

# **The Role of Fairness in Retaining Open Source Software Contributors: An Organizational Justice Framework for Platform Engagement**

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*By facilitating open source software (OSS) development online software platforms are constantly contributing to the tremendous growth of open source software. The main purpose of this study is to explore the relationship between volunteer OSS developers and OSS platforms. To achieve the goal, this study proposes a theory that perception of justice about the OSS platform defines the ongoing relationship between OSS platform and OSS developers. Drawing on social exchange theory, the study examines how perceptions of justice in rewarding contributors impact information systems and technology professionals' engagement with an OSS platform and their intention to contribute to future projects hosted by the OSS platform. The findings reveal that various dimensions of justice significantly affect both engagement and sustained participation intentions among information systems and technology professionals. The research advances open source literature by exploring the relationship between information systems and technology professionals contributing to open source projects and platform organizations, offering valuable insights for platforms seeking to foster long-term, voluntary engagement and enhance their standing within the open-source community.*

*Keywords: open source, software development, participation, reward, recognition, justice, organization engagement, platform engagement*

## **INTRODUCTION**

Open source software (OSS) development represents a transformative way of creating knowledge and software products, where “the economics of private goods, built on the scarcity of resources, is replaced by the economics of public goods, where scarcity is not an issue” (Hars & Ou, 2002, p. 25). Open source (OS) initiatives have delivered tremendous opportunities to collaborate and contribute to science and technology, opening doors to many new users (Swarts, 2019). Voluntary participation is central to OS initiatives, driven not by contracts or financial incentives but by contributors' choice to engage in various ways with OSS projects (Hertel et al., 2003; Benkler & Nissenbaum, 2006; Smith-Yoshimura & Shein, 2011; Alam &

Campbell, 2012, 2017; Ho & Rai, 2017; Lindberg et al., 2024; Bhuiyan & McKinzie, 2025). However, a lack of voluntary participation poses a significant challenge to many OSS development projects, highlighting the need to understand the factors influencing volunteers' intentions to continue contributing (Fang & Neufeld, 2009; Ho & Rai, 2017).

Considerable research in the information systems (IS) field has explored factors affecting information systems and technology (IST) professionals' participation in OSS environments, with much of this literature focusing on motivations—both intrinsic and extrinsic (Lindberg et al., 2024; Alam & Campbell, 2017; Hars & Ou, 2002; Hertel et al., 2003). Since OSS contributions are often voluntary and uncompensated, project-specific attributes and needs play a significant role in attracting and retaining volunteer contributors (Baird & Maruping, 2021). For instance, a higher level of code openness leads to a higher level of effective contribution from the open-source community to an open-source project (Mallipeddi et al., 2024). Project characteristics such as quality control mechanisms and project type have been shown to influence continued voluntary participation intentions (Ho & Rai, 2017). Moreover, interpersonal relationships among IST professionals can impact participation decisions. For example, Hahn et al. (2008) found that prior collaboration ties significantly influence the decision of IST professionals to join new OSS projects. Suppose an OSS project is treated as a job. In that case, its job characteristics (e.g., task identity, autonomy, or feedback) can influence an IST professional's job engagement, ultimately affecting their job satisfaction (Bhuiyan & McKinzie, 2025).

Existing research, however, has primarily considered continued participation from the perspective of individual OSS projects, without fully exploring how IST professionals' experiences in these projects shape their perceptions of the broader OSS platforms that host them. While individual developers can independently create and share OS software, platforms provide critical benefits, such as increasing visibility and connecting contributors across projects. Platforms allow IST professionals to discover other ongoing projects, identify areas of interest, and enhance their overall engagement. Consequently, understanding the relationships between individual IST professionals and OSS platforms is crucial, particularly in terms of sustained engagement with platform activities, such as new OSS projects and competitions. This study addresses this gap by investigating the factors influencing IST professionals' intentions to continue participating in OSS platforms.

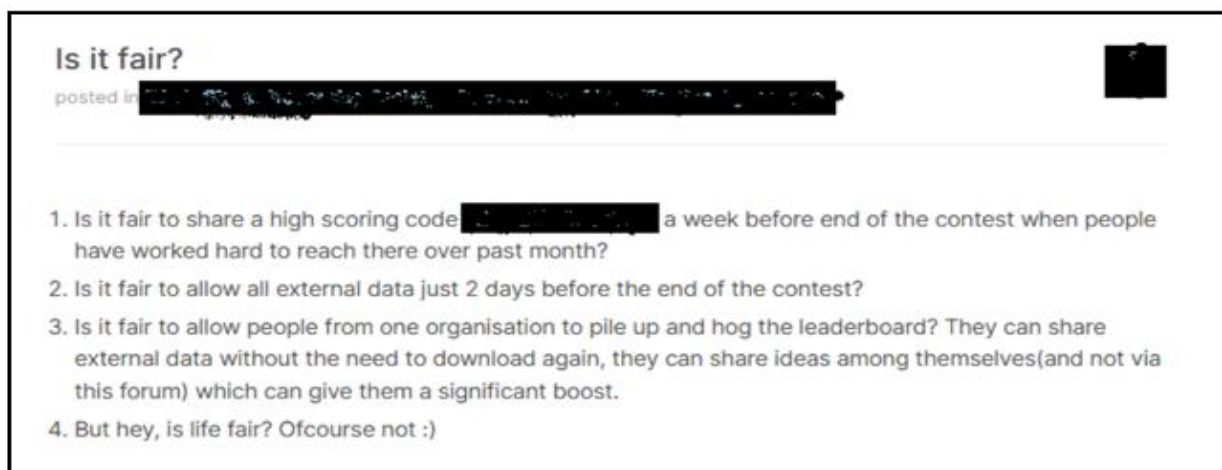
In the OSS environment, two main types of organizations play distinct roles. One type is the platform organization, which hosts software development and makes projects accessible to the public. The other is the organization that owns or initiates a specific OSS project. Although private individuals or groups own most OSS projects, they often rely on a platform to host and distribute their software or code. Without financial or contractual obligations, IST professionals' relationships with OSS platforms are shaped by their experiences with specific projects.

While OSS platforms typically do not directly compensate contributors, they play a crucial role in recognizing them through ranking systems and competitions. Ranking systems allow contributors to gain status within the platform community by assessing their contribution frequency or quality (Roberts et al., 2006). Many platforms also offer monetary incentives by hosting competitions, which motivate engagement and provide contributors with additional incentives and opportunities for recognition. The nature of these rewards—including their distribution, the fairness of determination procedures, and the clarity of communication—can shape the relationship between OSS platforms and the IST professionals who contribute. These experiences help IST professionals form perceptions about the platform's reward system, influencing their decisions to engage in future projects hosted on the platform.

