Calculative trust, relational trust, and organizational performance: A meta-analytic structural equation modeling approach

ABSTRACT

We draw on transaction cost economics and social exchange theory to explore how two different types of inter-organizational trust, namely, calculative trust and relational trust, affect organizational performance. Our meta-analysis of 60 empirical studies shows that both types of trust have a positive effect on organizational performance. However, the two types of trust influence organizational performance through different mediating mechanisms. Whilst calculative trust influences organizational performance through inter-organizational information exchange and uncertainty, relational trust affects organizational performance through inter-organizational communication and commitment. Our study enhances understanding of the mechanisms through which trust influences organizational performance, and also provides an explanation of the contradictory findings regarding the relationship between inter-organizational trust and organizational performance.

Keywords: Calculative trust, Relational trust, Meta-analytic structural equation model (MASEM), Organizational performance

1. Introduction

Inter-organizational trust plays a pivotal role in fostering collaborative relationships between organizations, consequently driving organizational performance. As such, the role of such trust in organizational performance has attracted considerable scholarly attention (Baer et al., 2021; Connelly et al., 2018; Faems et al., 2008; Long & Sitkin, 2018; Poppo et al., 2016). Research shows that such trust can improve organizational commitment (Morgan & Hunt, 1994; Shahzad et al., 2020), promote inter-organizational information exchange (Chi et al., 2021), reduce inter-organizational conflicts (Zaheer et al., 1998), decrease inter-organizational transaction costs (Gulati & Nickerson, 2008), and therefore facilitate inter-organizational cooperation (Squire et al., 2009; Wu et al., 2017), and enhance organizational performance. Notwithstanding the benefits of trust, previous studies have generated a bag of mixed results. Some studies find that trust can enhance firm performance in an exchange relationship (Gaur et al., 2011; Poppo et al., 2016). Others display either a negative effect or no almost effect on performance (Chang & Fang, 2015). We suggest that such contradictory findings arise in part because these studies did not distinguish between different types of inter-organizational trust when examining its effects on firm outcomes.

In seeking to better understand the relationship between inter-organizational trust and firm performance, recent advances have differentiated two types of trust — calculative trust and relational trust. Calculative trust refers to a rational expectation in which organizations or individuals deliberately and rationally weigh cost and

benefits created by trusting others (Poppo et al., 2016). It is argued that calculative trust will increase when the payoffs of trusting other people are perceived to outweigh the cost of these people exercising opportunism. In contrast, relational trust is derived from repeated interactions and shared experiences between organizations or individuals over time (Khalid & Ali, 2017; Poppo et al., 2016; Young-Ybarra & Wiersema, 1999), in which information available to the organizations or individuals within the relationship forms the basis of trust. This type of trust arises because reliability and dependability give rise to positive expectation of the other organization or individual and, as such, emotion enters into the relationship (Rousseau et al., 1998).

This differentiation between the two types of trust is particularly important for understanding the relationship between trust and organizational performance. The two types of trust differ in nature and therefore can be underpinned by different theoretical perspectives. While ccalculative trust reflects rational calculation of benefits gained versus costs associated with trusting counterparties (David & Han, 2004; Poppo, 2013) and thus can be best explained by transaction cost economics (TCE) (Williamson,1993), relational trust emerges from recurrent exchanges between organizations and thus can be best understood with social exchange theory (SET) (Poppo, 2013). Because of this difference in theoretical underpinnings, they affect organizational performance in different ways (Rousseau et al., 1998). While calculative trust tends to take effect in the early phases of inter-organizational relationships, compensating for weak contracting and thereby impacting transaction costs (David & Han, 2004), the effect of relational trust occurs mainly in the mid-to-

late stages of inter-organizational relationships (Morgan & Hunt, 1994; Poppo, 2013), acting as a substitute of contracting, and influencing inter-organizational relationships such as commitment and communication.

Prior research shows that both calculative and relational trust can enhance firm performance. For example, while Poppo et al. (2016) found that calculative trust facilitates organizational performance by reducing transaction costs, Abosag and Lee (2013) showed that relational trust stimulates organizational performance through improving relationship quality. However, despite this consistency, some studies showed that the impact of calculative trust on firm performance is lower than that of relational trust (Efrat & Øyna, 2021; Wang et al., 2020), whereas others showed the opposite finding — the effect of relational trust is greater than calculative trust (Poppo et al., 2016). These conflicting findings are intriguing and prompt us to answer the following questions: do the two types of inter-organizational trust influence firm performance differently and what are the mechanisms through which trust influences organizational performance?

This study attempts to address these questions by utilizing a meta-analytic structural equation modeling (MASEM) on a sample of 60 empirical papers that have examined the relationship between inter-organizational trust and organizational performance. Specifically, we examine whether both calculative trust and relational trust have a positive effect on firm performance. Furthermore, we consider how various dimensions of inter-organizational relationship, including information exchange, uncertainty, communication, and commitment, mediate the focal

relationships. While these are important factors that define and influence inter-organizational relationships, we still know little about how they affect the relationship between trust and organizational performance.

In addressing these research questions, we draw on TCE (Williamson, 1993) and SET (Young-Ybarra & Wiersema, 1999) to frame our study and develop hypotheses. TCE is relevant because it can explain the economic rationale of why and how calculative trust influences organizational performance. Similarly, SET provides a useful lens because it focuses on the exchanges and interactions between organizations or individuals and can explain how relational trust and reciprocity influence such exchanges and consequently organizational performance. The key results of the study show that both calculative trust and relational trust have a positive effect on firm performance (albeit the effect of calculative trust is slightly smaller than that of relational trust). Further, the results pertaining to the mediating effects show that calculative trust can boost organizational performance through two influencing paths: improving information exchange between organizations and decreasing uncertainty arising from conflicts or opportunistic behaviors between organizations, while relational trust can enhance organizational performance by increasing inter-organizational communication and commitment.

Our study makes two contributions. First, it contributes to the literature on the relationship between inter-organizational trust and organizational performance. Although previous studies suggest that inter-organizational trust can be multi-dimensional (Seppänen et al., 2007), they have focused on the relationship between

trust and organizational performance in a general way. As a result, we know little about how different types of inter-organizational trust influence organizational performance. We address this question by differentiating the role of two different types of inter-organizational trust – calculative trust and relational trust. Moreover, by underpinning calculative trust and relational trust with TCE and social exchange perspective, respectively, our study advances the theoretical understanding of the trust-performance relationship.

Second, our study contributes to understanding of the mechanisms through which inter-organizational trust influences organizational performance. Previous studies have investigated how factors, such as environmental uncertainty (Luo, 2002; Wang et al., 2011) and transactional attributes (Ali & Khalid, 2017; Poppo et al., 2016), moderate the relationship between inter-organizational trust and firm performance. However, although Delbufalo (2012) demonstrates that trust generates both direct and indirect outcomes in an inter-organizational relationship, only a small number of studies have examined the intermediate mechanisms through which trust influences organizational performance in social exchanges (Jiang et al., 2015). For example, research shows that knowledge transfer (Becerra et al., 2008) and resource sharing (Jiang et al., 2015) mediate the effect of trust on the success of strategic alliance. We still know little about whether certain attributes of inter-organizational relationships can also mediate the focal relationship. By theorizing and showing evidence that inter-organizational information exchange, uncertainty, communication, and commitment mediate the effect of inter-organizational trust on organizational

performance, our study extends understanding of the mediating mechanisms through which inter-organizational trust affects organizational performance.

2. Theoretical background

2.1. The conceptualizations of trust

Trust is defined as "the willingness of a party to be vulnerable to the actions of another party based on the expectation that the other will perform a particular action important to the trustor, irrespective of the ability to monitor and control that other party" (Mayer et al., 1995, p. 712). Mayer et al. (1995) suggest three conditions for trust to occur: ability (the skills and competencies of the trustee), benevolence (the expected goodwill of the trustee), and integrity (the moral and ethical acceptability of the trustee). Ganesan & Hess (1997) add to this conceptualization and posit that credibility also signals trust. Similarly, Cummings & Bromiley (1996) argue that trustworthiness depends on whether the other party can keep commitments, negotiate honestly, and avoid taking excessive advantage. While defining trust in slightly different ways, prior research generally regards trust as the cognitive, intentional, and emotional evaluations of whether the other party can and will fulfil obligations (Becerra et al., 2008).

While various perspectives can explain inter-organizational trust, economic and socio-psychological perspectives are among the most popular lenses (Khalid & Ali, 2017; Susarla et al., 2020). The economic (or behavioral) perspective sees inter-organizational trust as the rational assessment of another's likely behavior (Lewicki et al., 2006). Following the assumptions that inter-organizational relationships suffer

transaction costs and opportunistic behavior (Ashnai et al., 2016), trust from this perspective is developed through evaluation mechanisms such as information processing, risk evaluation, and uncertainty perception (Becerra et al., 2008). Specifically, organizations identify the other party's capabilities, reliability, credibility, and the anticipated costs and benefits associated with trust (Gaur et al., 2011; Mayer et al., 1995). These attributes reflect the transacting parties' ability to fulfil contracts, maintain motivations, and adhere to moral standards, thereby influencing the level of trust between them. This perspective underscores the importance of internal motivations and rational judgments inherent in inter-organizational trust (Choi et al., 2020).

