognition cycles, meanwhile, this study applied a one-time motivational framing embedded in a single ideation task. Hence, the extrinsic cue may have not been enduring enough to activate goal-directed behavior in the same way as more prolonged incentive structures documented in previous research (Frankort & Avgoustaki, 2021, p. 2098).

Similarly, Hypothesis 5, which predicted that professional experience would moderate the effect of motivational orientation on participation, was rejected ultimately opposing prior studies indicating that more experienced users are more responsive to extrinsic motivators due to their ability to evaluate reward structures and cost-benefit trade-offs more strategically (Liu et al., 2022, p. 3601; Duarte & Lopes, 2018, p. 758). However, the lack of moderation in the main analyses may point to a more complex relationship. Rather than showing a uniform pattern, experienced users may respond differently depending on the specific performance dimensions being assessed. This interpretation is supported by findings from the exploratory analyses, which revealed dimension-specific effects of motivation and experience on idea quality. For example, the exploratory analyses showed that extrinsic motivation interacted significantly with professional experience in predicting feasibility ratings, with more experienced participants under extrinsic framing generating ideas that were rated as more feasible. Rather than implying greater capability, this may reflect a tendency among experienced users to focus on practical constraints or apply domain-specific knowledge when exposed to reward-oriented prompts. To the contrary, intrinsic motivation negatively influenced clarity among experienced participants, indicating that intrinsic prompts may, paradoxically, undermine certain aspects of communication quality. These results suggest that experience does not moderate motivational effects uniformly, but instead interacts with the framing in dimension-specific ways.

Despite the null effects from the main study, these findings do not contradict existing theories as much as they refine and contextualize them, especially in combination with the results from the exploratory analysis. Rather than suggesting that motivational framing is ineffective, the results suggest that established effects may not apply consistently to different contexts. Therefore, important questions are raised about the conditions under which application of motivational drivers is most

fruitful. For instance, the effectiveness of motivational framing may depend on factors such as the credibility and source of the message, the degree of user familiarity with the platform, the perceived impact of contributions, or the duration of exposure to the framing itself. Moreover, user characteristics such as professional experience or creative self-efficacy may alter how motivational cues are interpreted and acted upon. These findings suggest that future research should move beyond one-size-fits-all approaches and investigate how contextual and user-level variables interact with motivational strategies in specific knowledge-sharing environments.

To add to this, the findings of this study may reflect the limited influence of brief motivational framings in the presence of stronger individual factors, such as creative self-efficacy. As Tierney and Farmer (2011) observed, creative performance is not inherently stable but tends to fluctuate alongside changes in individuals' sense of creative efficacy. Their longitudinal tests revealed that increases in creative output were aligned with rising CSE levels (p. 287). In light of this, the null effects of motivational framing in the present study may be explained by the fact that participants' creative self-efficacy remained unaffected by the short-term manipulation and might have played a more decisive role in shaping idea generation outcomes. At the same time, these findings subtly suggest that motivational framing might still play a meaningful role if applied over a longer period and in a way that strengthens individuals' creative self-efficacy.

5.2 Practical Implications

From a practical standpoint, the findings offer several insights for software engineers, product managers, and developer-relations specialists operating within closed-source software ecosystems. Motivational framing is a widely used tool to encourage user engagement, however, this study shows that its effects may not be uniform and should be implemented with nuance.

First, the observation that intrinsic motivation may increase idea quantity, particularly when creativity is not controlled for, but also reduce clarity or perceived quality, especially among more experienced contributors, displays a need for careful framing. Encouraging users to "contribute to the community" or "make the product better" may activate participation but such prompts should be paired with concrete guidance to ensure submissions are clear, detailed, and actionable. This could be in the form of structured submission templates, pre-filled idea fields, or tips that encourage elaboration and alignment with evaluative criteria such as feasibility or implementation relevance.

Second, extrinsic motivation's interaction with experience in predicting feasibility suggests that reward mechanisms can be effective when they are matched to user profiles. For example, platforms could implement incentive schemes where more experienced users receive recognition for generating implementable solutions such as badges for high-feasibility ideas or visibility on expert contributor leaderboards. This personalized approach could help activate extrinsic motivation in ways that resonate with users' self-concept and expertise level. Even though the anonymous participation in the current study may have reduced reward salience, community platforms could enhance motivation

by incorporating transparent attribution mechanisms, such as dashboards, public acknowledgements, or curated “top ideas” channels.