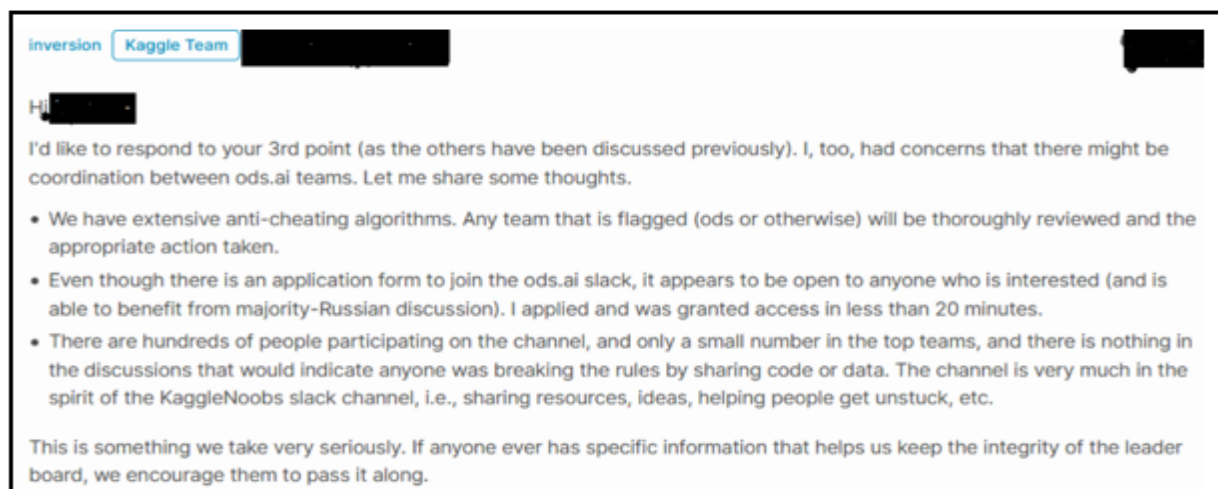
In organizational psychology, perceptions of fairness are referred to as the "perception of justice," encompassing both the fairness of the outcomes and the fairness of the processes producing those outcomes (Greenberg, 1990). The justice framework allows examination of how contributors perceive the rewards they receive, the transparency of reward-determination procedures, and the clarity of communication regarding these processes. These perceptions can foster a social exchange, motivating contributors to reciprocate through continued engagement on the platform. Justice researchers suggest that individuals view perceptions of justice as a "symbolic resource" inspiring reciprocative behavior in those who feel fairly treated (Colquitt et al., 2013).

For instance, Kaggle—a popular OSS data science platform—regularly hosts competitions with substantial monetary rewards. Even in the first couple of months of 2025, Kaggle organized numerous competitions, with rewards surpassing millions of dollars to winning teams and individuals (Kaggle, 2025). Questions of fairness sometimes arise on Kaggle’s discussion boards, where the Kaggle team actively addresses concerns, demonstrating a commitment to maintaining a fair and transparent environment. Figures 1 and 2 illustrate a discussion on Kaggle, displaying a participant’s fairness concern (Figure 1) and Kaggle’s response (Figure 2), along with responses from other members (identifying information redacted). When IST professionals perceive that rewards are fairly awarded, they are more likely to engage in future projects or competitions on the platform.

**FIGURE 1  
CONCERNS RAISED BY DISCUSSION LEADER<sup>1</sup>**



**FIGURE 2  
RESPONSE PROVIDED BY THE KAGGLE TEAM<sup>1</sup>**



Beyond platform participation, this study examines IST professionals’ engagement with the OSS platform itself. Engagement is a psychological construct that refers to the investment of physical, emotional, and cognitive resources by an individual in fulfilling a work role (Kahn, 1990). While engagement is often discussed in the context of specific jobs or tasks, research also examines engagement at the organizational

level, influencing outcomes such as organizational commitment (Anthony-McMann et al., 2017; Saks, 2006). This study argues that examining engagement alongside continued participation offers deeper insights into relationships between individual IST professionals and OSS platforms in OSS development.

Saks (2006) first conceptualized organizational engagement as distinct from job engagement, defining it as an employee's broader commitment to their organization. In this study, we introduce the concept of platform engagement to describe the bond between IST professionals and the OSS platform itself. We examine how perceptions of justice regarding rewards—developed through individual contributions to OSS projects—affect platform engagement, seeking to understand how these perceptions strengthen or weaken the ongoing relationship between IST professionals and an OSS platform.

To understand the role of justice perceptions, this study draws on social exchange theory, a foundational framework in organizational justice literature (Colquitt, 2008). Social exchange theory posits that individuals form reciprocal exchange relationships when they perceive mutual value in their interactions (Flynn, 2005). At the core of social exchange is reciprocity, as individuals track exchanges, assign value to them, and adjust their future interactions based on this balance (Faraj & Johnson, 2011). Applying this theoretical framework, this study examines how perceptions of justice related to OSS project rewards influence IST professionals' platform engagement and intentions to participate in future platform activities.

Our proposed research model examines how perceptions of distributive, procedural, and informational justice influence IST professionals' engagement with OSS platforms and their intentions to continue participating in future platform activities. To test this model, we surveyed IST professionals involved with various OSS projects across industries, including education, gaming, and communication. The projects were hosted on well-known OSS platforms, including GitHub, SourceForge, Kaggle, and Linux. In total, we analyzed 109 responses from IST professionals with roles ranging from peripheral developers to core members, finding support for our assertion that justice perceptions significantly impact engagement with the OSS platform and intentions to participate in future platform activities.

The study explores a previously overlooked aspect of OSS development: the role of justice perceptions in shaping contributing behavior. Perceptions of justice impact individual engagement and performance in the workplace, including IST projects (Bhuiyan & Setia, 2017). Here, we provide empirical evidence of similar effects in the open source domain. By applying social exchange theory to OSS platforms, this study expands the IS literature and offers insights into volunteer behavior dynamics within the OSS environment.

As organizations increasingly explore and utilize the OS environment for software development (Ho & Rai, 2017), they may assume that voluntary participation is unaffected by justice perceptions, given the absence of financial obligations. However, this study demonstrates that perceptions of fairness are crucial, even in volunteer-driven contexts. For IST managers, these findings underscore that subtle justice perceptions are integral to fostering sustained engagement in the open-source environment.

## **THEORY**

This section explores key concepts in the OSS context and establishes the theoretical foundations underpinning this study. We draw on two primary theories: organizational justice theory and social exchange theory (SET). Organizational justice theory helps examine individual perceptions of justice and their impacts on outcomes (Greenberg, 1990). Social exchange theory emphasizes reciprocity in relationships, suggesting that when individuals perceive fair treatment, they reciprocate through continued engagement and participation (Emerson, 1976; Flynn, 2005). Together, these theories allow exploration of how various dimensions of justice—distributive, procedural, and informational—influence IST professionals' engagement with OSS platforms and their intentions to participate in future platform activities.

### **Organizational Justice in Open Source Contexts**

*Organizational justice* provides a framework for understanding how individuals' perceptions of fairness in rewards and processes impact individuals' attitudes and behaviors (Greenberg, 1990). Originally conceptualized in organizational settings where formal employment relationships exist, this study explores

whether organization justice is relevant in volunteer-driven environments, such as OSS platforms, where formal contracts and compensation are absent (Hertel et al., 2003; Benkler & Nissenbaum, 2006; Smith-Yoshimura & Shein, 2011; Alam & Campbell, 2012, 2017; Ho & Rai, 2017). Without the binding force of financial compensation, perceptions of fair treatment may serve as a significant motivator for ongoing contributions.

The three types of justice—distributive, procedural, and informational—provide specific dimensions of fairness that influence contributors' experiences on OSS platforms. These constructs, adapted from Colquitt (2001), are widely recognized in justice research, including IS literature (e.g. Xue et al., 2011). In the context of open source, each type of justice can apply to the various forms of rewards and recognition received by contributors for their efforts.

*Distributive justice* refers to the perceived fairness of the outcomes of rewards relative to the effort contributed. According to Colquitt (2001), an outcome is something an individual receives in return for their service to an organization. Past research (e.g., Maslach et al., 2001) has identified three types of rewards—financial, social, and intrinsic. Merriam-Webster defines a reward as “something that is given in return for good or evil done or received or that is offered or given for some service or attainment,” while recognition involves acknowledging someone’s contributions in a meaningful way. Taken together, recognition may be viewed as a form of social reward. Since most IST professionals in OSS development are volunteers, this study considers non-monetary forms of rewards—such as recognition—as relevant outcomes contributors received while working on OSS projects. In the context of open source, distributive justice as the extent of fairness in the rewards related to the input provided by an IST professional in an OSS project.