On account of the needs of organizations to calculate the benefits and costs, trust from this perspective is categorized as calculative trust, which refers to the organization's rational expectation that its partners will take actions that are beneficial (Luo, 2002). The decision-making under the calculative trust is typically forward-looking, derived from "the shadow of the future" (Poppo, 2013). Organizations make decisions taking into account the future situation (Poppo et al., 2016). A positive expectation of trust implies that the partner is reliable to fulfill their obligations (Connelly et al., 2018). Under this expectation, although the trust-giving organizations may expose themselves to the opportunistic behavior of their partners, they believe that the benefits of trust would outweigh the cost of the partners' violation of trust (Poppo et al., 2016). Once the benefits cannot be greater than the sum of these costs, organizations are often reluctant to trust their partners, and instead turn to formal

mechanisms such controls or contracts to facilitate economic exchanges (Connelly et al., 2018). Consequently, calculating-based trust among partners can lower the probability of conflicts and opportunistic behaviors and therefore reduce the transaction costs of organizations to monitor and prevent uncertainties (Faems et al., 2008).

In contrast, the socio-psychological perspective believes that inter-organizational trust emerges from social interactions between exchange partners (Khalid & Ali, 2017). According to this perspective, relational trust is derived from repeated interactions over time between two parties with information available within the relationship itself (Rousseau et al., 1998). During such interactions, emotion enters into the relationship and reliability and dependability give rise to positive expectations of each other (Luo, 2002; Poppo et al., 2016). Based on the nature of relational exchange, whether the organizations trust their partners or not depends on the partners' motivation, quality, and past behaviors. Therefore, relational trust is considered to exist based on the "shadow of the past", which requires trusting parties to behave in accordance with their prior expectations and beliefs (Choi et al., 2020; Poppo, 2013).

Because relational trust is based on the relational exchange and value consistency between the two parties, the decision-making rules under relational trust are retrospective or heuristic (Poppo et al., 2016). It thus has strict requirements on the behaviors and values of both parties, as any dishonest behavior between organizations will damage this trust (Poppo et al., 2016). Through long-term and

stable interactions, goodwill, honesty, and good faith lead to a high level of relational trust between the two parties, which can create mutual recognition between organizations (Gulati & Sytch, 2008). It allows organizations in the relationship to regard each other's interests as their own's, so that they make decisions based on common values and a shared identity (Poppo et al., 2016; Susarla et al., 2020). Relational trust thus facilities the achievement of common goals and stimulates mutual understanding and adaptability of all parties (Moshtari, 2016).

2.2. Theoretical background of calculative trust and relational trust

Transaction cost economics (Williamson, 1973) posits that all economic activities, including inter-organizational transactions, involve transaction costs. Economic behavior under this theory, therefore, is driven by the goal of reducing transaction costs, through either market governance or hierarchical governance structures (Williamson, 1973). From this perspective, organizations are assumed to follow "bounded rationality" and "opportunism" – they cannot forecast completely, nor can they form perfect contracts (Williamson, 1993).

The TCE framework has been a useful lens to analyze trust in inter-organizational relationships. While Williamson (1973) assumes that economic actors are opportunists and trust cannot be discerned, Cummings & Bromiley (1996) extend this assumption and proposes that the degree of trustworthiness can be estimated to some extent. It is argued that actors in the economic exchanges should undertake rational evaluation regarding whether each transaction is worthy of cooperation

(Bromiley & Harris, 2006; Williamson, 1993). In the process of inter-organizational exchange, both parties are subject to the risk of opportunism and incompetency of the partners (Gaur et al., 2011; Katsikeas et al., 2009). Organizations, therefore, need to assess whether each transaction is worthy of trust based on careful weighing of the benefits of collaboration and the costs of the partner failing to deliver as expected (Poppo et al., 2016).

Despite reflecting the rational and calculative components of transactions (Poppo et al., 2016), the economic approach to trust is often criticized by sociological and psychological scholars for overlooking the social and ethical norms (Seppänen et al., 2007). Social exchange theory (SET), on the other hand, captures the dynamics and complexity of the exchange process. The SET studies individuals' social behavior in the process of resource exchanges and emphasizes that individuals voluntarily engage in and actively maintain interactive relationships with others in anticipation of bringing and receiving benefits (Blau, 1964). Specifically, these relationships are characterized by their bilateral, reciprocal, and mutually beneficial (win-win) nature (Cook et al., 2013; Cropanzano & Mitchell, 2005).

According to the SET, trust is a fundamental principle in inter-organizational cooperation (Khalid & Ali, 2017). A highly intimate relationship (trust) between organizations often does not exist at the initial stage of establishing an exchange relationship (Tunisini & Marchiori, 2020). As the interactions repeat, however, mutual understanding can be developed and a joint identification that allows partners to think and respond like the other can be created (Susarla et al., 2020). SET posits that the

quality of social interaction between organizations is the foundation of relational trust, which is gradually improved through repeated social interactions and successful exchanges between partners, in which the mutual recognition of institutionalized rules and normative behaviors are developed (Lewicki et al., 2006).

As discussed above, calculative trust and relational trust follow distinct theoretical assumptions. Given the dynamism of trust, while calculative trust predominantly occurs during the early stages of a relationship, it may transition to relational trust in the later stages, both of which can influence organizational outcomes through different mechanisms (Poppo, 2013; Rousseau et al., 1998). Because calculative trust and relational trust are underpinned by different theoretical perspectives, it is necessary to examine whether and how the two types of inter-organizational trust influence organizational performance differently. Table 1 provides comparisons between calculative trust under TCE and relational trust under SET.

（Insert Table 1 about here)

3. Hypothesis development

3.1. Calculative trust and organizational performance

According to the TCE, organizations will carefully evaluate the benefits and costs of each exchange and only choose the one with expected net benefits (Poppo et al., 2016; Williamson, 1993). Considering that the trust is based on rational calculation, the existence of calculative trust can decrease the transaction costs of organizations and constrain opportunistic behaviors (Gaur et al., 2011). At the initial stages of a relationship, organizations can evaluate the governance structure,

institutional environment, and reputation of the other party (Bachmann & Inkpen, 2011). After the development of calculative trust, organizations would focus less on self-protection and monitoring opportunistic behaviors but more on mutual task performance. Calculative trust thus reduces the costs of formal governance and mitigates exchange hazards (Gulati & Nickerson, 2008). Scholars argue that trust can sustain the exchange relationship even when formal safeguards against opportunism are not in place (Young-Ybarra & Wiersema, 1999).

The TCE emphasizes that calculative trust is essentially a forward-looking decision to put oneself at risk in anticipation of positive gains (Suh & Kwon, 2006). The exchange partners understand that, while successful fulfillment of obligations can lead to positive payoffs, opportunistic behavior or noncompliance imply punishment or even exchange termination (Poppo et al., 2016). Therefore, once devoted to calculative trust, organizations have strong motivations to invest in physical and human capital to achieve desired outcomes, ultimately improving organizational performance. Prior studies find supportive evidence that calculative trust can improve the strategic flexibility, innovation performance, and cost performance of both parties (Corsten et al., 2011; Young-Ybarra & Wiersema, 1999). Therefore, our paper puts forward the following hypothesis:

Hypothesis 1: Calculative trust has a positive effect on organizational performance.

3.2. Mediating effects of inter-organizational information exchange and uncertainty

Inter-organizational information exchange is the process where organizations

openly share knowledge that may be useful to their relationships (Ashnai et al., 2016). According to the TCE, information holders are often concerned about opportunistic behaviors such as unauthorized knowledge spillovers (Rungsithong & Meyer, 2020). With no trust or a low level of trust, therefore, organizations are reluctant to share information because of its risky and costly nature. The informational imbalance between exchange parties would negatively impact the profitability of organizations (Suh & Kwon, 2006).

In a high-trust relationship, however, it is easier for organizations to exchange and integrate knowledge and resources. Calculative trust is based on the confidence in the trustee's credibility and integrity (Bromiley & Harris, 2006). That is to say, organizations believe that their partners will not exploit the shared information for other use (Rungsithong & Meyer, 2020). It thus reduces the concerns of privacy and intellectual property inherent in information sharing (Zaheer et al., 1998). By reducing unnecessary information protection mechanisms (Cheng et al., 2008) and increasing the openness of relationships (Squire et al., 2009), trust overcomes the information barriers and allows knowledge to be shared formally and informally through inter-organizational interactions (Dyer & Singh, 1998; Yang & Maxwell, 2011).

The circulation of knowledge in the trust relationship is an important mechanism through which organizations improve efficiency and performance. The smooth exchange of information between organizations makes it more convenient for both parties to obtain information, effectively minimizing the redundancies in information search (Krishnan et al., 2006; Rungsithong & Meyer, 2020). As such exchange helps

mitigate information asymmetries, the transaction costs of inter-organizational projects would be reduced (Wu et al., 2017). Consequently, inter-organizational information exchange enhances organizational efficiency. For example, according to the Environmental, Social and Governance Report of Alibaba Corporation of China (2023)[1], the company built 1688 digital platform to enhance the exchange and sharing of production information among various organizations along its supply chain. This in turn has greatly enhanced the company's operational efficiency by reducing the time for a new product to appear in the shelf from one hour to just several seconds. Similarly, Alibaba's Ding Talk platform used 'Intelligent Manufacturing Ding' (IMD) to facilitate the exchange of key information such as orders, scheduling, and production among manufacturing factories. This inter-organizational informational exchange has enabled the company to address challenges in data integration, process opacity, and the proliferation of data silos in the production process and manufacturing management. This in turn helped the company reduce the production cycle by 35%, lowered associated costs associated with defect rates by 25% and enhance employee productivity by over 20%. Furthermore, information exchange promotes the circulation of innovative knowledge among organizations, thus improving the innovation capacity of organizations (Paulraj et al., 2008). By reducing costs and improving efficiency, knowledge sharing under trust will improve the organization's overall performance. Furthermore, information exchange promotes the

[1] Data source: https://data.alibabagroup.com/ecms-files/1509739361/3697acf7-dced-4a99-a8ea-ee86701baea8/2023%E9%98%BF%E9%87%8C%E5%B7%B4%E5%B7%B4%E7%8E%AF%E5%A2%83%E3%80%81%E7%A4%BE%E4%BC%9A%E5%92%8C%E6%B2%BB%E7%90%86%E6%8A%A5%E5%91%8A-%E7%BB%88%E7%89%88.pdf

circulation of innovative knowledge among organizations, thus improving the innovation capacity of organizations (Paulraj et al., 2008). By reducing costs and improving efficiency, knowledge sharing under trust will improve the organization's overall performance.