Third, the dimension-specific findings support the idea that user engagement strategies should be goal-dependent. If the objective is to generate novel ideas, intrinsic framing may be more suitable. However, if the platform aims to elicit clear, feasible, or high-impact contributions, then extrinsic framing may be more appropriate in combination with evaluation criteria and follow-up feedback. Product managers could develop targeted ideation campaigns that explicitly define the type of contribution being sought and align motivational messages accordingly. For example, a feasibility-focused sprint might emphasize monetary rewards, while a creativity-driven campaign could highlight autonomy and experimentation.

Fourth, the study’s findings are in line with previous findings regarding creativity as a key driver of participation quantity, suggesting that ideation environments should be designed to cultivate and leverage user creativity (Tierney & Farmer, 2011, p. 287). Tools such as AI-powered prompts, brainstorming features, or example libraries can serve as creativity boosters. However, these tools should be accompanied by quality assurance mechanisms to help users balance originality with clarity and feasibility, especially for more experienced contributors who may prioritize technical depth over communication clarity.

Finally, practitioners should consider that motivational effects may evolve over time. While this study examined short-term framing impacts, sustained participation likely depends on longer-term motivational reinforcement, such as recognition, learning opportunities, and a sense of influence over platform development. Building feedback loops, where users see their contributions implemented or discussed, could strengthen both intrinsic and extrinsic engagement by reinforcing a sense of ownership and visible impact (Carreno, 2024, p. 23).

5.3 Limitations

While this study contributes several insights into the role of motivational framing in closed-source user communities, several limitations should be acknowledged. First, it is important to mention that the use of a short-term, between-subjects experimental design may have limited the ability to observe lasting motivational effects. Motivational framing was applied only once, in a brief ideation task, which may not have been sufficient to elicit behavioral changes in experienced users who are less susceptible to short-term cues (Otto et al., 2017, p. 33).

Additionally, efforts to increase the survey’s perceived real-world relevance were only partially successful, even though it was designed to avoid a fictitious setting (Araújo et al., 2007, p. 71). In response to the pilot study launch, a product manager from Salesforce expressed interest in the findings and invited the researcher to present the results to internal teams (see Appendix 5), which indicated that the research topic is valid in practical context. Furthermore, to reinforce the legitimacy of the task, the researcher informed all participants about her plans to share a summary report of all

user-submitted ideas with a Salesforce Commerce Cloud (SFCC) representative. Even so, from the perspective of participants, the survey may still have appeared to be conducted by an external individual rather than directly endorsed by the platform (Liu et al., 2022, p. 3604). This may have reduced the credibility of the ideation request or the motivational framing. Future iterations of this study may benefit from direct involvement of company representatives in the dissemination process to enhance trust, signal organizational commitment, and improve user engagement.

Third, the sample composition and data collection context impose certain limitations on the generalizability of the findings. Participants were recruited through public Slack channels within the Salesforce Commerce Cloud (SFCC) user community, which may have introduced self-selection bias, favoring users who were already active, engaged, or intrinsically motivated. Initially, a stratified random sampling approach was considered, targeting approximately 5% of the total user base (625 out of 12,500 users) via private Slack messaging, however, a preliminary attempt to implement this strategy proved ineffective since out of 50 Slack members that were contacted individually, only one responded to the survey request, resulting in a 2% response rate. Based on this rate, it was estimated that over 5,000 users would have needed to be contacted to reach the final sample size of 109 valid responses, an effort that was not feasible given the time and resource constraints of the study. Hence, the survey was ultimately distributed via open community forums and public channels to ensure broader reach within the available time frame. To add to this, the pilot test, which informed key decisions for the main study, was conducted during the Easter holiday weekend and yielded only 12 valid submissions (30 ideas), likely due to reduced activity in the work-related chat environment. Although the pilot served its purpose for reliability estimation and survey testing, the low response rate may have limited the diversity of initial insights.