*Procedural justice* concerns the fairness of the process used to determine the distribution of rewards. In OSS platforms, procedural justice might involve transparent and consistent criteria for determining who receives recognition or promotion to higher ranks. Maslach and colleagues (2001) suggest that procedural justice is particularly important when formal contracts are absent, as fair and predictable processes can help build trust among contributors. In this study, procedural justice is operationalized as the fairness of the procedures that determine who receives reward for their contributions to OSS projects, acknowledging that fair procedures can maintain contributor satisfaction, even in the absence of direct compensation.

*Informational justice* refers to the fairness of communication surrounding reward processes and outcomes. In OSS platforms, contributors rely on clear and transparent information to understand how rewards and recognitions are allocated. Xue et al. (2011) conceptualized informational justice as “the perception of fairness resulting from being provided with explanations for the decision” (p. 404). In the OSS context, informational justice refers to the extent to which platform leaders or project managers share relevant information that enables contributors to understand the reward process and enhances their ability to earn recognition. Transparent communication helps contributors feel fairly treated and fosters trust in the platform.

### **Outcomes in Open Source Context**

This study focuses on two primary outcomes: *intention to participate in future platform activities (IPFPA)* and *engagement with open source software platforms (OSSPE)*. Each construct provides insight into how IST professional interacts with OSS platforms, particularly regarding the impact of justice perceptions on their engagement and ongoing participation.

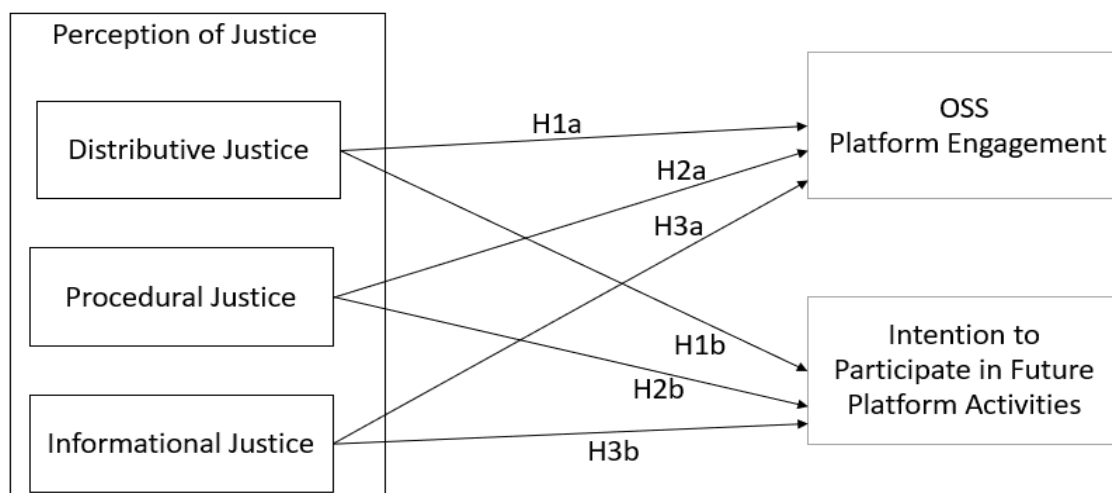
*Intention to participate in future platform activities* refers to the level of commitment IST professionals intend to make in future activities hosted by a specific OSS platform. This construct was adapted from Ho and Rai (2017), who conceptualized continued participation intention in the context of IST professionals' involvement with OSS projects. Here, it represents an IST professionals' anticipated commitment to engaging in subsequent activities on the same platform, such as contributing to new OSS projects or participating in platform-hosted competitions. Understanding these intentions is crucial for assessing whether perceptions of fair treatment influence contributors' willingness to remain active on the platform over time.

*Open source software platform engagement* describes an IST professional’s commitment to the open source platform that hosts the project to which they contribute. This concept is adapted from the organizational engagement framework proposed by Saks (2006), who distinguished between organizational engagement and job engagement (an individual’s engagement with their job). Saks (2006) defines organizational engagement as an individual’s emotional and cognitive investment in their organization. In this study, platform engagement represents a broader commitment beyond individual projects, capturing the IST professional’s relational bond with the OSS platform itself. For instance, when contributors feel fairly treated in reward allocation, they are more likely to experience a sense of loyalty and connection to the platform, driving continued engagement in platform-related activities. By distinguishing between platform engagement and project-specific commitment, this study provides a deeper understanding of contributors’ long-term engagement behaviors in volunteer-driven OSS environments.

Finally, the research model developed in this study attempts to examine how justice perceptions in OSS projects influence two outcomes: an IST professional’s engagement with the platform hosting the OSS project and their intention to participate in the platform’s future activities. SET offers a theoretical lens to examine these relationships, proposing exchanges are based on mutual value and a balance of contributions (Cropanzano and Mitchell 2005). “Social exchange theory can be viewed as a multidisciplinary paradigm that describes how multiple kinds of resources can be exchanged following certain rules and how such exchanges can engender high-quality relationships” (Colquitt et al., 2013, p. 200). Though limited, existing OSS research has applied SET to analyze relationship-building in open innovation communities. For instance, Faraj and Johnson (2011) employed a social exchange perspective to understand the dynamics within open innovation networks, suggesting that “the social aspect of the network is made even more salient by technological mediation of interaction” (p. 1466). Their study highlights the potential for examining social exchange dynamics, such as those created through justice perceptions, to shape interactions within OSS development platforms.

Justice perceptions, therefore, act as a symbolic resource, encouraging positive reciprocal behaviors in OSS environments where significant cognitive, physical, and emotional investments are. Without direct compensation, perceptions of justice may develop more subtly, shaped by extrinsic motivations for open-source participation. As identified by Roberts et al. (2006) and Hars and Ou (2002), contributors are often driven by motivations such as community identification, skill development, self-promotion, and opportunities for reward and recognition. Among these, reward and recognition provide the most tangible bases of justice perceptions, forming the foundation for positive reciprocal behaviors in OSS platforms. Figure 3 presents our proposed research model.

**FIGURE 3  
PROPOSED RESEARCH MODEL**



To examine the influence of justice perceptions on IST professionals' engagement and participation intentions in OSS platforms, this study draws on social exchange theory. SET identifies three primary forms of social exchange: negotiated, reciprocal, and generalized (Flynn, 2005). While Emerson (1976) proposed a fourth form of social exchange, called productive exchange, subsequent researchers have formulated it in a generalized form (Flynn, 2005). The negotiated and generalized forms of social exchange serve the interests of self and group, respectively. Reciprocal exchange, however, can serve both individual and collective interests. Reciprocal exchanges typically involve a sense of obligation to return favorable actions but may not require explicit terms (Flynn, 2005).

Participation in an OSS platform aligns well with reciprocal social exchange since IST professionals are often motivated by both intrinsic and extrinsic factors (Roberts et al., 2006). SET posits that perceptions of justice create a sense of obligation, which can lead to reciprocative behaviors that support organizational goals (Colquitt, 2013). When employees perceive justice in their workplace, they are more likely to feel obligated to reciprocate with behaviors that benefit organizational performance (Colquitt et al., 2013; Zhang et al., 2014). Research has shown that positive justice perceptions foster compliance with laws (Xue et al., 2011), promote positive relationships among team members (Colquitt, 2001; Masterson et al., 2000), and enhance organizational citizenship behaviors and engagement (Saks, 2006). Building on these findings, this study proposes that a similar reciprocal form of social exchange also occurs in the open-source environment.

