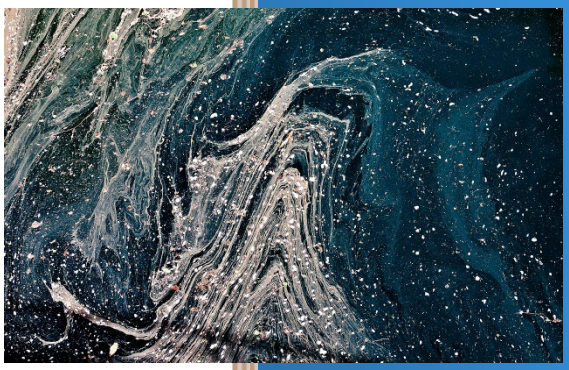
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Trust, Knowledge Sharing, and ICT Effects on Distributed Agile Performance in Pakistan

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Abstract: The rising adoption of distributed agile teams has reshaped the global software industry. However, sustaining their effectiveness remains a significant challenge, particularly in the rapidly evolving Information Technology (IT) industry. While trust dynamics, knowledge sharing process, and Information and Communication Technology (ICT) are extensively recognized as essential facilitators of collaboration, their interconnections in distributed agile teams remain underexplored. The present study examined the relationship between Cognitive-based Trust (CBT) and Affect-based Trust (ABT) and key knowledge-sharing processes, including Socialization (SOC) and Externalization (EXT), and assessed their mediation role in relation to Agile Distributed Team Performance (ADTP). The study also investigated the moderating role of ICT in these relationships. To address the objectives, a quantitative, cross-sectional research design was adopted. Data were collected through a survey using structured questionnaires from ADTP associated with the IT industry of Pakistan. Using purposive sampling, three major cities, namely Lahore, Karachi, and Islamabad, were selected. As a result, 193 responses were deemed usable for data analysis. The study utilized Structural Equation Modelling (SEM) to investigate the hypothesized relationships. SPSS 25 and SmartPLS 4 were applied to test hypothesized relationships. The most important findings demonstrate that CBT is significantly associated with both knowledge-sharing processes and team performance, whereas ABT shows weaker or non-significant effects. SOC and EXT are confirmed as key mediators linking trust to ADTP. ICT strengthens EXT but provides limited support for SOC-related processes. By integrating trust theory, selected SECI knowledge conversion processes, and socio-technical perspectives, this study advances understanding of trust and ICT operating through process-specific boundary conditions in distributed agile collaboration. It also provides practical guidance for emerging IT contexts. The findings also have implications for e-learning practices through an emphasis on CBT, knowledge articulation, and the efficient development of ICT in collaborative learning and knowledge-sharing within technology-oriented learning environments. On the other hand, the empirical demonstration of the role of socio-technical enablers in the knowledge-sharing process and its impact on performance in a collaborative learning environment enhances the existing e-learning literature. It also highlights the importance of fostering CBT, improving documentation practices, and aligning ICT use with relational engagement to enhance ADTP.

Keywords: Distributed agile team performance, Cognitive-based trust, Affect-based trust, Socialization, Externalization, Emerging IT industry

1. Introduction

1.1 Distributed Agile Development

In today's fast-paced IT industry, agility has become essential for managing the increasing complexity of software projects organization are increasingly adopting distributed agile teams to access global talent and deliver solutions efficiently under time constraints (Waheed et al., 2019). Evidence suggests that agile practices enhance productivity and project success in a complex environment (Project Management Institute, 2021).

However, despite these advantages, Distributed Agile Teams (DAT) face significant challenges, including communication and coordination difficulties, fragmented Knowledge-sharing, and limited opportunities for building interpersonal relationships across geographical, cultural, and temporal boundaries (Pinjani & Palvia, 2013; Waheed et al., 2019). These challenges directly affect team performance and highlight the importance of understanding underlying socio-technical mechanisms.

1.2 Socio-Technical Enablers of Knowledge-Sharing

Within distributed agile environments, trust plays a critical role in enabling effective collaboration and knowledge-sharing. Trust is conceptualized as CBT, reflecting competence and reliability, and ABT, grounded in

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emotional bonds (Algood et al., 2023; McAllister, 1995). Both forms of trust influence knowledge-sharing processes, which are central to team coordination and performance.