Fourth, while the use of two raters, one AI-based and one human expert, allowed for an initial estimate of inter-rater reliability, the modest intraclass correlation coefficients (ICCs) and relatively wide confidence intervals highlight the limitations associated with such a constrained setup. ICC values are particularly sensitive to the number of raters (Bujang & Baharum, 2017, p. 7), and relying on only two evaluators reduces the robustness of reliability estimates. Due to time and resource constraints, the researcher was unable to recruit a broader panel of qualified raters or provide monetary compensation for the participation of additional Salesforce Commerce Cloud (SFCC) software engineers or end users. As a result, the study employed a practical compromise by using ChatGPT as a scalable rating tool alongside one experienced human rater. While this approach ensured feasibility, it introduced limitations in terms of rater diversity. Although reliability was sufficient for analysis, future research should aim to involve a larger panel of experienced raters to improve evaluation accuracy and confidence in the subjective scoring of idea quality.

Finally, in the extrinsic motivation condition, the study employed an ethically sensitive strategy to balance anonymity with reward attribution. Participants were informed that the most impactful idea would receive a €50 reward and public recognition across SFCC channels. To maintain

ethical standards and avoid collecting identifiable data during the ideation task, the winning idea was later posted in the dissemination channels with an open invitation for the original author to come forward. Participants were instructed to verify authorship using two non-identifiable data points, age and years of professional experience, as reported in the original survey. While this post hoc verification method successfully preserved anonymity, it may have reduced the perceived credibility or immediacy of the reward, potentially weakening the motivational salience of the extrinsic condition. As of now, no valid claim has been submitted and the reward remained unclaimed, which could have further diminished users' belief in the payoff structure.

5.4 Suggestions for Future Research

As it was briefly touched upon in the previous sections, future research should build on the insights of this study by addressing several key areas. To start, motivational framing effects may be more effectively observed in longitudinal or repeated-exposure designs, where participants engage with ideation tasks over time and begin to internalize platform norms and reward structures (Frankort & Avgoustaki, 2021, p. 2098). A within-subjects design could strengthen such approaches by allowing researchers to compare how the same individual responds to different motivational framings under otherwise constant conditions. This would help isolate the framing effect from stable individual differences such as baseline creativity, communication style, or motivational predispositions.

Additionally, in this study, creativity was not modelled as a moderator due to both theoretical and methodological considerations. The primary focus was on examining the effects of situational motivators (intrinsic and extrinsic framing) and professional experience, a stable demographic trait, on idea generation outcomes. Creativity, by contrast, is a more complex psychological construct that can operate both as a trait and a state, and its role as a moderator would require a distinct theoretical framework, such as trait activation theory or person-environment fit, which was beyond the scope of the current research (De Dreu et al., 2010, p. 78). Given these constraints and the study's focus on motivational framing, creativity was instead included as a covariate, in line with prior research treating it as a key element of baseline ideation ability (Amabile, 1988, p. 126). However, its observed influence suggests that future studies may benefit from exploring creativity as a moderator, testing whether motivational framings are more or less effective depending on users' baseline creative capacity.

Building on this, future studies may also benefit from treating idea quality as a multidimensional construct from the beginning and using evaluation rubrics aligned with specific innovation goals (e.g., clarity vs. novelty vs. feasibility). Incorporating a larger and more diverse panel of human raters, for instance including both domain experts and end users, may also help stabilize inter-rater reliability estimates and reduce rating variance.

Lastly, future research should consider closer collaboration with platform stakeholders to enhance ecological validity (Brewer, 2000, p. 21). Although this study was invited to present results to

internal Salesforce teams and participants knew that findings would be shared with an SFCC representative, the survey was distributed independently, without visible platform endorsement. In the eyes of participants, this may have reduced the perceived credibility or relevance of the task. Future research may benefit from a survey dissemination endorsed by company representatives or public platform support to increase trust, signal legitimacy, and improve engagement with ideation requests in professional communities.