Although IST professionals contributing to OSS projects are generally unpaid, they are likely to form justice perceptions based on the rewards they receive. Researchers (e.g., Cropanzano & Byrne, 2000; Rupp, et al., 2001; Cropanzano & Rupp, 2008) suggest that "justice reflects the sort of symbolic resource that should foster reciprocative actions on the part of employees" (Colquitt et al., 2013, p. 201). Maslach et al. (2001) argued that engagement at work is positively related to perception of justice, and disengagement when justice is perceived to be lacking. Saks (2006) similarly noted that when employees perceive justice within their organization, they feel compelled to reciprocate with greater levels of engagement.

Thus, if IST professionals perceive that the rewards they receive are inadequate compared to their contributions, they may feel disengaged from the platform hosting the OSS project. This disengagement may not immediately affect their involvement in a specific project, especially if they wish to avoid being perceived as quitters by the OSS community or feel a sense of obligation to see a project through to completion. However, once a project reaches completion or a milestone, they may choose not to participate in future projects hosted by the platform organization. Based on these insights, we propose the following hypotheses:

**H1a:** *The perception of distributive justice of rewards in an OSS project will positively influence an IST professional's OSSPE that hosted the OSS project.*

**H1b:** *The perception of distributive justice of rewards in an OSS project will positively influence an IST professional's IPFPA.*

Procedural justice is closely related to distributive justice, with the distributive justice focusing on outcomes and procedural justice on the fairness of the processes used to determine those outcomes. Research shows that procedural justice is highly correlated with organizational commitment (Colquitt et al., 2013). In the OSS development context, procedural justice may be even more important. Given the volunteer nature of OSS, IST professionals expect transparent and fair processes for determining and distributing rewards. Even if the rewards are limited or symbolic, strong procedural justice can maintain contributors' satisfaction.

Platform organizations actively support OSS projects by promoting them, recruiting contributors, and hosting competitions. For instance, after a Kaggle-hosted competition distributes rewards, participants may expect Kaggle to ensure fair procedures are followed. When procedural justice is perceived as lacking, IST professionals may blame both the OSS project organizer and the OSS platform, which can affect their engagement and intention to participate in future platform activities. Hence, we hypothesize:

*H2a: The perception of procedural justice of rewards in an OSS project will positively influence an IST professional's OOSPE that hosted the OSS project.*

*H2b: The perception of procedural justice of rewards in an OSS project will positively influence an IST professional's IPFPA.*

Informational justice, or the fairness of communication about reward processes and outcomes, is particularly important in the decision-making processes of IST professionals (Xue et al., 2011). In OSS development, contributors expect information regarding potential rewards to be shared fairly among all participants. The nature of open source itself—focused on transparency and shared knowledge—makes accurate and open communication essential. OSS platforms offer various methods for communicating with contributors, including discussion boards, email, social media, and community guidelines. When contributors perceive that relevant information is missing or insufficient, they may view the platform as being poorly managed, leading to reduced engagement.

On the other hand, clear communication of reward processes enhances IST professionals' sense of trust and fairness in the platform. Informational justice may foster a sense of loyalty, driving continued engagement with and participation in the platform's future activities. Based on these ideas, we propose the following hypotheses:

*H3a: The perception of informational justice of rewards in an OSS project will positively influence an IST professional's OSSPE that hosted the OSS project.*

*H3b: The perception of informational justice of rewards in an OSS project will positively influence an IST professional's IPFPA.*

## **METHOD**

### **Study Design and Procedure**

This study employed a cross-section survey design to examine IST professionals' perceptions of justice, engagement and participation within OSS platforms. As a non-interventional survey study, the research received exempt status from the Institutional Review Board at the primary author's university.

Data collection was conducted via Amazon Mechanical Turk (AMT), which served as the primary recruitment and marketing tool to reach potential respondents. The survey itself was hosted on the Qualtrics platform. An anonymous link directed interested IT professionals from AMT to Qualtrics. Respondents were paid \$5 for completing the survey in full. Upon reaching the end of the survey, each participant received a randomly generated seven-digit code to enter into AMT to confirm completion and receive payment. To further ensure data quality, respondents were limited to four hours to complete the survey. This four-hour limit began when the participants agreed to respond to the AMT survey invitation and ended once they submitted the code obtained for survey completion.

The survey was specifically marketed to IST professionals on AMT to reach the target audience. The AMT category 'Job Function – Information Technology' within AMT was set as a requirement to filter respondents. Additional screening questions were included in the survey to further ensure responses met study criteria: "Are you an information system or technology professional?" and "Are you currently participating in or have recently participated in one or more open source development of information systems projects?" These questions were paired with a highlighted note clarifying that a "potential participant of this survey must be an information systems or technology professional who is currently contributing to or has contributed to one or more open source software development project(s)." Participants who responded "no" to these screening were automatically redirected out of the survey, terminating further participation. Such respondents received a thank-you message explaining the termination. This combination of targeted recruitment, time limitations, and initial screening ensured that only qualified IST professionals

with relevant OSS development experience participated, providing a focused and reliable dataset for the study's analysis.

### Sample and Screening Criteria

A total of 290 IST professionals completed the survey, each providing the code needed to confirm completion and receive payment. However, only 109 responses were included in the final analysis. Responses were excluded from the final analysis for two primary reasons. First, respondents were excluded if they did not receive any form of reward in the OSS projects referred to in this study. A total of 53 responses were excluded from the final analysis for this reason. Second, responses that did not include complete answers for the focal variables—perceptions of justice, platform engagement, and continued participation intention—or for relevant control variables, such as gender, age group, OSSD experience, and project tenure, were deemed as incomplete and excluded from the final analysis. This resulted in the exclusion of 128 responses, leaving 109 usable responses for analysis (n = 109).

Approximately 20% of the respondents were female, and the remaining respondents were male. Most respondents were in the 21–30 age group (52%), followed by the 31–40 age group (39%). Younger professionals, particularly those in their 20s and 30s, were more heavily engaged in open source development than older IST professionals. The demographic data also indicated that more male IST professionals contributed to OSS projects and received rewards compared to female IST professionals. Table 1 provides a detailed demographic breakdown.

**TABLE 1  
PARTICIPANTS' DEMOGRAPHICS**

<b>Age Group</b>	<b>Female</b>	<b>Male</b>	<b>Total</b>
Below 20 years	0	2	2
Between 21 and 30 years	11	46	57
Between 31 and 40 years	11	32	43
Between 41 and 50 years	0	6	6
Above 50 years	0	1	1
Total	22	87	109

The respondents averaged approximately 5 years of work experience in OSS development. The largest group of respondents (32%) contributed to OSS projects both voluntarily and for payment, while 18% exclusively volunteered, and 16% contributed solely for payment. Respondents participated in a range of projects, with some having worked on as many as 40 OSS projects, while others were engaged in their first. Approximately 90% of respondents reported holding full-time jobs in the domain of proprietary software development, and the average number of contributors per project was 12.

The respondents reported participation in both volunteer-based (51) and paid (58) OSS projects. Among these, most projects were initiated by private individuals or groups (34%), followed by platform organizations (28%), non-profits other than the platform (20%), and for-profit organizations. The top five platforms favored by respondents were GitHub, Linux, Kaggle, SourceForge, and Oracle BeehiveOnline. Respondents reported contributing to projects hosted across various OSS platforms, which were compatible with multiple operating systems, such as Linux and Windows. These projects served diverse purposes, including e-commerce, security enhancements, artificial intelligence, patient data systems, heatmapping, internet bots, and cryptocurrency.