Knowledge-sharing is commonly understood through the SECI model, where SOC represents tacit knowledge exchange and EXT refers to the conversion of tacit knowledge into explicit forms (Nonaka, Takeuchi & Umemoto, 1996). Within these processes, trust elevates innovativeness and anticipatory problem-solving, fostering a reciprocal cycle in which knowledge-sharing is reinforced (Huber et al., 2016). While these processes are essential in distributed teams, their effectiveness depends on both social and technological conditions.

Although ICT has been widely recognized as an enabler of knowledge-sharing in distributed agile teams, prior research presents mixed and sometimes contradictory findings. On one hand, studies such as Alavi and Leidner (2001) and Lee and Choi (2003) emphasize that ICT enhances knowledge creation, coordination, and organizational performance by facilitating information exchange and collaboration. Similarly, Davidaviciene et al. (2020) and Müller and Antoni (2022) highlight its positive role in improving communication efficiency and supporting knowledge-sharing of distributed teams,

On the other hand, research also suggests that ICT may constrain certain aspects of knowledge-sharing, particularly those involving tacit knowledge and interpersonal trust. For example, Pinjani and Palvia (2013) argue that reliance on computer-mediated communication can weaken social interaction and limit the development of trust in global distributed teams. Likewise, Chowdhury (2005) emphasizes that affect trust, which is essential for sharing complex and tacit knowledge, is difficult to establish in technology-mediated environments.

These contrasting findings indicate that ICT does not operate as a uniformly positive enabler but rather as a context-dependent factor that differentially influences (Tyagi, Sibal and Suri, 2018; Waheed et al., 2019) knowledge-sharing processes. In particular, ICT may effectively support explicit knowledge articulation (externalization) while simultaneously constraining informal, trust-based interactions required for tacit knowledge exchange (socialization). However, prior studies have not sufficiently examined how ICT simultaneously enables and constrains these processes, within a unified framework, particularly in relation to trust and performance outcomes in distributed agile teams and especially within a developing country context (Tyagi, Sibal & Suri, 2018; Waheed et al., 2019).

1.3 Context of the Study: Pakistan IT Industry

The IT section in Pakistan, though relatively young, is expanding rapidly and gaining global recognition as software companies increasingly serve international clients. This growth is largely driven by outsourced IT services and offshore development centres established by foreign firms seeking cost-effective solutions (Board of Investment, 2023). However, despite this expansion, project failure rates remain a significant concern.

Prior studies report that a considerable proportion of IT and e-government projects in Pakistan fail or achieve limited success due to issues such as poor project planning, weak coordination, and ineffective management practices (Abbas et al., 2017; Mustaqeem, Khalid & Nabi, 2020). Wafa et al.(2022) indicate that approximately 40% of IT projects fail, while only around 15% of e-government projects are considered successful. These persistent challenges are further linked to inadequate adoption and implementation of agile methodologies, emphasizing the importance of agile practices in addressing the inherent complexity of IT projects (Dhir, Kumar & Singh, 2018).

Figure 1 outlines the issues with agile DAT that lead to high failure rates in IT projects and shows how trust feeds back in improving knowledge-sharing processes. Agile principles 5 and 11 enable reliability and emotional bonding; however, both tacit and explicit knowledge support agile principles 6 and 12. The supportive function of ICT enhances knowledge-sharing processes, subsequently IT project outcomes.

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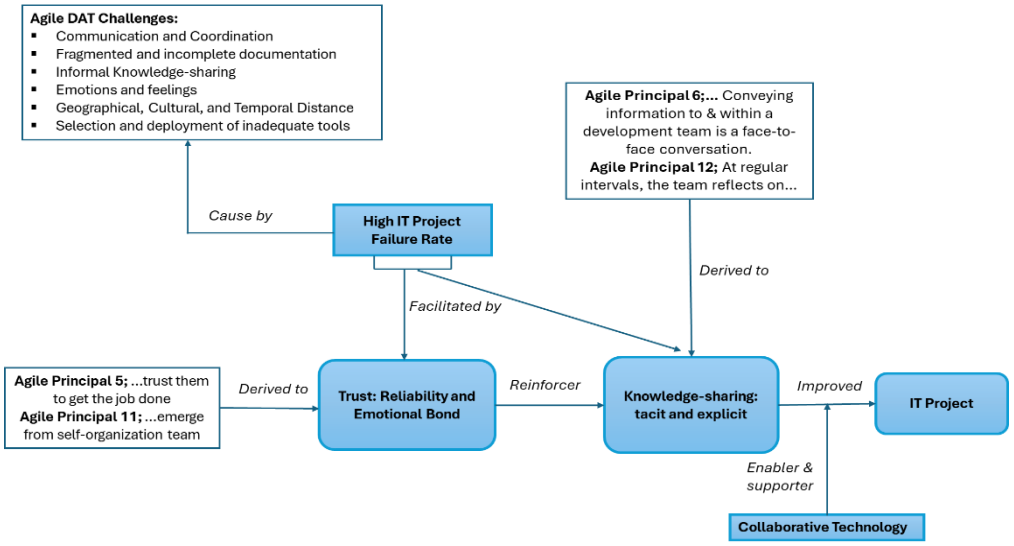