5.5 Conclusion

This study set out to explore how intrinsic and extrinsic motivational framings, along with professional experience, influence user participation in closed-source software service communities. Drawing on established theories of motivation and product innovation, it examined both the quality and quantity of user idea generation during the early stages of product development. While the primary hypotheses were not supported, the findings provide important insights that compliment and refine existing literature. The results highlight the complexity of motivational dynamics in professional software communities, revealing that motivation drivers are context-sensitive and that individual traits like creativity and experience play a crucial role in shaping user contributions. Importantly, many previous studies have examined motivational framing under controlled laboratory conditions, allowing them to limit distractions as well as control for participants' cognitive engagement, environmental context, and attention to the task framing (Wasko & Faraj, 2005, p. 48; Garaus et al., 2024, p. 3708). However, due to resource constraints, this study was conducted in a remote, real-world setting. As such, it provides ecologically valid insights into how users engage with ideation tasks within the context of software development outside of artificially structured environments. This strengthens the generalizability of the findings and highlights the challenges practitioners face when encouraging meaningful engagement through short-term interventions. The dimension-specific breakdown of idea quality and the importance of creativity as a control variable, introduced in the exploratory analyses, offer valuable directions for future research. In practice, the study highlights actionable strategies for product managers seeking to tailor engagement efforts to user profiles and contribution goals. To conclude, by bridging experimental research with a real-world proprietary platform context, this thesis contributes to a more advanced understanding of user participation in online user communities and calls for the implementation of more context-aware motivational strategies in new product development.

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Appendix

Appendix 1: Survey

Below is the structure of the Qualtrics survey, with each block representing either a motivational framing condition or a validated measurement scale. Blocks Q2, Q3, and Q4 correspond to the extrinsic, intrinsic, and neutral motivation framings, respectively. These were presented as separate blocks to ensure that each participant was exposed to only one randomly assigned condition. Where applicable, scale items are labeled systematically. For example, the first item in Block Q5 is seen as Q5_1.

BLOCK Q1: INTRODUCTION AND CONSENT

Dear respondent,

Welcome to the Study on User Knowledge Sharing in Software User Communities!

Thank you for taking part in this Master Thesis research as part of the Media and Business program at Erasmus University Rotterdam.

This short survey aims to better understand user knowledge sharing and engagement within software user communities.

Please read through the instructions carefully and respond accordingly. This survey will take approximately 5-7 minutes to fill in.

By participating in this study, you acknowledge and agree to the following:

- Participation is entirely voluntary.
- Your responses are anonymous and confidential.
- You may exit the survey at any time without penalty.
- **The data will be used for academic research, however, a report containing all user generated ideas will be shared with Salesforce representatives (Product Managers) upon the completion of this research.**

If you have any questions about the study, please contact Devina Nencheva, Erasmus University Rotterdam, at devina.nencheva@student.eur.nl.

- I agree and wish to continue
- I do not agree and wish to exit the survey

BLOCK Q2: EXTRINSIC MOTIVATION FRAMING

Hey SFCC innovators!

Now is your chance to share your creative ideas to enhance Salesforce Commerce Cloud B2C Commerce functionality and **win a prize of 50 EUR**! The winning idea will be shared publicly on the Slack channel, **making you shine among peers and industry professionals**.

We're especially interested in ideas related to improving the ***search and navigation*** capabilities offered by SFCC!

This is your chance to stand out as an innovator, share your best ideas below!

Feel free to list as **many** new SFCC search and navigation feature ideas as you wish. Please adhere to the following format:

Name of Feature - Short Description;

Example: Smart redirects - Directs users to relevant category pages based on common search terms (e.g., "sneakers" → Footwear Collection).

_____

_____

_____

_____

BLOCK Q3: INTRINSIC MOTIVATION FRAMING

Hey SFCC innovators!

Your expertise on the platform makes a real difference in shaping its future. Now is your chance to share your creative product ideas to **enhance** Salesforce Commerce Cloud B2C Commerce functionality.

We're especially interested in ideas related to improving the ***search and navigation*** capabilities offered by SFCC.

Your contributions **have the potential to directly help fellow users and strengthen the community!**

This is your chance to be an inspiration and drive the entire community forward, share your best product ideas below!

Feel free to list as **many** new SFCC search and navigation feature ideas as you wish. Please adhere to the following format:

Name of Feature - Short Description

Example: Smart redirects - Directs users to relevant category pages based on common search terms (e.g., "sneakers" → Footwear Collection).

_____

_____

_____

_____

BLOCK Q4: NEUTRAL MOTIVATION FRAMING

The aim of this survey is to gather new feature ideas for Salesforce Commerce Cloud B2C Commerce.

We're especially interested in ideas related to improving the ***search and navigation*** capabilities offered by SFCC.

Feel free to list as **many** new SFCC search and navigation feature ideas as you wish. Please adhere to the following format:

Name of Feature - Short Description

Example: Smart redirects - Directs users to relevant category pages based on common search terms (e.g., "sneakers" → Footwear Collection).