Inter-organizational uncertainty refers to the opportunistic behaviors and conflicts among exchange parties that harm organizations' short-term interests and long-term goals (Wu et al., 2017). It arises from the difficulties of monitoring the behaviors of partners (Suh & Kwon, 2006). From the TCE point of view, calculative trust is one of the key factors in controlling inter-organizational opportunism, thereby reducing the behavioral uncertainty of partners (Lado et al., 2008).

Calculative trust has a great binding force on unanticipated behaviors (Dyer & Singh, 1998; Gaur et al., 2011). Because the exchange parties are bound by the rewarding and punishment mechanisms that any noncompliance indicates penalties or loss of long-term partners, unobservable behaviors would be disciplined and uncertainty in exchanges can be reduced (Poppo et al., 2016). Also, environmental uncertainty resulting from changes in market and institutional conditions can be mitigated by trust. When exchange parties trust each other, they tend to share accurate and diverse information, with which speedy and responsive decisions can be made and strategies can be adjusted accordingly (Krishnan et al., 2006). A trust relationship also contributes to the innovativeness of firms and provides firms with great capabilities to develop new technologies, products, and processes, which allow them

to react to problems and unforeseen circumstances (Wu et al., 2017). While unpredicted conditions and disagreements in day-to-day relationships may result in conflicts of interest, exchange partners would focus more on developing solutions instead of doubting each other or suspending the relationship (Malhotra & Lumineau, 2011; Zaheer et al., 1998). The predictability and strategic flexibility inherent in trust would further reduce the possibility of disputes (Zaheer et al., 1998).

Opportunistic behaviors and conflicts, individually or jointly, lead to uncertainty among organizations and have a significant negative impact on organizational performance (Corsten et al., 2011; Gaur et al., 2011). If uncertainties are frequent and widespread, the effort and resources spent on forming solutions will increase, resulting in increased transaction costs and reduced efficiency among organizations. Once organizations fail to perceive or deal with the uncertainty, the negative impact will continue to expand, which will seriously affect the cooperative relationship between organizations (Wu et al., 2017). Therefore, scholars have found a negative correlation between uncertainty and organizational performance in exchange relationships (Barnes et al., 2015). However, trust between organizations can better control these “malicious behaviors” (Koza & Dant, 2007) and mitigate transactional uncertainty, thereby decreasing coordination costs and improving the performance of inter-organizational projects (Wu et al., 2017).

In sum, calculative trust can mitigate concerns regarding information security and reduce uncertainty in transactions, which have the effects of reducing coordination costs and improving efficiency and performance. Therefore, our paper

puts forward the following hypothesis:

Hypothesis 2 (a, b): The positive relationship between calculative trust and organizational performance is mediated by (a) inter-organizational information exchange and (b) inter-organizational uncertainty.

3.3. Relational trust and organizational performance

The SET argues that relational trust can enhance mutual understanding and shared values and thus encourage all parties of the transaction to abide by and commit to common goals (Poppo et al., 2016). Frequent and successful interactions, either face-to-face or through telecommunications, leads to a high level of trust, embeddedness, and intimacy between exchange parties (Becerra et al., 2008; Squire et al., 2009). Therefore, relational trust acts as a behavioral lubricant (Becerra et al., 2008) that allows organizations to become more cooperative, transparent, and strategically flexible (Jiang et al., 2015), thereby leading to better performance.

Relational trust facilitates information exchange and knowledge flow in the network, thus improving the consistency of decision-making and the quality of communication (Cheng et al., 2008). It not only enables the explicit knowledge of rules and regulations of organizations to flow among exchange parties, but also enhances the free flow of tacit knowledge such as values and culture, which cannot be obtained through formal contracts but is essential for organizations to form alliances and make transactions. The efficient information exchange can allow for close coordination among trust partners (Paulraj et al., 2008), enable organizations to

acquire heterogeneous resources and overcome the rigidity of knowledge (Chi et al., 2021), and promotes the circulation of creative ideas. Therefore, the knowledge exchange facilitated by trust will boost the innovation of products, technologies, and processes (Chi et al., 2021; Spralls et al., 2011), ultimately improving organizational performance.

The SET assumes that organizations involved in relational trust perceive relationships as stable (Lewicki et al., 2006). With a high level of relational trust, therefore, organizations do not need to continuously monitor the exchange process or deal with potential risks in resource and knowledge transfer. Compared with the relationship between organizations that rely on formal contracts, relational trust allows organizations to pay more attention to the quality of interactions rather than to protect themselves from uncertainty. Studies thus find that relational trust can substitute hierarchical and ownership-based governance, reduce the fear of partners' speculation (Morgan & Hunt, 1994), and improve the efficiency of social exchanges, thereby improving the performance of the organizations. Therefore, our paper puts forward the following hypothesis:

Hypothesis 3: Relational trust has a positive effect on organizational performance.

3.4. Mediating effects of inter-organizational communication and commitment

Inter-organizational communication is a relational competency manifested in formal and informal interactions at the organizational level (Fynes et al., 2008; Paulraj

et al., 2008). While formal communication is usually through written forms or formal meetings, informal communication is more personalized and spontaneous and can occur outside the organizational structure. In a trust relationship, communication can be more open, frequent, and bidirectional, which "enhances the feeling that promises and obligations can be delivered as agreed" (Barnes et al., 2015, p. 27). Trust-based governance increases the efficiency of communication and learning from each other, further enhancing the closeness and consensus between trust parties. In the face of uncertainty and conflicts, trust parties are less likely to take competitive behaviors, but are more willing to continue communicating with each other.

High-quality communication under trust is instrumental for successful inter-organizational relationships. While insufficient communication may cause misunderstanding, timely and frequent communication can facilitate cooperation and reduce factions (Su et al., 2008). When decision-makers are aware of the values and orientations of each other, convergent expectations and joint decision-making can be achieved, potentially allowing organizations to overcome bounded rationality problems (as proposed by economic scholars) (Agarwal et al., 2010). Also, communication in relational exchanges enables partners to collaborate and share knowledge more efficiently (Shahzad et al., 2020; Spralls et al., 2011). Indeed, prior studies find that efficient communication has a positive influence on the success of partnerships, supporting the trust-communication-performance mechanism (Fynes et al., 2008; Su et al., 2008).

According to SET, trust and commitment are one of the most critical factors in

understanding the performance of business relationships (Blau, 1964; Morgan & Hunt, 1994).Commitment is defined as "the willingness of organizations to develop stable relationships and to make short-term sacrifices to maintain the relationship, as well as their confidence in the stability of the trading partner relationship" (Ashnai et al., 2016, p. 130). Scholars studying corporate exchange relations have found that relational trust enhances partners' commitment to inter-organizational relations (Palmatier, 2008; Wu et al., 2015). With relational trust, organizations develop confidence in the exchange relationship (Morgan & Hunt, 1994), so that they are willing to make short-term sacrifices for its long-term stability (Ashnai et al., 2016). The exchange parties' propensity to replace partners can be reduced, and the possibilities for further interactions tend to increase, thus strengthening the organizational commitment to the business relationship (Ashnai et al., 2016; Palmatier et al., 2007).

Commitment plays a significant role in generating beneficial outcomes in the interactions among exchange partners. Organizations are more likely to act positively toward their committed partners, so that opportunistic behaviors that undermine mutual understanding and shared norms can be reduced (Palmatier et al., 2007). The "strong desire to commit more time, resources, and energy to developing an enduring working relationship" would allow difficulties to be resolved more effectively (Barnes et al., 2015, p. 29). Therefore, inter-organizational commitment can maintain long-term shared values between partners, improve the quality of the relationship, and enhance the financial outcomes of the interaction (Abosag & Lee, 2013; Barnes et al.,

2015). Our paper puts forward the following hypothesis:

Hypothesis 4 (a, b): The positive relationship between relational trust and organizational performance is mediated by (a) inter-organizational communication and (b) inter-organizational commitment.

Following previous meta-analysis studies, we summarize the definitions and sources of each variable, as shown in Table 2.

(Insert Table 2 about here)

4. Methodology

4.1. Data retrieval and screening

A key process of meta-analysis involves data retrieval and screening. In order to ensure the representativeness and reliability of our research data, we have collected published research articles according to the following rules.

(1) We searched for data in WOS (Web of Science), Elsevier, Springer, Emerald, ProQuest, and other databases. These databases are acknowledged to ensure a broader range of target literature.