Figure 1: Research Background

1.4 Research Gap and Study Contribution

Despite the growing body of research on trust, knowledge-sharing, and ICT, several important gaps remain. Prior studies have largely examined these constructs independently or through direct relationships, with limited attention to their combined effects within integrated mechanisms (Davidavičienė, Al Majzoub & Meidute-Kavaliauskiene, 2020; Müller & Antoni, 2022). In particular, the role of ICT as a boundary condition influencing the indirect relationship between trust and team performance through specific knowledge-sharing processes remains underexplored. Furthermore, existing research presents inconsistent findings regarding the role of ICT, yet these contradictions have not been systematically examined at the process level (Chowdhury, 2005; Pinjani & Palvia, 2013).

To address these gaps, this study integrates trust theory, the SECI model, and socio-technical perspectives to examine how ICT moderates the indirect relationship between trust and performance through knowledge-sharing processes. This approach enables examination of how cognitive-based and affect-based trust influence performance through socialization and externalization, while ICT moderates these relationships (see Figure 2). By conceptualizing mediation and moderation as a linked process, Müller and Antoni (2022), where ICT is a boundary condition that moderates the indirect effects of trust on ADTP through knowledge-sharing processes, this study provides a more comprehensive understanding of how trust, knowledge-sharing, and ICT jointly shape agile distributed team performance.

- Do CBT and ABT influence ADTP?
- Do SOC and EXT mediate the relationship between CBT, ABT, and ADTP?
- Does ICT moderate the relationship between SOC, EXT, and ADTP?

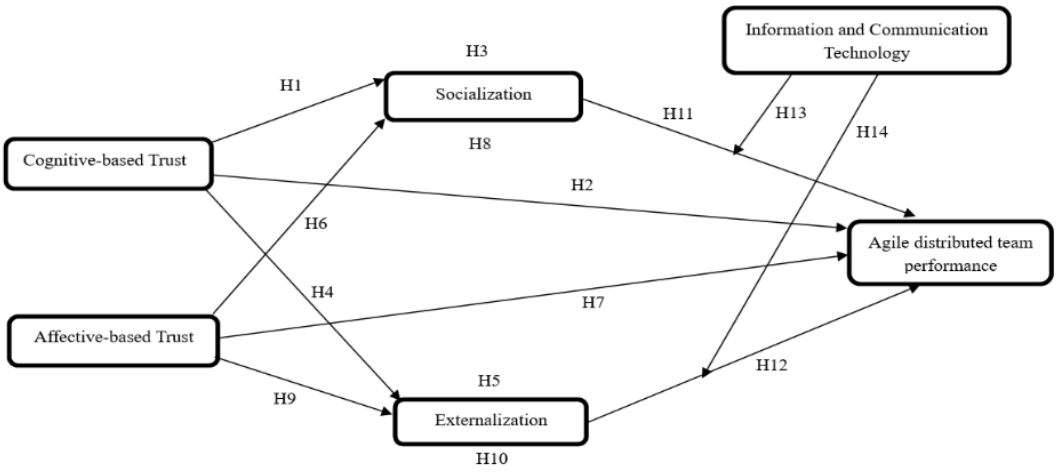


Figure 2: The Conceptual Diagram

2. Theoretical Background and Literature Review

2.1 Theoretical Background

This study is underpinned by the SECI model of knowledge-sharing (Nonaka, Takeuchi and Umemoto, 1996), which describes the processes through which tacit and explicit knowledge are transformed. These processes involve strong interpersonal interaction elements and are closely linked to the current research goal of exploring trust dynamics and ICT determinants of knowledge-sharing and ADTP. Notably, the SECI model allows for the process-level analysis of knowledge conversion and its efficiency and constraints, enabling the identification of boundary conditions in trust and ICT-enabled collaborative processes.