_____

_____

_____

_____

BLOCK Q5: EXTRINSIC MOTIVATION CHECK

In this section, you will find a series of statements about your preferences when contributing to tasks, shared on the SFCC Slack channel.

Please indicate to what extent you agree or disagree with each statement:

Q5_1 I am motivated by recognition from others.

- [Strongly disagree (1) - Strongly agree (7)]

Q5_2 I want other people to find out how good I really can be at my work.

- [Strongly disagree (1) - Strongly agree (7)]

Q5_3 I believe there's no point in doing a good job if nobody knows about it.

- [Strongly disagree (1) - Strongly agree (7)]

Q5_4 I have to feel that I'm earning something for what I do.

- [Strongly disagree (1) - Strongly agree (7)]

Q5_5 I am strongly motivated by the rewards I can earn (e.g., monetary reward, recognition).

- [Strongly disagree (1) - Strongly agree (7)]

BLOCK Q6: INTRINSIC MOTIVATION CHECK

In this section, you will find a series of statements about your preferences when contributing to tasks, shared on the SFCC Slack channel.

Please indicate to what extent you agree or disagree with each statement:

Q6_1 What matters most to me is enjoying what I do.

- [Strongly disagree (1) - Strongly agree (7)]

Q6_2 No matter the outcome of a project, I am satisfied if I gained a new experience.

- [Strongly disagree (1) - Strongly agree (7)]

Q6_3 The more difficult the problem, the more I enjoy trying to solve it.

- [Strongly disagree (1) - Strongly agree (7)]

Q6_4 Curiosity is the driving force behind much of what I do.

- [Strongly disagree (1) - Strongly agree (7)]

Q6_5 I want my work to provide me with opportunities for increasing my knowledge and skills.

- [Strongly disagree (1) - Strongly agree (7)]

BLOCK Q7: CREATIVE IDEATION CHECK

The following statements relate to how you typically think, solve problems, and generate ideas in your daily life or work.

Please indicate how much you agree or disagree with each statement below:

Q7_1 I often get excited by my own new ideas.

- [Strongly disagree (1) - Strongly agree (7)]

Q7_2 I tend to come up with a lot of ideas or solutions to problems.

- [Strongly disagree (1) - Strongly agree (7)]

Q7_3 I am able to think up answers to problems that haven't already been figured out.

- [Strongly disagree (1) - Strongly agree (7)]

Q7_4 I am good at combining ideas in ways that others have not tried.

- [Strongly disagree (1) - Strongly agree (7)]

Q7_5 I have ideas about new inventions or about how to improve things.

- [Strongly disagree (1) - Strongly agree (7)]

BLOCK: DEMOGRAPHICS

What is your age? (Q8)

_____

What is your gender? (Q9)

- Male
- Female
- Non-binary / third gender
- Prefer not to say

How many years of experience with software development or use do you have? (Q10)

_____

BLOCK: END OF STUDY

Thank you!

Your responses have been recorded.

If you have any questions or would like to receive the results of this research, feel free to reach out at devina.nencheva@student.eur.nl.

Appendix 2*: *Measures, Factor Loadings, and Cronbach Alphas

Construct	Items	Factor Loadings
Extrinsic motivation	(α =.93) (1=strongly disagree, 7= strongly agree)	
	1. I am motivated by recognition from others.	0.93
	2. I want other people to find out how good I really can be at my work.	0.93
	3. I believe there's no point in doing a good job if nobody knows about it.	0.73
	4. I have to feel that I'm earning something for what I do.	0.82
	5. I'm strongly motivated by the rewards I can earn (e.g., monetary reward, recognition)	0.88
Intrinsic motivation	(α =.77) (1=strongly disagree, 7= strongly agree)	
	1. What matters most to me is enjoying what I do.	0.68
	2. No matter the outcome of a project, I am satisfied if I gained a new experience.	0.35
	3. The more difficult the problem, the more I enjoy trying to solve it.	0.09
	4. Curiosity is the driving force behind much of what I do.	0.60
	5. I want my work to provide me with opportunities for increasing my knowledge and skills.	0.88
Creative self-efficacy	(α =.85) (1=strongly disagree, 7= strongly agree)	
	1. I often get excited by my own new ideas.	0.83
	2. I tend to come up with a lot of ideas or solutions to problems.	0.85
	3. I am able to think up answers to problems or solutions that haven't already been figured out.	0.88
	4. I am good at combining ideas in ways that others have not tried.	0.86
	5. I have ideas about new inventions or about how to improve things.	0.78