(2) “inter-organizational trust”, “interorganizational trust”, “inter-firm trust”, “interfirm trust”, “calculated trust”, “calculative trust”, “computational trust”, “relational trust”, “relationship trust”, “organizational performance”, “innovative performance”, “creative performance” and “innovative performance” are used as keywords for searching, and Boolean logic is adopted in the process of searching.

(3) The major journals in the fields of management science, innovation management, and innovation performance were searched manually, which can reduce

the risk of missing high-quality papers.

(4) We checked the collected references of empirical studies included in the meta-analysis to see if there are any missing studies.

(5) In order to include the accuracy of meta-analysis data in the collected literature abstracts, “trust” was used as the keyword to search in the collected studies’ abstracts, and the papers without “trust” is excluded.

(6) Search the abstract with “case study” as the keyword and exclude the studies containing “case study”. The studies included in meta-analysis refer to those empirical studies that report the effect sizes or other statistics that can be converted into the effect sizes, but case studies are not included here.

(7) In the abstracts, the keywords such as “result”, “emotional”, “statistical”, “finding”, “survey”, and “evidence” were searched. According to Newbert’s (2007) study, empirical research into meta-analysis should include at least one of these keywords.

(8) According to the selected studies, read the full text one by one, excluding those that do not report Pearson correlation coefficient *r* or other statistics that can be converted into correlation coefficient *r* and excluding those that report correlation coefficient *r* but are inconsistent with the purpose of this study, such as those that study antecedent variables of inter-organizational trust, intra-organizational trust, and job performance.

The process of studies screening is similar to what was described above. According to (1), (2), (3), and (4), 1050 literature were initially retrieved, and then 35

duplicate studies were deleted, leaving 1015 studies. Then, according to (5) and (6), 575 inappropriate studies were deleted, leaving 440, and 116 duplicate studies were deleted from 439 studies, leaving 30. According to (7), 253 studies were selected, and finally, 60 studies were selected according to (8), which were included in the meta-analysis.

According to the requirements of research topics and meta-analysis methods, the meta-analysis research included must meet the following conditions: (1) the study must include variables such as inter-organizational trust and organizational performance; (2) it must be an empirical study and report Pearson correlation coefficient *r* or other statistics that can be converted into *r* (including path coefficient, *t* value, Cohen's d), excluding case studies and theoretical studies; (3) the samples must be independent of each other; and (4) only one of several kinds of literature published with the same sample was selected for meta-analysis (the one with the highest sample size). The details of 60 articles (62 samples) included in the meta-analysis are shown in Appendix A.

4.2. Research method

4.2.1. Meta-analysis method

Meta-analysis is a quantitative, integrative research approach that fundamentally adheres to a uniform set of rules and rigorous procedures to synthesize effect sizes from a large body of empirical studies (Glass, 1976). This method allows for a more robust and accurate estimation of the population's "true" effect size. The process

involves selecting relevant outcomes from past quantitative studies, integrating and encoding these findings into a new dataset, and subsequently conducting analyses to draw inferences and address research questions. Moreover, the traditional literature review often pays more attention to the qualitative description of published research, which has some shortcomings, such as relying too much on the subjective evaluation of authors, lacking specific standards, and being difficult to repeat. Meta-analysis technology can overcome these shortcomings as it has many advantages, including prescribed operation protocol and quantitative analysis, which make it much better than traditional literature review methods.

4.2.2. Data coding

Our meta-analysis data involves coding by two researchers. The coding content consists of effect size statistics and research description, in which the effect size statistics include sample size, interested parties, correlation coefficient *r*, variable type. The research description includes author, publication time, abstract, sample source area, journal type. Then, the two researchers checked according to their coding results and discussed and corrected the inconsistencies. Finally, 62 independent samples were obtained from 60 studies, and 62 samples were subdivided according to the theories involved in the kinds of literature, including 41 independent samples and 83 effect sizes under the TCE, with 8504 organizations and 42 independent samples and 72 effect sizes under the SET, with 9176 organizations.

In management research, due to the reliability of the scale and the sampling

problem, it is often necessary to modify the effect size of the research reported and then use the modified real effect size for meta-analysis so that the meta-analysis result is more convincing (Lipsey et al., 2001). The revised formula is as follows:

$$ES_r{}' = \frac{ES_r}{\sqrt{a_{xx}a_{yy}}}$$

where $ES_r{}'$ represents the revised effect size, ES_r represents the observed effect size, and $a_{xx}$and a_{yy} represents the reliability of independent and dependent variables. However, if other statistics that can be converted into effect sizes are reported, they will be converted into correlation coefficient *r* according to the following formula:

$$r = \sqrt{\frac{t^2}{t^2 + df}}$$

$$r = \sqrt{\frac{F}{F + N - 2}}$$

$$SD_w = \sqrt{\frac{SD_E^2 + SD_C^2}{2}}$$

$$d = \frac{M_E - M_C}{SD_W}$$

$$r = \frac{d}{\sqrt{d^2 + 4}}$$

where *t* is the statistic used to test whether the hypothesis is significant or not, and *df* is the degree of freedom of *t* statistic; *F* is a statistic used to test whether the mean difference between the experimental group and the control group is significant; SD_C and SD_E are the standard deviations of the dependent variables in the experimental group and the control group, respectively. *N* is the sample size included in the study; M_E and $M_C$are the means of the dependent variables of the experimental group and the control group respectively, and SD_W is the standard deviation within the group and *d*

refers to Cohen's d (Hedges & Cooper, 1994).

In the process of meta-analysis data coding, variables with similar meanings often need to be combined (Ng et al., 2005). The methods of variable processing in academia can be divided into two types: precision processing and broadness processing. Different processing is suitable for different studies. In our paper, the method of broadness of variable concept is adopted[2], and the researchers read the variable measurement scales reported in the literature included in meta-analysis, and combine the correlation coefficients with similar meanings into combined effect sizes in the coding process (Joshi & Roh, 2009). In our paper, referring to the ideas of Hedges et al. (1999), firstly convert the *r* into their corresponding *Fisher's Z* values, and then average the *Fisher's Z* values, finally convert the *Z* values into *r*. The formula for converting the correlation coefficient *r* into *Fisher's Z* value is: Z=0.5×ln $(\frac{1+r}{1-r})$. The formula for converting *Fisher's Z* into correlation coefficient *r* is $r = \frac{e^{2z}-1}{e^{2z}+1}$.

The meta-analysis adopted the professional meta-analysis software CMA (Comprehensive Meta-analysis) for data processing. CMA software has the advantages of convenient data import, simple operation and powerful data output function, and is widely used in meta-analysis research. The effect size processed according to the above steps was input into CMA software, and CMA software performed subsequent *Fisher's Z* conversion on the effect size and calculated the confidence interval, sampling variance and Q value of 95% CI (80% CI) of the effect

[2] Researchers use different measures for organizational performance including economic performance, operational performance, and competitive performance (Katsikeas et al., 2009; Spralls et al., 2011). Given our research purpose, we combine these measures into a single variable - organizational performance.

size. Specific analysis procedures are as follows:

(1) Effect size transformation

The effect size r_i of correlation coefficient after reliability correction is converted into *Fisher's Z* value, and the conversion formula is:

$Z_i = 0.5 \times \ln\left(\frac{1+r_i}{1-r_i}\right)$, in which Z_i is *Fisher's Z* value of the i_{th} research sample.

(2) Calculate the weight of the effect size

In the fixed effect model, it is assumed that all the effect sizes are the same, so it is only necessary to consider the internal variance σ_i^2, while in the random effect model, it is also necessary to consider the inter-group variance τ_i^2 of the effect sizes. Therefore, the weights W_i of the effect sizes corresponding to these two models are also different, and the calculation formula are as follows:

Fixed effect model: $W_{i_F} = N_i - 3$

Random effect model: $W_{i_R} = \frac{1}{\tau^2_{\overline{Z_R}} + \frac{1}{N_i - 3}}$

In which N_i represents the number of individual samples included in the i_{th} research sample; $\tau^2_{\overline{Z_R}} = \frac{\sum_{i=1}^{k} W_i(Z_i - \overline{Z_R}) - df_1}{\sum_{i=1}^{k}(N_i - 3) - \frac{\sum_{i=1}^{k}(N_i-3)^2}{\sum_{i=1}^{k}(N_i-3)}}$; df_1 is *K-1,* degree of freedom of χ^2 distribution.