### Measures

This study operationalized its focal constructs using established and validated scales from prior literature. The variables of interest included perceptions of justice (distributive, procedural, and

information) and relevance to the OSS development context, all measures were adapted where necessary (listed in Table 2), and responses were recorded on a seven-point Likert-type scale ranging from (1) “strongly disagree” to (7) “strongly agree.”

*Justice Perceptions*

*Distributive justice* was assessed using a 4-item scale from Colquitt (2001), adapted for the OSS context. Items evaluated fairness of rewards relative to the participant’s contributions, such as “Did your rewards reflect the effort you put into your project?” *Procedural justice* was measured using a 7-item scale from Colquitt (2001), also adapted for the OSS context. This scale assessed the fairness of processes leading to reward distribution, with items like: “Were those procedures free of bias?” *Informational justice* was evaluated using a 5-item scale from Colquitt (2001), tailored to the communication practices of project managers or platforms in OSS context. An example item is: “Did the project manager or platform explain the procedures thoroughly about how the recipient of the reward will be determined?”

*Open Source Software Platform Engagement*

*OSSPE* was measured using a six-item scale adapted from Saks (2006). The items captured participants’ cognitive, emotional, and behavioral engagement with the platform hosting the OSS project. Example items included: “Being a member of this organization is exhilarating for me” and “I am highly engaged in this organization.”

*Intention to Participate in Future Platform Activities*

*IPFPA* was measured using a two-item scale adapted from Ho and Rai (2017), focusing on participants’ commitment to future engagement with the platform. Example items included: “I plan to continue to participate in projects hosted in [platform name].”

In adapting the scales, items were minimally revised to fit the OSS context without fundamentally altering their meaning. For instance, “Does your (outcome) reflect the effort you have put into your work?” was modified to “Did your rewards reflect the effort you put into your project?”

**TABLE 2  
MEASUREMENT ITEMS FOR THE FOCAL VARIABLES**

<p><i>Distributive Justice</i></p> <p>The following items refer to your rewards that you received due to your participation in the open source software project. To what extent:</p> <ul style="list-style-type: none"> <li>• Did your rewards reflect the effort you put into your project?</li> <li>• Were your rewards appropriate for the work you completed?</li> <li>• Did your rewards reflect what you contributed to the project?</li> <li>• Were your rewards justified, given your performance?</li> </ul>
<p><i>Procedural Justice</i></p> <p>The following items refer to the procedures used to arrive at the rewards that you received for your participation in the open source software project. To what extent:</p> <ul style="list-style-type: none"> <li>• Were you able to express your views and feelings during those procedures?</li> <li>• Did you have influence over the rewards arrived at by those procedures?</li> <li>• Were those procedures applied consistently?</li> <li>• Were those procedures free of bias?</li> <li>• Were those procedures based on accurate information?</li> <li>• Were you able to appeal the rewards arrived at by those procedures?</li> <li>• Did those procedures uphold ethical and moral standards?</li> </ul>

<p><i>Informational Justice</i></p> <p>The following items refer to the project management/leadership who were responsible for determining and distributing rewards for your participation in the open source software project. To what extent:</p> <ul style="list-style-type: none"> <li>• Was the project manager or platform candid in his/her communications with you about the rewards?</li> <li>• Did the project manager or platform explain the procedures thoroughly about how the recipient of the reward will be determined?</li> <li>• Were the project manager or platform explanations regarding the procedures reasonable?</li> <li>• Did the project managers or platform communicate project or competition details in a timely manner?</li> <li>• Did the project manager or platform tailor his/her communications to individuals' specific needs?</li> </ul>
<p><i>Platform Engagement</i></p> <p>Please rate how engaged you are in the platform organization (the platform name goes here) that is hosting the open source software project in question.</p> <ul style="list-style-type: none"> <li>• Being a member of this organization is very captivating.</li> <li>• One of the most exciting things for me is getting involved with things happening in this organization.</li> <li>• I am really not into the "goings-on" in this organization (R).</li> <li>• Being a member of this organization make me come "alive."</li> <li>• Being a member of this organization is exhilarating for me.</li> <li>• I am highly engaged in this organization.</li> </ul>
<p><i>Intention to Participate in Future Platform Activities</i></p> <ul style="list-style-type: none"> <li>• I predict I would continue participating in projects hosted in (platform name).</li> <li>• I plan to continue to participate in projects hosted in (platform name).</li> </ul>

**Control Variables**

To account for alternative explanations, this study included several control variables related to individual attributes and project characteristics. Individual-level controls included gender (coded as a binary: female or male) and age (divided into five age groups: below 20 years, 21 – 30, 31 – 40, 41 – 50, and above 50), both of which are important in various IS and non-IS studies (Anthony-McMann et al., 2017; Ho & Rai, 2017; Morris & Venkatesh, 2010; Rich et al., 2010; Saks, 2006).

Several project-related attributes, identified as important in the OS literature, were included as controls. These included project phase, project update frequency, team size, contribution type (voluntary or paid), experience in OSSD, and tenure in the project (e.g., Ho & Rai, 2017; Faraj et al., 2015; Setia et al., 2012). Team size reflected the total number of contributors to the project. Tenure in project was measured in years, with months converted into fractional years.

**Analysis and Results**

This study followed a standard approach to analyze the proposed research model, focusing first on the reliability and validity of the scales used, followed by testing the proposed relationships between justice perceptions and the focal outcomes of platform engagement and intention to participate in future platform activities.

**Measurement Model Evaluation**

The reliability of the scales was assessed using Cronbach's Alpha, with all focal variables exceeding the acceptable threshold of 0.70. Cronbach's Alpha scores were as follows: distributive justice (0.82), procedural justice (0.76), informational justice (0.79), OSS platform engagement (0.84), and intention to participate in future platform activities (0.72). These results confirm the internal consistency of the scales. Reliabilities date is shown in Table 4.

To assess the convergent and discriminant validity of the constructs, factor analysis was conducted using principal components with varimax rotation and Kaiser normalization. The rotation converged in six iterations, identifying five factors. Bartlett’s test of sphericity (Chi-Square =714.14,  $p < .005$ ) confirmed the dataset’s suitability for factor analysis (Bartlett 1950). Community values for all items exceeded 0.50, and the average factor loadings were above 0.70. Average variance extracted (AVE) values were also above 0.50, indicating strong convergent validity (Fornell & Larcker, 1981). No cross-loading exceeded the acceptable threshold, substantiating discriminant validity. Table 3 details the factor loadings.

The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was 0.85, labeled as “meritorious” (Kaiser & Rice, 1974). This confirmed the sample’s adequacy for factor analysis, eliminating the need to examine the anti-image correlation matrix. Harman’s one-factor test was conducted to evaluate the presence of common method bias, which survey data are often prone to (Podsakoff et al., 2003). The test results indicated that no single factor accounted for the majority of the variance, confirming the absence of significant common method bias (Iyengar et al., 2015).

Several items were excluded due to low factor loadings or contextual irrelevance to the OSS environment. One item from distributive justice—“Were your rewards appropriate for the work you completed?”—was dropped due to ambiguity between “work” and “contribution.” Four procedural justice items were excluded as they were incompatible with the OSS context, such as “Were you able to appeal the rewards arrived at by those procedures?” Similarly, two informational justice items were dropped because they did not align with the OSS environment, where communication structures often lack formalized processes. For example, items referring to tailoring communications to individuals’ specific needs were deemed irrelevant. Additionally, two reverse-coded platform engagement items—including “I am really not into the “goings-on” in this organization”—were removed due to validity concerns, as reverse-coded items have been shown to introduce respondent confusion and reduce the validity of scales (Morris and Venkatesh, 2010).