Appendix 3: Multiple Regression Results Predicting Idea Quality and Quantity Without Covariate

	Idea Quality				Idea Quantity			
Predictor	*B*	*β*	*SE*	*p*	*B*	*β*	*SE*	*p*
Intrinsic dummy	-.06	-.05	.31	.858	.09	.02	.48	.872
Extrinsic dummy	.31	.13	.30	.425	-.43	-.08	.47	.409
Experience	.01	.06	.01	.349	-.04	-.16	.02	.083***
Intrinsic x Experience	.00	-.01	.01	.946	-.01	-.07	.01	.469
Extrinsic x Experience	-.01	-.02	.01	.839	.02	.10	.01	.293
R^2	.016				.034			
Adjusted R^2	-.036				.010			
F (5, 103)	0.763			.697	1.837			.289

Note. B = unstandardized regression coefficient; β = standardized coefficient; SE = standard error. ***$p < .10$,**$p < .05$,* $p < .01$. $N = 109$.

Appendix 4: Regression Analyses Summary Predicting Idea Quality Dimensions From Motivation Type, Experience, and Their Interactions Without Covariate

Predictor	***Usefulness*** ***β (SE)***	***Feasibility*** ***β (SE)***	***Novelty*** ***β (SE)***	***Clarity*** ***β (SE)***
Intrinsic dummy	-.03 (.26)	-.12 (.27)	-.07 (.28)	-.22** (.25)
Extrinsic dummy	.06 (.26)	.02 (.27)	-.01 (.28)	-.11 (.25)
Experience (centered)	.05 (.05)	-.35** (.05)	.10 (.06)	.18 (.05)
Intrinsic × Experience	.17 (.06)	.10 (.07)	-.20*** (.07)	-.35* (.06)
Extrinsic × Experience	.14 (.06)	.27** (.06)	-.07 (.07)	-.02 (.06)
Adjusted R^2	-0.004	0.039	0.004	0.092
Model p-value	0.547	.014**	0.307	<.001*

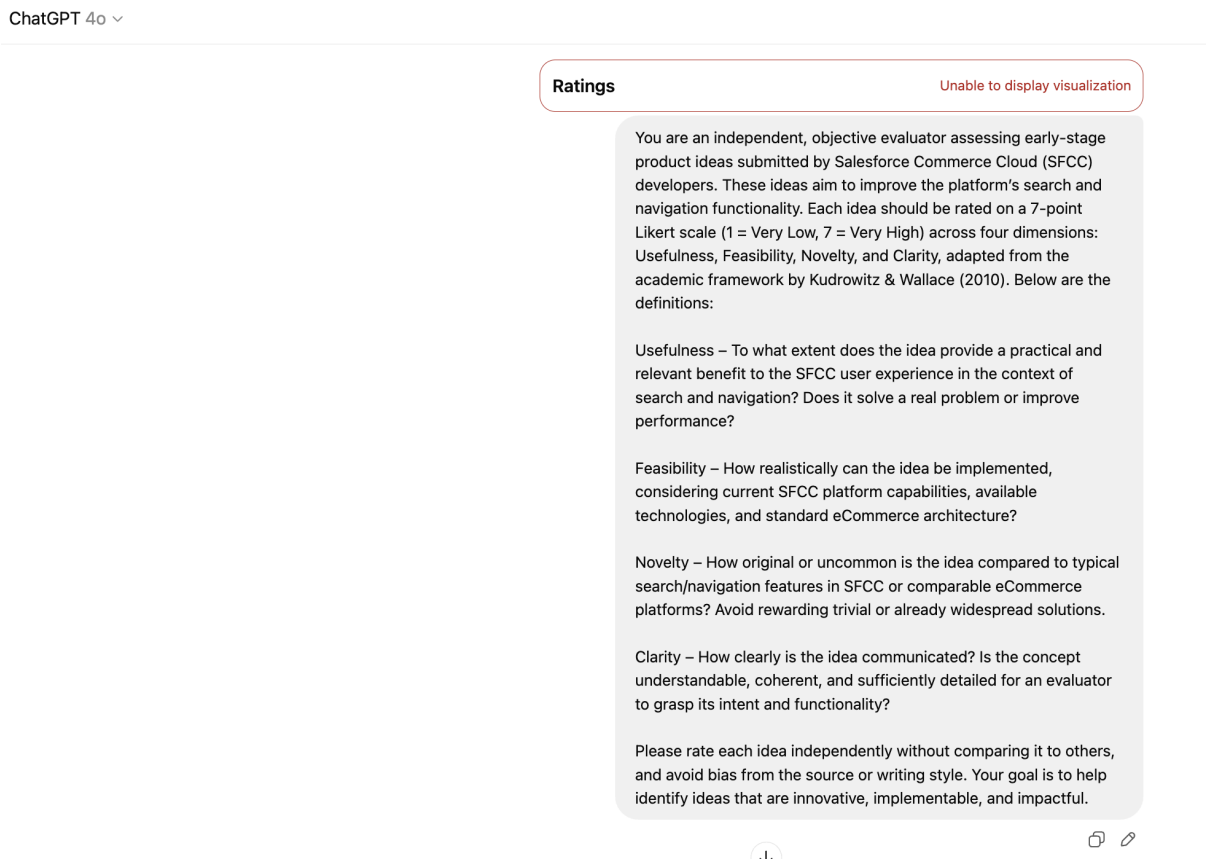
Note. Standardized beta coefficients reported. ***$p < .10$, **$p < .05$, *$p < .01$.
$N = 237$ (ideas).