(3) Calculate the integration of the effect size

Because the weights of the corresponding effect sizes of the two models are different, the calculation methods of the integrated effect sizes are also different, and the formulae are as follows:

Fixed effect model: $\overline{Z_F} = \frac{\sum_{i=1}^{k}(N_i-3)Z_i}{\sum_{i=1}^{k}(N_i-3)}$

Random effect model: $\overline{Z_R} = \frac{\sum_{i=1}^{k} W_{i_R} Z_i}{\sum_{i=1}^{k} W_{i_R}}$

(4) Calculating the confidence interval of 95% (80%) and integration effect size

The formulae for calculating Z_{test} statistics of integration effect size are as follows:

Fixed effect model: $Z_{test_F} = \frac{\overline{Z_F}}{\sqrt{\frac{1}{\sum_{i=1}^{k}(N_i-3)}}}$

Random effect model: $Z_{test_R} = \frac{\overline{Z_R}}{\sqrt{\frac{1}{\sum_{i=1}^{k} W_{i_R}}}}$

The 95% confidence interval are calculated as follows:

Fixed effect model: $95\%CI_F = \overline{Z_F} \pm 1.959964 \times \sqrt{\frac{1}{\sum_{i=1}^{k}(N_i-3)}}$

Random effect model: $95\%CI_R = \overline{Z_R} \pm 1.959964 \times \sqrt{\frac{1}{\sum_{i=1}^{k} W_{i_R}}}$

In the random effect model, it is often necessary to consider the confidence interval of 80% of the integrated effect size, and the calculation formula is as follows:

$80\%\mathrm{CI_R} = \overline{\mathrm{Z_R}} \pm \mathrm{t}^{\mathrm{a}}_{\mathrm{df}_2}\sqrt{\tau^2_{\overline{\mathrm{Z_R}}} + \frac{1}{\sum_{\mathrm{i=1}}^{\mathrm{k}} \mathrm{W_{i_R}}}}$, in which $t^{a}_{df_2}$ is a two-tailed *t* statistic whose degree of freedom (df_2) is *K-2*; *a* is its significance level (*a* corresponding to 80%CI is 0.20); df_2 is the degree of freedom of *t* statistic.

(5) Carry out inverse *Fisher'Z* transformation

In the last step of data processing, the above-mentioned related indexes need to be transformed into *r*-centered indexes by inverse *Fisher'Z* transformation, and the transformation formula is as follows: $r = \frac{e^{2\overline{Z}}-1}{e^{2\overline{Z}}+1}$.

Among them, the formula of fixed effect model and random effect model is the same, and $\overline{Z}$ represents the integrated effect size.

5. Empirical results

5.1. Trust-performance relationship

The results concerning the relationship between inter-organizational trust and organizational performance under TCE and SET are shown in Table 3. Under the TCE, the fixed effect model shows that the relationship between trust and performance is significant (*ESr'*=0.464, p<0.001), and from the perspective of the random effect model, the relationship between calculative trust and organizational performance is also significant (*ESr'*=0.462, p<0.001). In Table 3, the confidence interval of the effect size indicates whether the meta-analysis result is reliable or not. When the correlation coefficient is selected as the effect size, the confidence interval does not include the value of 0, and the meta-analysis result can be considered reliable. The 95% confidence interval of the meta-analysis results of the relationship between calculative trust and organizational performance is 0.386-0.532 (random effect model), and the 80% confidence interval is 0.413-0.509 (random effect model), all of which not including the value of 0. This shows that the meta-analysis results of the relationship between trust and performance are reliable. Moreover, the failure safety factor of 20883 is far bigger than 215 (*5K+10*), and the analysis results also exclude the interference of publishing errors. Whether it is a fixed effect model or a random effect model, the correlation between calculative trust and organizational performance is 'large'[3] (Delbufalo, 2012), and the sign of the effect size is positive,

[3]Delbufalo (2012) suggests that the degree of correlation between inter-organizational trust and its outcomes based on by coefficient size can be classified into three categories: 'weak correlation' (0.10 or less), 'middle correlation' (larger than 0.10 but smaller than or equal to 0.30), and 'strong correlation' (larger than 0.30). We use these criteria which differ from Lipsey & Wilson (2001).

which indicates that there is a positive correlation between trust and organizational performance under TCE. Hypothesis 1 is therefore supported. Our paper will use the results of the random effect model for follow-up research.

(Insert Table 3 about here)

Under the SET, the relationship between trust and performance is ESr'=0.493 ($p<0.001$), which is statistically significant. Moreover, neither its 95% confidence interval (0.425-0.556) nor its 80% confidence interval (0.449-0.535) include the value of 0, proving the results reliable. The Fail Safe-N is 28032, bigger than 220 ($5k+10$), which indicates that the result also excludes the influence of publishing errors. Therefore, hypothesis 3 has been supported. Compared with calculative trust, it is worth noting that the relationship between the two kinds of trust and organizational performance is "strongly correlated", meaning that both kinds of trust bring benefits rather than losses to the organization. At the same time, it can be seen that relational trust has a greater impact on organizational performance than calculative trust. A possible explanation is that trust is essentially a positive psychological state or emotional response, which is more related to the subjective factor of "willingness to do". Therefore, trust can lead to constant improvements of relationships between different organizations; that is, it enhances the quality of relationships through exchanges, making the positive effect on the organizational performance more lasting and significant.

5.2. Mediating effects

Under the different theoretical backgrounds, inter-organizational trust and various mediating variables, as well as the relationship between each intermediary variable and organizational performance, have always attracted the attention of academia. What is the specific process of the trust-performance relationship? What variables play intermediary roles in the positive impact of trust on performance? In our paper, we will discuss the theoretical framework with the MASEM method, and adopt maximum likelihood estimation to make the standard error estimation more accurate (Combs et al., 2019). It is mainly divided into two steps: firstly, our paper conducted multiple bi-variate meta-analysis on the encoded effect data to form the correlation matrix of multivariate relationship (as shown in Table 4); then, the obtained correlation matrix was imported into the Mplus for structural equation modeling.

(Insert Table 4 about here)

In the process above, the correlation matrix of meta-analysis is calculated by CMA (comprehensive meta-analysis), a special software for meta-analysis (the specific calculation steps and formulas have been shown above). At the same time, in order to solve the problem of inconsistent sample size, our paper adopts the Harmonic Mean of the sample size of each effect size in the correlation matrix as the sample size of structural equation meta-analysis (Viswesvaran & Ones, 1995), and the calculation formula is:

$$P = \frac{1}{\frac{1}{m}\sum_{i=1}^{m}\frac{1}{n_i}}$$

where m is the number of correlation coefficients; n is the sample size corresponding to the i_{th} correlation coefficient. The calculation table of sample size is shown in Table 4. After calculation, the sample size adopted in our paper is 1623 (TCE) and 1077 (SET) respectively. After 12 times of bi-variate meta-analysis (6 times for each theory), the correlation matrices of meta-analysis effect size based on structural equation model are obtained, as shown in Table 4. Table 4 includes the combined effect size after error correction, the number of research samples included in each correlation, the total number of samples, and the upper and lower limits and Q values of the confidence interval of 95% of the effect size. Then, the two correlation matrices were respectively input into the Mplus to test the model, and finally Table 5 was obtained.

(Insert Table 5 about here)

As shown in Table 5, the data under the TCE fit the theoretical model as follows: χ2 value=0.187; CFI=1.000; TLI=1.000; RMSEA=0.000; SRMR=0.003, all of which have reached the ideal standard, which shows that the model proposed in our paper reflects the objective reality well. In addition, the fitting condition of the theoretical model of social exchange is χ2 value=0.452; CFI=1.000; TLI=1.000; RMSEA=0.000; SRMR=0.005, although the fitting degree of the social exchange theoretical model is lower than that of the TCE. It also reaches the ideal standard, which also shows that the model proposed in our paper reflects the objective reality well.

According to TCE, the absolute value of the influence of calculative trust on

information exchange (0.514) is greater than its absolute value of uncertainty (0.473), and the relationship between trust and both is significant. In contrast, although the impact of information exchange and uncertainty on performance is significant, the impact of information exchange and uncertainty on trust has dropped significantly. The impact of trust on information exchange is 1.40 times that of information exchange on performance, while the impact of trust on uncertainty is 3.96 times that of uncertainty on performance, implying the importance of trust in improving information exchange and reducing uncertainty. Comparatively speaking, the effect of trust on performance is 0.217 ($p< 0.001$), which is much smaller than the result of the meta-analysis (0.462), indicating that information exchange and uncertainty may mediate some effects.

Under the SET, the influence of trust on commitment ($\beta=0.679$, $p< 0.001$) is greater than that of trust on communication ($\beta=0.540$, $p< 0.001$), but the influence of commitment on performance ($\beta=0.220$, $p< 0.001$) is smaller than that of communication on performance ($\beta=0.281$, $p< 0.001$). Similarly, it can be seen that the impact of trust on performance ($\beta=0.190$, $p< 0.001$) is smaller than that of meta-analysis, which also shows that communication and commitment may mediate some effects of trust on performance under the SET.

The Sobel method (Sobel, 1982) is adopted in our paper to test the significance of each mediating effect, which has also been used in other studies (Zhang et al., 2020). When the coefficient of each path is statistically significant, it is necessary to estimate the product term of each indirect path. As long as the product term of these

indirect effects is statistically significant, the corresponding indirect path (mediating effect) can be considered valid.

Table 6 shows the results of the intermediary effect under TCE and SET. It can be seen that under the TCE, both indirect effect 1 (CT→UN→PF) and 2 (CT→IE→PF) are statistically significant, which also indicates that hypothesis 2a and hypothesis 2b have been supported, that is, under the TCE, information exchange and uncertainty mediate the relationship between trust and performance. Moreover, the size of indirect effect 2 is much larger than that of indirect effect 1, which is 3.30 times. Inter-organizational uncertainty and information exchange mediate the influence of 53.03% trust on performance. Under the SET, indirect effect 3 (β=0.154, $p< 0.001$) and indirect effect 4 (β=0.150, $p< 0.001$) are both significant, so hypothesis 4a and hypothesis 4b have been supported. Indirect effect 3 is slightly larger than indirect effect 4, but it is not as big as the difference between information exchange and uncertainty under the TCE. In addition, the total indirect effect 2 (β=0.303, $p< 0.001$) is much smaller than the total effect 2 (β=0.493, $p< 0.001$), which shows that under the SET, communication and commitment mediate 61.46% of trust's influence on performance.