2.2 Cognitive-based Trust, Socialization, and Agile Distributed Team Performance

In South Asian contexts, particularly Pakistan, the adoption of agile methodologies in distributed teams faces structural challenges, including cultural differences, temporal separation, and limited face-to-face interaction, all of which constrain trust development (Wahbeh et al., 2024). While McAllister (1995) conceptualizes CBT as a rational evaluation of reliability and competence, this perspective is largely grounded in co-located settings and provides limited insight into performance dynamics in agile distributed environments.

Existing literature suggests that trust facilitates communication and knowledge-sharing (Politis, 2003). Yet these studies remain behaviorally oriented, offering a limited explanation of how such interactions translate into ADTP. Similarly, SOC, as a tacit knowledge-sharing process, relies on shared experiences and informal interaction, conditions that are inherently constrained in distributed agile settings. Although agile practices (e.g., stand-ups and retrospectives) attempt to replicate these interactions (Legood et al., 2023) and framework such as Tyagi , Sibal and Suri (2018) emphasize the importance of trust and tacit knowledge in agile environments, these contributions remain largely conceptual and lack empirical validation in distributed agile contexts.

Empirical findings on CBT and tacit knowledge-sharing are also contextually fragmented. For example, Holste and Fields (2010) and Capestro et al. (2024) emphasize knowledge exchange in non-agile or manufacturing contexts, while Umar et al. (2023) report positive trust–knowledge relationships in academic settings. These variations suggest that trust–knowledge dynamics are context-dependent, yet prior research has not adequately examined their implications for ADTP in agile distributed teams (Buvik & Tkalich, 2022).

Accordingly, this study addresses this gap by proposing that CBT enhances socialization and, in turn, improves ADTP through better shared understanding, coordination, and task reliability in distributed members. Furthermore, CBT is expected to support both tacit (SOC) and explicit (EXT) knowledge processes, providing a more comprehensive explanation of performance outcomes. This research hypothesized that:

H1: There is a significant positive relationship between CBT and SOC among ADTP.

H2: There is a significant positive relationship between CBT and ADTP.

H3: SOC mediates the relationship between CBT and ADTP.

H4: There is a significant positive relationship between CBT and EXT.

2.3 Cognitive-based Trust, Externalization, and Agile Distributed Team Performance

EXT refers to the conversion of tacit knowledge into explicit, shareable forms; however, this process remains inherently challenging due to the experiential nature of tacit knowledge. While agile teams rely on digital repositories (e.g., Confluence, JIRA, Wikis) to support knowledge codification. Prior research (Tyagi , Sibal and Suri ,2018), largely emphasizes tool availability rather than the conditions under which effective externalization occurs in distributed environments.

Trust has been identified as a critical enabler of coordination and knowledge-sharing, yet its role in externalization remains insufficiently theorized. For instance, Alami, Krancher and Paasivaara (2022) highlight the role of trust in fostering psychological safety and coordination in agile software teams, while Buvik and Tkalich (2022) demonstrate its strong influence on performance in distributed work contexts. However, both studies stop short of explaining how CBT facilitates the articulation of tacit knowledge into structured, reusable forms, particularly in agile distributed teams.

Empirical evidence suggests that CBT has a stronger association with both tacit and explicit knowledge processes compared to affect-based trust (Chen et al., 2021), indicating its importance in contexts requiring clarity,

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reliability, and structured communication. Despite this, prior research has not sufficiently linked CBT-driven externalization to ADTP.

Accordingly, this study argues that CBT enhances externalization by enabling teams to effectively document and reuse knowledge, thereby reducing rework and improving coordination under distributed conditions. In turn, effective externalization is expected to directly contribute to ADTP. Based on this, the study hypothesized:

H4: There is a significant positive relationship between CBT and EXT.

H5: EXT mediates the relationship between CBT and ADTP.

H12: There is a significant positive relationship between EXT and ADTP.