**TABLE 3**  
**FACTOR ANALYSIS WITH VARIMAX ROTATION AND KAISER NORMALIZATION**

	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
Distributive Justice 1	<b>0.77</b>	0.17	0.26	0.18	0.17
Distributive Justice 3	<b>0.74</b>	0.28	0.23	0.25	-0.07
Distributive Justice 4	<b>0.73</b>	0.07	0.17	0.34	0.24
Procedural Justice 2	0.08	<b>0.89</b>	0.19	0.20	0.13
Procedural Justice 6	0.34	<b>0.72</b>	0.21	0.26	-0.12
Informational Justice 1	0.32	0.22	<b>0.65</b>	-0.03	0.36
Informational Justice 2	0.11	0.15	<b>0.83</b>	0.14	0.10
Informational Justice 5	0.17	0.12	<b>0.83</b>	0.26	-0.05
OSS Platform Engagement 1	0.40	0.16	-0.05	<b>0.72</b>	0.13
OSS Platform Engagement 2	0.07	0.10	0.26	<b>0.75</b>	0.23
OSS Platform Engagement 4	0.12	0.26	0.24	<b>0.74</b>	0.05
OSS Platform Engagement 6	0.31	0.10	0.07	<b>0.79</b>	0.10
Intention to participate in future Platform activities 1	0.11	-0.03	-0.03	0.18	<b>0.63</b>
Intention to participate in future Platform activities 2	0.09	0.03	0.17	0.25	<b>0.86</b>

The mean scores for justice perceptions exceeded 5.11, while OSS platform engagement and intention to participate in future platform activities scored 5.57 and 5.86, respectively. Standard deviations for most variables hovered around 1, except for procedural justice which had a standard deviation of 1.44. These descriptive statistics (detailed in Table 4) indicate that the focal variables—distributive justice, procedural justice, informational justice, intention to participate in future platform activities, and OSS platform engagement—were skewed toward higher scores, consistent with expectations for self-reported data

variables (Belanger et al., 2001). Similar upward skewness has been observed in previous engagement studies (e.g., Rich et al., 2010).

The Shapiro-Wilk test—an effective test of normality for sample sizes less than 5,000 (Razili & Wah, 2011)—yielded p-values less than 0.05 for the focal variables, indicating that their distributions significantly deviated from normality. To address normality concerns, the variables were transformed using a logarithmic function. The log transformations improved the distributions, producing a closer approximation to normality and enabling more robust statistical analyses (Tabachnick & Fidell, 2013).

Table 5 presents the correlations among the variables after applying log transformations to address normality concerns. Control variables showed slight correlations with the focal variables and other control variables. As expected and consistent with Colquitt's (2001) findings, the three justice perceptions—distributive, procedural, and informational—were highly correlated, reflecting their conceptual interconnectedness. All three justice perceptions showed significant correlations with IPFPA and OSSPE, except for procedural justice, which was not significantly correlated with intention. In addition, OSS platform engagement and intention to participate in future platform activities were significantly correlated with each other. These results provide preliminary support for the proposed relationships in the research model.

**TABLE 4  
DESCRIPTIVE STATISTICS AND RELIABILITIES**

	Gender	Age Group	OSD Exp	Tenure In Project	Contr. Type	Project Phase	Project Update	Team Size	Dist. Justice	Proc. Justice	Info. Justice	Platform Eng.	Intention to Participate
Mean	0.20	2.51	4.67	1.85	0.47	2.12	2.42	8.05	5.59	5.11	5.36	5.57	5.86
Standard Error	0.04	0.06	0.32	0.14	0.05	0.08	0.07	0.60	0.11	0.14	0.11	0.09	0.10
Median	0.00	2.00	4.00	1.33	0.00	2.00	3.00	6.00	6.00	5.00	5.33	5.75	6.00
Mode	0.00	2.00	3.00	1.25	0.00	3.00	3.00	5.00	6.00	6.00	6.00	5.50	7.00
Standard Deviation	0.40	0.68	3.34	1.41	0.50	0.79	0.75	5.89	1.16	1.44	1.16	0.94	0.99
Sample Variance	0.16	0.46	11.16	1.99	0.25	0.62	0.56	34.70	1.35	2.07	1.34	0.88	0.99
Kurtosis	0.27	0.89	6.27	1.60	-2.02	-1.36	-0.56	2.39	1.35	-0.06	0.91	0.38	-0.17
Skewness	1.51	0.78	2.16	1.36	0.13	-0.22	-0.60	1.48	-1.06	-0.70	-0.82	-0.79	-0.74
Range	1.00	4.00	21.00	6.17	1.00	2.00	3.00	31.00	6.00	6.00	6.00	4.50	4.00
Minimum	0.00	1.00	0.00	0.08	0.00	1.00	1.00	1.00	1.00	1.00	1.00	2.50	3.00
Maximum	1.00	5.00	21.00	6.25	1.00	3.00	4.00	32.00	7.00	7.00	7.00	7.00	7.00
Reliabilities	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.82	0.76	0.79	0.84	0.72

**TABLE 5**  
**CORRELATIONS**

Variables	1	2	3	4	5	6	7	8	9	10	11	12
1 Gender												
2 Age Group	-0.01											
3 OSD Exp	0.00	.49**										
4 Contribution	-.20*	-.01	-.05									
5 Pro. Phase	-.16	.27**	.29**	0.00								
6 Project Update	-.19*	0.15	0.15	-0.11	.211*							
7 Tenure in Project	-0.01	0.13	.33**	-0.14	0.11	0.09						
8 Team Size	.28**	-0.06	0.12	-0.12	-0.03	0.18	0.02					
9 Distributive Justice	0.04	-0.02	.19*	-0.11	0.08	0.08	.24*	.45**				
10 Procedural Justice	0.14	-.24*	0.02	-0.11	-0.08	0.01	.25*	.30**	.46**			
11 Informational Justice	-0.04	-0.12	0.15	-0.10	0.12	0.19	.27**	0.18	.58**	.44**		
12 OSS Platform Engagement	-0.03	-0.10	.20*	-0.06	-0.05	-0.07	.27**	0.17	.58**	.44**	.44**	
13 Intention to Participate in Future Platform Activities	0.03	0.02	0.08	-0.07	0.05	0.14	.23*	.24*	.52**	0.10	.36**	.43**

Note: \*p < 0.05; \*\*p < 0.01

## Hypothesis Testing

This study tested the research model's central premise that perceptions of justice in open source projects influence IST professionals' engagement with the OS platform organization and their intention to participate in future platform activities. Ordinary least squares (OLS) regression was employed to examine these relationships in two phases. Variance inflation factors (VIF) were calculated to assess multicollinearity, and all VIF remained well below the acceptable threshold of 10 (Gruber et al., 2010; Petter et al., 2007), confirming the absence of serious multicollinearity issues.