(Insert Table 6 about here)

6. Discussion

6.1. Summary of findings

Using a meta-analytic approach, this research reviews and integrates previous empirical studies on the relationship between inter-organizational trust and its

outcomes published from 1990 to 2021. Drawing on transaction cost economics and social exchange theory that underpin trust (Blau, 1964; Williamson, 1993), this study finds that both calculative and relational trust, as two key types of trust, have a positive influence on organizational performance (the effect size of calculative trust is relatively smaller than that of relational trust). Interestingly, however, we find that the influencing mechanisms for the two types of trust differ under different theoretical assumptions. Under the transaction cost economics, calculative trust improves organizational performance by facilitating information exchange and reducing uncertainty at the inter-organizational level. Under the social exchange theory, relational trust enhances organizational performance by enhancing inter-organizational communication and commitment.

6.2. Implications for research

Our study has some implications for theory. First, this study advances extant research on inter-organizational trust and its effect on organizational outcomes by providing a more systematic and nuanced review of previous empirical studies on the focal relationship. Prior conceptualizations view inter-organizational trust from different lenses. For instance, Seppänen et al. (2007) reviewed different theoretical bases of inter-organizational trust and argued that "a combination of social and economic approaches would offer the most comprehensive view of the complex phenomenon of trust in inter-organizational relationships". Similarly, Zhong et al. (2017) discussed how trust can be developed under transaction cost economics, social embeddedness theory, and resource dependence theory. As for the outcomes of inter-

organizational trust, Delbufalo (2012) reviewed the empirical research and proposed that inter-organizational trust can lead to direct economic outcomes (financial and cost performance), indirect outcomes (e.g., information sharing), and relational outcomes (e.g., commitment and satisfaction). Chaudhary et al. (2021) summarized the antecedents and consequences of inter-firm trust in family businesses.

While the above studies present a broad picture of the trust – performance nexus, they tend to regard trust as a unidimensional concept and did not conceptualize how different types of inter-organizational trust may influence organizational performance. We address this lack of understanding by positing that under different theoretical bases, different types of inter-organizational trust influence exchange relationships through different mechanisms (Seppänen et al., 2007; Susarla et al., 2020). Specifically, drawing on transaction cost economics and social exchange theory, we distinguish between calculative trust and relational trust and explore how they influence organizational performance in different ways, following different theoretical logics. This research thus furthers the current understanding of inter-organizational trust.

Second, this study extends prior research by revealing the complex mechanisms through which different types of trust influence organizational performance. Prior review studies on the subject focus on whether trust influences organizational outcomes (e.g., Connelly et al., 2018; Delbufalo, 2012) and/or the moderating mechanisms underlying the relationship (Zhong et al., 2014). As a result, we still know little about the mediating mechanisms underlying the focal relationship. In this

study, we combine different theoretical approaches and build a comprehensive conceptual framework regarding the causal relationships among trust, performance, and the intermediaries. We conceptualize how certain key dimensions of inter-organizational relationships mediate the relationship between trust and performance. Interestingly, we find that calculative and relational trust have different influencing mechanisms on organizational outcomes; while under the transaction cost economics calculative trust improves performance by facilitating information exchange and reducing uncertainty, under the social exchange theory relational trust increases performance by enhancing inter-organizational communication and commitment. Our study thus enhances the understanding of the complex mechanisms underlying the trust-performance relationship and also adds to previous review studies on inter-organizational trust.

Third, this research furthers understanding of the relationships between different types of trust and organizational performance. While the extant literature focuses on the role of trust as an important antecedent of successful inter-organizational relations from a social relational perspective (Choi et al., 2020; David & Han, 2004), we understand relatively little about trust from an economic perspective (Susarla et al., 2020). Although transaction cost economics is employed as the theoretical lens of trust by a small number of studies (e.g., David & Han, 2004), most of the previous studies only refer to it when defining trust and only a limited number of studies explicitly test calculative trust as a mechanism (Bromiley & Harris, 2006; Poppo et al., 2016). Indeed, David and Han (2004, p. 52) suggest that “there was very little

attention and evidence for transaction cost economics propositions regarding the relative performance of governance forms". By examining the influence of calculative and relational trust on organizational performance from economic and social relational perspectives, respectively, this research indicates that both the economic and social logics help explain how and why trust is beneficial for organizational exchange relationships, thus providing a deeper and more nuanced understanding of the mechanisms through which trust influences organizational performance.

Along this line, our study further shows that relational trust has a slightly stronger impact on organizational performance than calculative trust. This finding is consistent with the notion about the role of different types of trust in the different stages of organizational exchanges. In the early stages of organizational exchanges, as the parties involved have limited knowledge about each other, trust is primarily driven by calculative trust based on cost-benefit analysis (Lewicki et al., 2006). However, as the interacting parties engage in repeated exchanges, emotional connections between organizations begin to develop, thus relational trust gradually comes into play. This suggests that as organizational relationships develop or cooperation deepens, relational trust gradually replaces calculative trust as the dominant force in inter-organizational relationships. This said, we do not argue for the complete replacement of calculative trust by relational trust. Instead, both trust types undergo a dynamic and evolving process, aligning well with the continuous changes of inter-organizational relationships (Lewicki et al., 2006; Poppo, 2013).

6.3. Managerial implications

First, our study suggests that managers need to build different types of trust to facilitate inter-organizational exchanges and enhance organizational performance. On one hand, the establishment of calculative trust initiates information flow between firms, restricts opportunistic behaviours, and reduces transaction costs for inter-organizational economic exchanges. On the other hand, as exchanges repeat, relational trust facilitates communication and commitment between parties, and reinforces mutual recognition and shared beliefs (Choi et al., 2020). Therefore, both types of trust can strengthen inter-firm relationships, ultimately leading to value co-creation and long-term mutual benefits for the organizations involved. A multi-dimensional trust-based governance mechanism is thus beneficial for organizations to achieve performance outcomes in exchange relationships.

Second, our study shows that while information exchange and uncertainty mediate the calculative trust – performance relationship, communication and commitment mediate the relational trust – performance relationship. According to these findings, managers should understand that different types of trust have their own pathways to influence performance. Without suitable dimensions of inter-organizational relationships playing the bridging roles, trust may not necessarily lead to high organizational performance. This study thus provides managers with useful guidelines as to how to leverage trust to achieve higher organizational performance.

Finally, our findings indicate that the dynamic and procedural nature of trust should be noticed when managers attempt to build inter-organizational trust and

enhance performance. During the early stages of the inter-organizational relationship, because there is a lack of repeated interactions and shared beliefs between partner organizations, it is challenging to establish emotion-based relational trust. Consequently, the dominant form of trust at this stage is calculative trust, which is based on the organization's rational and deliberate assessment of its partner's abilities and reputation. As the collaborations between organizations deepen over time, continued interaction and emotional connections between the parties give rise to the relational trust. Therefore, managers should not take a static and uniform view of the trust-performance relationship; instead, they should understand the dynamic nature of different types of trust and allocate different resources at the different stages of inter-organizational relationship to maximize the effect of trust on organizational performance.

6.4. Limitations and further research

First, this study provides a comprehensive review of the economic and socio-psychological perspectives of inter-organizational trust and its relationship with organizational performance. However, it has ignored other perspectives of inter-organizational trust. For example, the social network perspective argues that organizational relationships are no longer dyadic but are network-based (Sarker et al., 2011). This view has received empirical support. For example, Madhwal & Panfilov (2017) show that the emergence of distributed ledger networks, which employ technologies such as digital currencies and smart contracts that free organizations from the constraints of traditional governance mechanisms, challenges the extant

conceptualizations of trust. This phenomenon can lead to a "trustless trust" that allows organizations to cooperate openly without the need for trust (Hawlitschek et al., 2018). As the development of information technology has changed inter-organizational relationships substantially, the formation and influence of trust among organizations are inevitably transformed. Future research efforts can explore such new type of trust and how its influence on organizational performance may differ from traditional types of trust.

Second, our paper explores the mediating effects of information exchange, uncertainty, communication, and commitment on the trust-performance relationship through meta-analytic structural equation modelling. While these dimensions of inter-organizational relationships help reveal the mechanisms through which trust influences organizational performance, there can be other intermediate variables that mediate the focal relationship. For example, the transaction cost economics suggests that asset specificity is a critical factor when considering transaction costs associated with inter-organizational relationships (David & Han, 2004; Wang et al., 2020). Future research can explore the mediating effects of such organization-specific factors and other dimensions of inter-organizational relationships to enable a more complete account of the mediating mechanisms enabling the effect of inter-organizational trust on organizational performance.