2.4 Affect-based Trust, Socialization, and Agile Distributed Team Performance

ABT refers to confidence grounded in emotional bonds and interpersonal relationships developed through shared experiences (Legood et al., 2023; McAllister, 1995), which may encourage openness and willingness to share knowledge among team members rather than directly shaping task performance. Chowdhury (2005) argues that ABT is an emotional and social tie between individuals, facilitating the exchange of complex knowledge through shared mental models and mutual understanding. Implementing and sustaining agile methodologies such as daily stand-ups, face-to-face communication, sprint ceremonies, and pair programming in distributed agile teams is challenging. However, the presence of emotional connections and interpersonal interactions among team members may mitigate coordination constraints, facilitate the successful transfer of tacit knowledge and increase the likelihood that individuals will share information.

Scholars hold varying perspectives on the impact of ABT on tacit knowledge-sharing. For example, Swift and Hwang (2013) claim that ABT is more critical than CBT in the exchange of social knowledge. Similarly, Holste and Fields (2010) argue that ABT, emotional trust, plays a more substantial role in influencing the willingness to share tacit knowledge rather than its application. In contrast, Chen et al. (2021) suggest that emotional trust is less strongly linked to both tacit and explicit knowledge, in contrast to CBT. Capestro et al. (2024) align with this viewpoint, claiming that emotional trust plays a minimal role in shaping technological and organizational factors underlying tacit knowledge-sharing. Consequently, emotional trust may function as a contextual motivator influencing individuals' readiness to engage in tacit knowledge exchange rather than as a direct performance driver. From a performance perspective, ABT contributes to ADTP primarily by strengthening SOC processes that support interpersonal coordination, psychological safety, and willingness to engage in collaborative work. Based on the discussion, the study hypothesized:

H6: There is a significant positive relationship between ABT and SOC.

H7: There is a significant positive relationship between ABT and ADTP.

H8: SOC mediates the relationship between ABT and ADTP.

2.5 Affect-based Trust, Externalization, and Agile Distributed Team Performance

EXT is the conversion of tacit knowledge into explicit forms and is inherently complex, requires more than interpersonal closeness. While ABT fosters openness and willingness to share, its role in enabling externalization remains inconsistent and underexplored. For example, Holste and Fields (2010) suggested that weak emotional ties limit knowledge articulation; however, strong emotional bonds alone do not ensure effective codification.

Recent studies indicate that ABT is insufficient in isolation and depends on enabling conditions such as psychological safety. Alami, Krancher and Paasivaara (2022) show that emotional trust supports knowledge t processes only in psychologically safe environments, while Ahmad (2025) and Santana et al. (2025) highlight that a supportive communication climate is necessary for transforming trust into explicit knowledge-sharing. This suggests that ABT enhances willingness, but not necessarily the ability to externalize knowledge.

These inconsistencies indicate that the ABT–EXT relationship is context-dependent, and its link to agile ADTP remains insufficiently examined. Accordingly, ineffective externalization, particularly in low psychological safety contexts, may constrain performance by limiting knowledge reuse. Based on this, the study hypothesized that:

H9: There is a significant positive relationship between ABT and EXT.

H10: EXT mediates the relationship between ABT and ADTP.

2.6 The Relation of ICT between Socialization, Externalization, and Agile Distributed Team Performance

While ICT is widely recognized as an enabler of knowledge-sharing in distributed agile teams, existing literature presents contradictory evidence regarding its effectiveness. Prior studies, e.g., (Alavi and Leidner, 2001; Davidavičienė, Al Majzoub and Meidute-Kavaliauskiene, 2020; Lee and Choi, 2003; Müller and Antoni, 2022) largely adopt a technology-centric perspective, emphasizing ICT's role in enhancing communication, coordination, and performance. However, this view overlooks important process-level differences and contextual conditions.

In contrast, other studies suggest that ICT may simultaneously enable and constrain knowledge-sharing. For example, ICT facilitates explicit knowledge articulation through EXT, particularly via asynchronous communication (Tyagi , Sibal & Suri, 2018). Yet it may hinder SOC, as computer-mediated communication reduces social richness and limits the development of affect-based trust, which is essential for tacit knowledge exchange (Chowdhury, 2005; Pinjani & Palvia, 2013). These conflicting findings indicate that ICT is not a uniform enabler but a contingent factor whose impact varies across knowledge processes.