### *Phase 1: OSS Platform Engagement Model*

The first phase evaluated the impact of justice perceptions on IST professionals' engagement with OSS platforms. Initially, the regression model included only the control variables, none of which had a significant influence on IST professionals' OSS platform engagement. The control-only model explained 15.03% of the variance in OSS platform engagement. Subsequently, the three justice perceptions—distributive, procedural, and information—were added to the OLS model. This inclusion increased the variance explained to 47.92%, a substantial improvement of 32.89% over the control-only model. Results, detailed in Table 6, indicated significant positive relationships for distributive justice ( $B = 0.05$ ,  $p < 0.005$ ) and procedural justice ( $B = 0.0029$ ,  $p < 0.05$ ) with platform engagement. These findings support hypotheses 1a and 2a. Although informational justice had a positive influence on platform engagement, the effect was not statistically significant, resulting in no support for Hypothesis 3a.

**TABLE 6**  
**OSS PLATFORM ENGAGEMENT MODEL RESULTS**

	OSS Platform Engagement	
	Control Variables	Main Effects
R <sup>2</sup>	0.15	0.47
ΔR <sup>2</sup>		0.33**
Gender (1= Female)	-0.00	-0.00
Age Group	-0.00	-0.00
OSSD Experience	0.00	0.00
Contribution (1=Free)	-0.00	-0.00
Project Phase	-0.00	-0.00
Project Update	0.0	-0.00
Team Size	0.00	0.00
Tenure in Project	0.00	0.00
Distributive Justice		0.05**
Procedural Justice		0.003**
Informational Justice		0.01

Note: \* $p < 0.05$ ; \*\* $p < 0.01$ .

### *Phase 2: Future Participation Intentions Model*

The second phase examined the effects of justice perceptions on IST professionals' intention to participate in future OSS platform activities. The control-only model explained 33.31% of the variance in participation intentions, with OSS platform engagement emerging as a significant predictor. Adding the three justice perceptions to the OLS model increased explained variance to 44.77%, an improvement of 11.46%. As shown in Table 7, distributive justice ( $B = 0.0233$ ,  $p < 0.05$ ) and procedural justice ( $B = 0.0033$ ,  $p < 0.01$ ) had significant positive effects on IST professionals' future participation intentions, providing

support for H1b and H2b. Conversely, informational justice ( $B = 0.007$ ) did not exhibit a significant effect, resulting in no support for H3b.

**TABLE 7**  
**RESULTS FOR INTENTION TO PARTICIPATE IN FUTURE PLATFORM ACTIVITIES**

	<b>Intention to Participate in Future Platform Activities</b>	
	Control Variables	Main Effects
R <sup>2</sup>	0.33	0.44
ΔR <sup>2</sup>		0.11*
Gender (1= Female)	-0.00	0.00
Age Group	0.00	0.00
OSSD Experience	-0.00	0.00
Contribution (1=Free)	0.00	-0.0
Project Phase	0.00	0.00
Project Update	0.00	0.00
Team Size	0.00	-0.00
Tenure in Project	0.00	0.00
OSS Platform Engagement	0.35**	0.27**
Distributive Justice		0.02*
Procedural Justice		0.003
Informational Justice		0.007

Note: \*p < 0.05; \*\*p < 0.01.

### **Robustness Test Using Alternative Engagement Dimensions and Measures**

Engagement is a multifaceted construct encompassing the physical, cognitive, and emotional investment of individuals in their work roles (Rich et al., 2010). This study hypothesized that perceptions of justice would influence an IST professionals' engagement with OSS platforms and their intentions to participate in future activities hosted these platforms. Platform engagement, adapted from the organizational engagement concept proposed by Saks (2006), was chosen as the primary engagement measure because it aligns well with the organizational nature of OSS platforms. However, this measure does not explicitly address the physical, emotional, and cognitive dimensions of engagement.

To evaluate the robustness of the findings, alternative models were tested using engagement measures that capture the physical, emotional, and cognitive dimensions of engagement. Rich et al. (2010) developed scales assessing physical, emotional, and cognitive engagement, which offer a broader perspective on engagement beyond organizational ties. These scales were deemed suitable for examining justice perceptions in the context of OSS development. Before application, reliability and validity tests were conducted on the Rich et al. (2010) measures. The Cronbach Alphas values were 0.79 for physical engagement, 0.91 for emotional engagement, and 0.92 for cognitive engagement, confirming their reliability. No validity issues were detected. Using these alternative models, the study tested the impact of justice perceptions on physical, emotional, and cognitive engagement. The results are presented in Table 8.

**TABLE 8**  
**RESULTS FOR PHYSICAL, EMOTIONAL, AND COGNITIVE ENGAGEMENT**

	Physical Engagement		Emotional Engagement		Cognitive Engagement	
	Control Variables	Main Effects	Control Variables	Main Effects	Control Variables	Main Effects
Gender (1= Female)	0.18	0.16	-0.09	-0.08	-0.14	-0.13
Age Group	-0.28	-0.10	-0.16	-0.08	-0.30	-0.18
OSSD Experience	0.04	0.03	0.06*	0.05	0.04	0.03
Contribution (1=Free)	-0.32	-0.15	-0.24	-0.07	-0.27	-0.10
Tenure in Project	0.10	0.01	0.07	0.00	0.11	0.03
Team Size	0.01	0.01	0.00	-0.01	0.00	0.00
Distributive Justice		0.13		0.35**		0.23**
Procedural Justice		0.15		0.11		0.11
Informational Justice		0.21**		-0.01		0.08

Note: \*p < 0.05; \*\*p < 0.01.

The findings from the alternative models were largely consistent with those from the OSS platform engagement model. Distributive justice significantly influenced both emotional and cognitive engagement, mirroring the strong positive effect on platform engagement in the primary model. However, procedural justice did not significantly impact any of the alternative engagement dimensions, contrasting with its positive effect on platform engagement in the primary model. Informational justice, which was insignificant in the primary model, demonstrated a significant positive effect on physical engagement.

Certain control variables also exhibited relevance. OSS development experience significantly predicted emotional engagement, while tenure in the project influenced cognitive engagement. However, these control variables lost significance when justice perceptions were added to the models, underscoring the robustness of justice perceptions as primary predictors of engagement. Despite these nuances, the robustness checks reinforce the central findings of this study: perceptions of justice play a crucial role in shaping engagement within the OSSD environment. The main effects models explained 35.74%, 39.57%, and 39.67% of the variance in physical engagement, emotional engagement, and cognitive engagement, respectively, significantly outperforming models with only control variables.

## DISCUSSION

Volunteer participation is a cornerstone of the open source innovation model (von Hippel & von Krogh, 2003). However, many OSS projects face abandonment due to declining long-term voluntary participation (Fang & Neufeld, 2009). Thus, understanding factors that influence sustained voluntary participation remains a critical area of inquiry for IS researchers (Ho & Rai, 2017; Maruping et al., 2019). Previous studies have largely focused on why IST professionals continue to contribute to specific OSS projects (e.g., Ho & Rai, 2017; Daniel et al., 2018), adopting a project-centric perspective. In contrast, this study addresses an understudied area by exploring factors that foster ongoing engagement with OSS platforms, rather than individual projects.

This study investigates the impact of perceptions of justice on IST professionals' engagement with OSS platforms and their intentions to participate in future platform activities. Drawing on social exchange theory, we conceptualize the OSS platform as a quasi-organization capable of authoritative actions that shape justice perceptions. Through a survey of IST professionals, we evaluated three justice perceptions—distributive, procedural, and informational—and tested their influence on platform engagement and

continued participation intentions. We also employed alternative engagement dimensions—physical, emotional, and cognitive—to test the robustness of the results.

The findings strongly support the role of distributive and procedural justice in fostering platform engagement and continued participation intentions. The results show that both distributive and procedural justice have a positive influence on IST professionals' engagement with OSS platforms. These two forms of justice also positively impacted IST professionals' intention to participate in future platform activities. Interestingly, informational justice did not have a significant effect on either OSS platform engagement or participation intentions, which may reflect unique characteristics of the OSS environment.