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Table 1. Comparisons between calculative and relational trust

Key Category	Calculative trust	Relational trust	Sources
Theoretical perspective	Transaction cost economics	Social exchange theory	Williamson, (1993) Blau, (1964)
Underlying assumption	Pursuing self-interests	Seeking mutual benefits	Bromiley & Harris (2006) Rousseau et al. (1998)
Core concepts	Rational choice; expectation; calculation of gains and losses	Repeated interaction; Emotional response; shared identity	Lewicki et al. (2006) Rousseau et al. (1998)
Decision rules	Forward-looking	Heuristic	Poppo et al. (2016)
Generation time	Earlier time of exchange relationship	Latter time of exchange relationship	Rousseau et al. (1998)
Major benefits	Reducing opportunistic behaviors and transaction costs	Improving mutual understanding and common beliefs	Poppo et al. (2016)
Ultimate purpose	Completing economic exchange	Achieving relational exchange	Young-Ybarra & Wiersema (1999)

Table 2. Definitions of variables

Variable	Category	Definitions and Sources
Independent variables	Calculative trust	Calculative trust is a rational expectation (after carefully weighing the benefits and costs) that the other party will take beneficial actions (Luo, 2002; Poppo et al., 2016).
	Relational trust	Relational trust derives from repeated interactions over time between two parties with information available within the relationship itself (Rousseau et al., 1998).
Mediating variables	Inter-organizational information exchange	Inter-organizational information exchange is defined as the process in which organizations openly exchange knowledges that may be useful to both parties (Doney & Cannon, 1997).
	Inter-organizational uncertainty	Inter-organizational uncertainty refers to opportunistic behaviors and conflicts among organizations that are harmful to short-term interests and long-term goals of organizations (Wu et al., 2017).
	Inter-organizational Communication	Inter-organizational communication is a relational competency, which is manifested in formal and informal interactions at the organizational level (Paulraj et al., 2008).
	Inter-organizational commitment	Inter-organizational commitment is defined as "the willingness of organizations to develop stable relationships and to make short-term sacrifices to maintain the relationship, as well as their confidence in the stability of the trading partner relationship" (Ashnai et al., 2016, p. 130).
Dependent variable	Organizational performance	Organizational performance refers to the multidimensional structure of an organization to meet organizational goals, which consists of profitability, growth, and capital market performance dimensions (Venkatraman & Ramanujam, 1986) or is embodied in customer satisfaction, market share growth (Katsikeas et al., 2009) and product technology innovation (Corsten et al., 2011).

Table 3. Results of trust-performance

Theory	A	B	Model	K	N	ES_r'	95% CI	80% CI	Two-tailed test	Heterogeneity analysis	Fail Safe-

											Z value	P value	Q value	df(Q)	P value	I^2	N
TCE	CT	PF	F	41	8504	0.464	0.447	0.480	0.453	0.475	45.956	0.000	744.243	40	0.000	94.625	20883
			R	41	8504	0.462	0.386	0.532	0.413	0.509							
SET	RT	PF	F	42	9176	0.502	0.487	0.518	0.492	0.512	52.543	0.000	723.529	41	0.000	94.333	28032
			R	42	9176	0.493	0.425	0.556	0.449	0.535							

Notes: TCE represents transaction cost economics; SET represents social exchange theory; A represents variable a; B represents variable b; F represents fixed effect model, R represents random effect model; K represents the number of research samples; N represents the sample size; *ESr′* represents the average effect size after correction of sampling and measurement errors; 95%CI represents 95% confidence interval of effect size; 80%CI represents 80% confidence interval of effect size; ***, $p < 0.001$; **, $p < 0.01$; * $p < 0.05$.

Table 4. Correlation matrix based on structural equation model

Theory	Variables	1	2	3
Transaction cost economics	1. Calculative Trust			
	2. Uncertainty	-0.473		
	K(N)	9 (2348)		
	95% CI	-0.575--0.355		
	Q	90.806***		
	3. Information Exchange	0.514	-0.235	
	K(N)	11 (2569)	2 (513)	
	95% CI	0.351-0.647	-0.343--0.120	
	Q	264.154***	1.684	
	4. Performance	0.462	-0.309	0.506
	K(N)	41 (8504)	9 (2348)	11 (2569)
	95% CI	0.386-0.532	-0.498-0.093	0.374-0.618
	Q	744.243***	235.575***	94.277***
Social exchange theory	1. Relational trust			
	2. Communication	0.540		
	K(N)	7 (1327)		
	95% CI	0.415-0.645		
	Q	42.289***		
	3. Commitment	0.679	0.354	
	K(N)	7 (1555)	2 (375)	
	95% CI	0.522-0.792	0.262-0.440	
	Q	144.684***	0.842	
	4. Performance	0.493	0.465	0.450
	K(N)	42 (9176)	7 (1327)	7 (1555)
	95% CI	0.425-0.556	0.313-0.594	0.254-0.610
	Q	723.529***	60.161***	118.361***

Notes: ***, $p < 0.001$; **, $p < 0.01$; * $p < 0.05$

Table 5. Path analysis of model and fitting indices

Path	Transaction cost economics		Social exchange theory	
	Path coefficient	*T value*	Path coefficient	*T value*
CT←→IE	0.514***	24.140	-	-
CT←→UN	-0.473 ***	-21.628	-	-
CT←→PF	0.217***	8.270		
UN←→PF	-0.120***	-5.190		
IE←→PF	0.366***	15.378		
RT←→CN	-	-	0.540	21.055
RT←→CM	-	-	0.679	30.353
RT←→PF	-	-	0.190	5.032
CN←→PF	-	-	0.285	9.565
CM←→PF	-	-	0.220	6.465
Fitting index	Model fitting situation			
χ^2 value (P＞0.05)	0.187		0.452	
CFI (＞0.90)	1.000		1.000	
TLI (＞0.90)	1.000		1.000	
RMSEA (＜0.08)	0.000		0.000	
SRMR (＜0.08)	0.003		0.005	

Notes: The ideal situation of model fitting index is in brackets; CT represents calculative trust; RT represents relational trust; CM represents commitment; CN represents communication; IE represents information exchange; UN represents uncertainty; PF represents performance***, $p < 0.001$; **, $p < 0.01$; * $p < 0.05$.

Table 6. Results of mediating effects

Theory	Path	Effect	Estimation value	Standard error	Z value	*P value*
Transaction cost economics	CT→PF	Total effect 1	0.462	0.022	20.978	0.000
		Total indirect effect 1	0.245	0.018	13.338	0.000
		Direct effect 1	0.217	0.026	8.270	0.000
	CT→UN→PF	Indirect effect 1	0.057	0.011	5.047	0.000
	CT→IE→PF	Indirect effect 2	0.188	0.015	12.970	0.000
Social exchange theory	RT→PF	Total effect 2	0.493	0.027	18.577	0.000
		Total indirect effect 2	0.303	0.030	10.274	0.000
		Direct effect 2	0.190	0.038	5.032	0.000
	RT→CN→PF	Indirect effect 3	0.154	0.018	8.709	0.000
	RT→CM→PF	Indirect effect 4	0.150	0.024	6.323	0.000

Notes: CT represents calculative trust; RT represents relational trust; CM represents commitment; CN represents communication; IE represents information exchange; UN represents uncertainty; PF represents performance; ***, $p < 0.001$; **, $p < 0.01$; * $p < 0.05$.

Appendix A

ID	Author(s)	Title	Journal/University	N	Publication type	Trust-performance correlation (uncorrected)	Reliability-trust (calculative and relational)	Reliability-performance
1	Ho (2005)	The supply chain advantage: development of a strategic business model for the Hong Kong clothing industry	Hong Kong Polytechnic University	123	D	0.380/0.460	0.950/0.890	0.860
2	Ye (2005)	Strategic IT partnerships in transformational outsourcing as a distinctive source of IT value: a social capital perspective	University of Maryland	151	D	0.302	0.819	0.869
3	Katsikeas et al. (2009)	Developing successful trust-based international exchange relationships	Journal of International Business Studies	214	J	0.065/0.21	0.710/0.900	0.870
4	Lado et al. (2008)	Trust-opportunism paradox, rationalism, and performance in interfirm relationships: evidence from the retail industry	Strategic Management Journal	409	J	0.210	0.940	0.910
5	François (2008)	Supply chain collaboration: the role of key contact employees	Ohio State University	168	D	0.120/0.070	0.835/0.930	0.724
6	Li et al. (2010)	Learning trajectory in offshore OEM cooperation: Transaction value for local suppliers in the emerging economies	Journal of Operations Management	140	J	0.070/0.120	0.930/0.835	0.780
7	Ling-yee, (2010)	Encouraging extra-role behavior in a channel context: The role of economic-, social-, and justice-based sharedness mechanisms	Industrial Marketing Management	353	J	0.530	0.840	0.900
8	Spralls et al. (2011)	Extranet use and building relationship capital in interfirm distribution networks: The role of extranet capability	Journal of Retailing	175	J	0.536	0.950	0.920
9	Gaur et al. (2011)	Environmental and firm level influences on Inter-organizational trust and SME performance	Journal of Management Studies	565	J	0.680	0.7681	-

ID	Author(s)	Title	Journal/University	N	Publication type	Trust-performance correlation (uncorrected)	Reliability-trust (calculative and relational)	Reliability-performance
10	Wei et al. (2012)	Linking inter-organizational trust with logistics information integration and partner cooperation under environmental uncertainty	International Journal of Production Economics	154	J	0.405	0.930	0.820
11	Nicolaou et al. (2013)	Information quality, trust, and risk perceptions in electronic data exchanges	Decision Support Systems	221	J	0.465/0.443	0.876/0.861	0.856
12	Poppo et al. (2016)	When can you "trust" trust? Calculative trust, relational trust, and supplier performance	Strategic Management Journal	211	J	0.450/0.280	0.820/0.890	0.920
13	Ashnai et al. (2016)	Inter-personal and inter-organizational trust in business relationships: An attitude-behavior-outcome model	Industrial Marketing Management	331	J	0.140	0.940	0.920
14	Holtgrave et al. (2017)	Untangling the trust-control nexus in international buyer-supplier exchange relationships: An investigation of the changing world regarding relationship length	European Management Journal	212	J	0.330/0.280	0.950/0.940	0.920
15	Wu et al. (2017)	Impact of specific investments, governance mechanisms and behaviors on the performance of cooperative innovation projects	International Journal of Project Management	238	J	0.520	0.870	0.900
16	Alaaraj et al. (2018)	External growth strategies and organizational performance in emerging markets organizational performance in emerging markets	International Journal of Commerce & Management	240	J	0.436/0.437	0.925/0.871	0.897
17	Li et al. (2018)	Nexus of inter-organizational trust, principled negotiation, and joint action for improved cost performance: Survey of Chinese megaprojects	Journal of Management in Engineering	248	J	0.528/0.542	0.936	0.882
18	Wu et al. (2020)	How different strengths of ties impact project performance in megaprojects: the mediating role of trust	International Journal of Managing Projects in Business	350	J	0.534/0.793	0.964/0.973	0.981
19	Wang et al. (2020)	The origins of trust asymmetry in international relationships: An institutional view	Journal of International Marketing	134	J	0.250/0.360	0.875/0.935	0.910