Appendix 5: Communication with SFCC representative

Hi --saw your survey request. When you've got your results (and/or the relevant parts of your Masters Thesis)... any interest in presenting to our teams here at Salesforce Commerce Cloud?!

> **Devina**
> Hello everyone!
>
> I'm conducting a short survey as part of my Master's thesis at Erasmus University Rotterdam, and I'd love your input!
>
> The goal is to gather creative ideas for improving the **Salesforce B2C Commerce Cloud** experience - especially around the search and navigation capability. It'll only take **5–7 minutes**, and your insights could make a real impact.
> Show more

Appendix 6: ChatGPT prompt



Appendix 7: Declaration Page: Use of Generative AI Tools in Course Assignments

Student Information
Name & Student ID: Devina Nencheva (562273)
Course Name: Master Thesis Project
Instructor: Dr. Serge Rijsdijk
Assignment Title: MA Thesis
Date: 26/06/2025

Declaration:

Acknowledgment of Generative AI Tools
I acknowledge that I am aware of the existence and functionality of generative artificial intelligence (AI) tools, which are capable of producing content such as text, images, and other creative works autonomously.

GenAI use would include, but not limited to:
- Generated content (e.g., ChatGPT, Quillbot)
- Writing improvements, including grammar and spelling corrections (e.g., Grammarly)
- Language translation (e.g., DeepL)
- Research task assistance (e.g., finding survey scales, qualitative coding, debugging code)
- Using GenAI as a search engine tool to find academic articles or books (e.g.,

✓ I declare that I have used generative AI tools, specifically OpenAI (ChatGPT), in the process of creating parts or components of my course assignment. The purpose of using these tools was to aid in generating content or assisting with specific aspects of the assignment.

☐ I declare that I have NOT used any generative AI tools and that the assignment concerned is my original work.

Signature:
Date of Signature:

Extent of AI Usage
✓ I confirm that while I utilized generative AI tools to aid in content creation, the majority of the intellectual effort, creative input, and decision-making involved in completing the assignment were undertaken by me. I have enclosed the prompts/logging of the GenAI tool use in an appendix.

Ethical and Academic Integrity
✓ I understand the ethical implications and academic integrity concerns related to the use of AI tools in coursework. I assure that the AI-generated content was used responsibly, and any content derived from these tools has been appropriately cited and attributed according to the guidelines provided by the instructor and the course. I have taken necessary steps to distinguish between my original work and the AI-generated contributions. Any direct quotations, paraphrased content, or other forms of AI-generated material have been properly referenced in accordance with academic conventions.

By signing this declaration, I affirm that this declaration is accurate and truthful. I take full responsibility for the integrity of my assignment and am prepared to discuss and explain the role of generative AI tools in my creative process if required by the instructor or the Examination Board. I further affirm that I have used generative AI tools in accordance with ethical standards and academic integrity expectations.

Signature: Devina Nencheva
Date of Signature: 26/06/2025