The robustness tests provided additional insights by examining engagement across physical, emotional, and cognitive dimensions. Informational justice significantly influenced physical engagement, while distributive justice had a notable impact on both emotional and cognitive engagement. These results align with the broader literature and underscore the multidimensional nature of engagement. Importantly, these alternative engagement dimensions corroborate the central premise of this study: perceptions of justice play a crucial role in shaping the behavior of IST professionals on OSS platforms.

### **Theoretical Implications**

This study makes a significant contribution to the theory in three distinct ways. While the application of organizational justice as a theoretical lens is not entirely new within behavioral science or business research, its use remains limited. In management literature, organizational justice has been employed to explain job performance (Zhang et al., 2014). Similarly, it has been applied in logistics research to understand outsourcing relationships between third-party logistics providers and users (Hofer et al., 2012). Within the IS domain, organizational justice has been utilized to examine compliance intentions in mandatory IT settings (Xue et al., 2011), and, more recently, to investigate the influence justice perceptions on IST project performance (Bhuiyan & Setia, 2017). Across these applications, the justice framework has provided significant explanatory power, as it illuminates the social exchanges between employees and their organizations. This study enriches this nascent trend in IS research by exploring how perceptions of justice shape the behavior of IST professionals. Furthermore, it extends the application of justice theory to the unique context of OSS development, marking the first known examination of how perceived justice in reward structures influences contributor behavior in the open-source environment.

Another contribution lies in advancing the engagement literature by applying the concept to the field of information systems, specifically in the context of OSSD. Scholars in management and psychology have established that employee engagement significantly influences individual and organizational outcomes (e.g. Kahn, 1990; Harter et al., 2002; Saks, 2006; Rich et al., 2010; Soane et al., 2012; Anthony-McMann, 2017). This study builds on this body of work by positioning justice perceptions as antecedents of organizational engagement. To the best of our knowledge, this is the first study to examine the engagement of IST professional to OSSD platform. In applying the concept of organizational engagement to an emerging field (open source software development), this research responds to Whetten's (2008) call for theoretical contributions that extend established constructs to novel contexts, thereby the open source literature.

Additionally, this study by examining the multidimensional nature of engagement—physical, emotional, and cognitive—using measurement items developed by Rich et al. (2010). By incorporating these measures alongside those developed by Saks (2006), this research integrates two dominant perspectives on engagement, further enriching the engagement literature. It also bridges the concepts of participation and engagement, which are often studied separately. Although no new measurement items were developed, the inclusion of both constructs within the same model reinforces their distinctiveness. The integrated approach highlights the theoretical and empirical distinctions between participation and engagement, providing a more nuanced understanding of their roles in OSSD.

This study not only extends theoretical understanding of organizational justice and engagement in the IS domain but also provides insights into how these constructs operate within the unique context of OSSD. These theoretical advancements lay the foundation for practical recommendations, which are discussed in the following section.

## **Managerial Implications**

As OSSD continues to gain traction, both private and public organizations increasingly rely on its collaborative innovation model (August et al., 2018). Government initiatives, such as Data.gov, utilize OSSD platforms like GitHub for data sharing and software development (Data.gov, 2025), while major corporations, including Google and Microsoft, actively participate in OSSD to drive their innovation agendas (Ho & Rai, 2017). This growing reliance underscores the importance of sustaining voluntary participation among IST professionals, whose contributions fuel the success of these platforms.

This study offers actionable insights for platform managers seeking to cultivate lasting relationships with contributors. These findings highlight the critical role of perceived justice, particularly distributive and procedural justice—in shaping IST professionals' engagement and continued participation. Platforms generate significant revenue and innovation from the efforts of voluntary contributors, making it essential to cultivate a sense of fairness in reward and distribution procedures.

In the absence of formal employment contracts or consistent financial incentives, perceived justice emerges as a key determinant of contributor retention. Managers should ensure that rewards, whether monetary, reputational, or otherwise, are distributed equitably and communicated transparently. Additionally, platforms must establish and enforce fair procedures for determining and distributing these rewards. For example, procedural consistency and clarity can mitigate perceptions of bias and enhance contributors' trust in the platform.

Ultimately, OS platform managers must acknowledge the multifaceted nature of engagement, encompassing emotional, cognitive, and physical dimensions. While fostering engagement across all dimensions can be resource-intensive, doing so will likely yield significant benefits in terms of contributor loyalty and innovation output. By adopting justice-oriented management practices, platform leaders can build a robust ecosystem that encourages sustained contributions, benefiting both contributors and the broader platform community.

## **Limitations and Suggestions for Future Research**

While this study provides meaningful insights into the role of justice perceptions in OSSD, several limitations present an opportunity for future research. First, the lack of significant findings related to informational justice warrants closer examination. Given that IST professionals are typically attuned to information-related processes, the results are somewhat counterintuitive. One potential explanation is that communication in OS environments is inherently ineffective, rendering informational justice less impactful. Alternatively, the sample's characteristics may have influenced the findings. Future research could investigate the nuances of informational justice within OSSD, focusing on the specific roles of communication quality and transparency in reward processes.

Second, the study identified a negative relationship between age group and platform engagement, though this effect diminished once justice perceptions were added to the model. Although age was treated as a control variable in this study, its potential influence on engagement warrants further investigation. Future research could explore how generational differences work in style, technology adoption, or motivations for participating in OSSD. Such studies could use qualitative approaches to complement quantitative findings, offering a richer understanding of age-related dynamics in OSSD.

Lastly, while this study focused on individual-level perceptions and behaviors, future research could examine how platform-level characteristics—such as governance structures, community norms, and technological affordances—interact with justice perceptions to influence engagement and participation. A multilevel analysis approach could provide valuable insights into the interplay between individual and platform-level factors. By addressing these limitations, future studies can build on the current findings, deepening our understanding of how justice perceptions and other factors drive sustained participation in OS platforms.

## CONCLUSION

This study examines how perceptions of fairness affect the engagement and sustained participation of IST professionals in open source software development (OSSD) platforms. By extending organizational justice theory to the OSSD context and incorporating social exchange theory, this research highlights the critical roles of distributive, procedural, and informational justice in shaping contributors' relationships with platforms. The findings reveal that distributive and procedural justice have a significant impact on both platform engagement and intentions to participate in future platform activities. These results underscore the importance of fair reward allocation and transparent procedures, even in volunteer-driven environments. Interestingly, informational justice showed mixed effects, suggesting that its role may vary depending on the context and engagement dimension.

Theoretical contributions include expanding the application of organizational justice theory to the open source domain, integrating multidimensional engagement perspectives, and differentiating between participation and engagement. By bridging these constructs, the study offers a nuanced understanding of how justice perceptions influence contributor behavior in OSSD. From a practical standpoint, the findings provide actionable insights for platform managers seeking to enhance long-term engagement and loyalty. Fair reward systems, consistent procedures, and clear communication emerge as pivotal strategies for fostering sustained participation and building trust among contributors.

While the study advances understanding of justice perceptions in OSSD, limitations such as the sample composition and unexplored platform-level factors offer avenues for future research. Investigating generational differences, communication dynamics, and platform characteristics can further enrich this growing area of inquiry. In conclusion, perceptions of fairness are not merely abstract concepts but tangible drivers of engagement and participation in the open source environment. As OSSD platforms continue to shape the future of software innovation, prioritizing fairness will be integral to cultivating vibrant, sustainable contributor communities.

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