ID	Author(s)	Title	Journal/University	N	Publication type	Trust-performance correlation (uncorrected)	Reliability-trust (calculative and relational)	Reliability-performance
20	Lee et al, (2020)	Joint contract-function effects on BIM-enabled EPC project performance	Journal of Construction Engineering and Management	252	J	0.510/0.536	0.857/0.876	0.879
21	Efrat et al. (2021)	An interaction orientation approach to SME-Intermediaries relationships	European Management Journal	165	J	0.010/0.130	0.920/0.870	0.960
22	Vryza (1997)	Control mechanisms, inter-partner trust, and performance in international joint ventures: A transaction cost approach	University of Tennessee, Knoxville	140	D	0.196	0.800	0.860
23	Zaheer et al. (1998)	Does trust matter? Exploring the effects of interorganizational and interpersonal trust on performance	Organization Science	107	J	0.542	0.766	0.750
24	Muthusamy (2000)	Performance and stability of strategic alliances: an examination of the influence of social exchange processes	Oklahoma State University	128	D	0.578	0.930	0.920
25	Garvisn (2000)	Characteristics and outcomes of entrepreneurial collaborations: the effect of trust on partnership success, partner satisfaction, and financial performance	Georgia State University	54	D	0.410	0.890	0.872
26	Ruth (2006)	Transaction costs, technology, and the scope of human resource outsourcing relationships	Purdue University	80	D	0.635	0.940	0.920
27	McDowell (2006)	Interorganizational relationships: the effects of organizational efficacy on member firm performance	University of North Texas	146	D	0.485	0.870	0.900
28	Gulati & Nickerson (2008)	Inter-organizational trust, governance choice, and exchange performance	Organization Science	222	J	0.589	0.840	0.880
29	Corsten et al. (2011)	The effects of supplier-to-buyer identification on operational performance-An empirical investigation of inter-organizational identification in automotive relationships	Journal of Operations Management	346	J	0.093	0.870	0.880

ID	Author(s)	Title	Journal/University	N	Publication type	Trust-performance correlation (uncorrected)	Reliability-trust (calculative and relational)	Reliability-performance
30	Arranz & De Arroyabe (2011)	Effect of formal contracts, relational norms and trust on performance of joint research and development projects	British Journal of Management	163	J	0.176	0.810	0.770
31	Arranz & De Arroyabe (2011)	Effect of formal contracts, relational norms and trust on performance of joint research and development projects	British Journal of Management	208	J	0.170	0.790	0.770
32	Yurov & Botella (2014)	Trust and its innovation in asymmetric environments of the supply chain management process	Journal of Computer Information Systems	81	J	0.540	0.766	0.832
33	Yurov & Botella (2014)	Trust and its innovation in asymmetric environments of the supply chain management process	Journal of Computer Information Systems	52	J	0.500	0.873	0.852
34	Revilla & Knoppen (2015)	Building knowledge integration in buyer-supplier relationships: The critical role of strategic supply management and trust	International Journal of Operations & Production Management	133	J	0.440	0.820	0.720
35	Xu et al. (2016)	Improving supply chain performance through industry standards use and community socialization: A perspective of standards consortia	International Journal of Physical Distribution & Logistics Management	216	J	0.200	0.840	0.980
36	Ojha et al. (2016)	Supply chain organizational infrastructure for promoting entrepreneurial emphasis and innovativeness: The role of trust and learning	International Journal of Production Economics	128	J	0.491	0.919	0.926
37	Singh & Teng (2016)	Enhancing supply chain outcomes through information technology and trust	Computers in Human Behavior	167	J	0.650	0.980	0.890
38	Brockman et al. (2017)	The role of buyer trust in outsourced CRM: Its influence on organizational learning and performance	Journal of Business-to-Business Marketing	221	J	0.489	0.960	0.860
39	Raza-Ullah & Kostis (2019)	Do trust and distrust in coopetition matter to performance?	European Management Journal	225	J	0.590	0.930	0.920
40	Crick & Crick	Rising up to the challenge of our rivals:	Industrial Marketing	323	J	0.660	0.960	0.980

ID	Author(s)	Title	Journal/University	N	Publication type	Trust-performance correlation (uncorrected)	Reliability-trust (calculative and relational)	Reliability-performance
	(2021)	Unpacking the drivers and outcomes of coopetition activities	Management					
41	Chi et al. (2021)	How cooperative innovation could be more effective in China: a relationship perspective	Journal of Business & Industrial Marketing	310	J	-0.034	0.850	0.899
42	Aulakh et al. (1996)	Trust and performance in cross-border marketing partnerships: a behavioral approach	Journal of International Business Studies	181	J	0.430	0.770	0.800
43	Candace (1996)	The role of transaction cost theory and social exchange theory in strategic alliance commitment	University of California	91	D	0.620	-	-
44	Tippins (1999)	Information management within the distribution channel: the effects of information technology and customer learning on channel performance outcomes	University of Nebraska	271	D	0.312	-	-
45	Myhr (2001)	Business-to-business partnerships- an empirical examination in a supply chain context	University of Virginia	156	D	0.419	-	-
46	Singh (2006)	An empirical examination of the influence of Information technology and trust on Supply chain dyad relationships and performance	University of Texas at Arlington	220	D	0.600	0.980	0.900
47	Klein et al. (2007)	Competitive and cooperative positioning in supply chain logistics relationships	Decision Sciences	91	J	0.506	-	-
48	Luo (2007)	Procedural fairness and interfirm cooperation in strategic alliances	Strategic Management Journal	168	J	0.155	0.850	0.940
49	Briggs & Grisaffe (2010)	Service performance-loyalty intentions Link in a business-to-business context: the role of relational exchange outcomes and customer characteristics	Journal of Service Research	110	J	0.600	0.920	0.740
50	Bianchi & Saleh (2010)	On importer trust and commitment: a comparative study of two developing countries	International Marketing Review	204	J	0.650	0.820	0.940
51	Ha (2013)	The role of relationships in crisis communication: the impact of agency-client	University of North Carolina	433	D	0.348	0.825	0.841

ID	Author(s)	Title	Journal/University	N	Publication type	Trust-performance correlation (uncorrected)	Reliability-trust (calculative and relational)	Reliability-performance
		relationships and perception of crisis strategies on crisis-related task conflict, performance, and satisfaction						
52	Brinkhoff et al. (2014)	All you need is trust? An examination of inter-organizational supply chain projects	Production and Operations Management	68	J	0.560	0.900	0.960
53	Lin et al. (2014)	Impact of export market orientation on export performance A relational perspective	Baltic Journal of Management	244	J	0.277	0.850	0.910
54	Schneider, (2014)	A capability approach to interorganizational innovation	University of Illinois	182	D	0.730	-	-
55	Chang & Fang (2015)	Enhancing export performance for business markets: effects of interorganizational relationships on export market orientation (EMO)	Journal of Business-to-Business Marketing	235	J	0.039	0.913	0.862
56	Barnes et al. (2015)	Interpersonal factors as drivers of quality and performance in Western–Hong Kong interorganizational business relationships	Journal of International Marketing	202	J	0.630	0.840	0.850
57	Wu (2016)	The mediating roles of governance mechanisms and knowledge transfer on the relationship between specific investments and cooperative innovation performance	Technology Analysis & Strategic Management	238	J	0.530	0.870	0.900
58	Pemartın et al. (2017)	Effects of collaborative communication on NPD collaboration results: two routes of influence	Journal of Product Innovation Management	207	J	0.522	0.940	0.906
59	Hirshberg & Shoham (2017)	A behavioral model of international channel relationships	Journal of Business-to-Business Marketing	104	J	0.342	0.880	0.870
60	Lu et al. (2017)	The interaction effect between intra-organizational and inter-organizational control on the project performance of new product development in open innovation	International Journal of Project Management	243	J	0.595	0.928	0.924
61	Lu et al. (2019)	Quality management practices and inter-organizational project performance: Moderating	International Journal of Project Management	265	J	0.687	0.915	0.931

ID	Author(s)	Title	Journal/University	N	Publication type	Trust-performance correlation (uncorrected)	Reliability-trust (calculative and relational)	Reliability-performance
		effect of governance mechanisms						
62	Qian et al. (2020)	Personal and organizational level relationships in relational exchanges in supply chains-a bottom-up model	Supply Chain Management: An International Journal	209	J	0.260	0.750	0.840

Notes: J represents journal article; D represents doctoral dissertation.