Despite this, prior research has not sufficiently examined how ICT differentially shapes socialization and externalization within a unified framework, nor how it conditions their relationship with performance outcomes. This gap is particularly evident in distributed agile contexts and developing countries, where communication practices and ICT usage may differ (Waheed et al., 2019). Accordingly, this study adopts a contingency perspective, proposing that ICT moderates the effectiveness of trust-based knowledge-sharing processes in influencing ADTP, rather than directly enhancing performance. The study hypothesized:

H13: The mediating effect of SOC in the relationship between CBT, ABT, and ADTP varies across levels of ICT.

H14: The mediating effect of EXT in the relationship between CBT, ABT, and ADTP varies across levels of ICT.

3. Methods and Materials

3.1 Research Design and Sampling Strategy

Based on the positivist philosophy, the present research adopts a quantitative, cross-sectional research design to study the hypothesized relationships (Trochim et al., 2011). The main objective of the study was to examine the influence of ABT and CBT on ADTP with the mediation of SOC and EXT and the moderating effect of ICT. Therefore, a quantitative approach seemed suitable for studying the research objective. The study population contains 10,253 IT-registered companies in Pakistan. The Securities and Exchange Commission of Pakistan (SECP) obtained the list of firms. Three metropolitan cities, namely Lahore, Islamabad, and Karachi, were selected due to the dense population, which accounts for 34.78%, 26.1%, and 24.6%, respectively. In addition, these three cities account for 85.4% of all SEP-registered IT companies in Pakistan (Ministry of Information Technology and Telecommunication, 2020).

The study employed a purposive sampling technique to collect the data due to the absence of an updated and complete list of IT companies. Furthermore, the purposive sampling was found suitable because it properly aligned with the study objectives. In the same context, Vehovar, Toepoel and Steinmetz (2016) suggested that purposive sampling increases the validity and precision of findings. Furthermore, IT companies were selected based on two inclusive criteria. Firstly, IT companies that have adopted agile software development have organized into distributed teams. Moreover, the company's headquarters (HQs) should be in Pakistan, with distributed teams operating in various countries. Secondly, IT companies with at least two to three years of experience were selected. The reason for choosing two to three years is that the respondents would have sufficient time to build trust among distributed agile teams. Studies have shown that trust is not an instantaneous process, but rather a gradual and cumulative one that requires an ongoing process.

Additionally, the study selected developers, Scrum masters/project managers, and testers because they represent the core functional roles in Agile distributed teams. Developers contribute to knowledge creation and sharing, Scrum Masters/project managers facilitate coordination and trust, and testers ensure quality and continuous feedback. Together, these roles capture the technical, managerial, and quality dimensions of Agile teamwork, providing a comprehensive and representative view of team processes, collaboration, and performance. These roles directly influence knowledge-sharing processes and trust dynamics, supporting interpretation of the study's findings. Since this study employed a cross-sectional design, the findings captured

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relationships at a single point in time and do not allow for causal or longitudinal interpretations of trust development.

3.2 Data Collection Process

The study employed a self-administered, structured questionnaire to obtain responses through a survey technique. Researchers commonly adopt this approach in areas where information needs to be gathered from a broad audience (Keeter et al., 2006). In this way, purposive sampling allows researchers to use their professional and personal contacts to gain access to the software companies. In doing so, a formal request was submitted to the Admin/HR department of the software houses, requesting approval to conduct the study. This study initiated the actual data collection process once it was granted. Data collection was conducted over a period of approximately six months. Online questionnaires were distributed via email and professional contacts, with follow-up reminders issued to improve response rates.

The study employed an online and printed questionnaire to gain the maximum responses. Respondents were provided with a detailed briefing on the academic nature of the study alongside the questionnaire to ensure ethical compliance. Additionally, the study assured respondents that their identities and responses would remain confidential. Beyond this, the study clarified that participation was voluntary, and respondents could withdraw at any time during the data collection process without providing justification. Accordingly, the researchers also obtained informed consent in both oral and written forms.

G*Power was used for sample size calculations. The software is widely used to determine sample size in social science research (Rahman, 2023). Consequently, based on G*Power calculations, a minimum sample size of 134 respondents was required. However, approximately 250 online questionnaires were distributed to IT professionals, and 218 questionnaires were returned; among these, twenty-five were excluded due to missing or incomplete data. Ultimately, 193 usable responses were obtained, representing a 76.6% response rate, and were adequate for conducting the planned statistical analyses and supporting reliable inferences.

3.3 Measurement Instrument

The study used a survey based on a 5-point Likert scale (1 = "strongly disagree" to 5 = "strongly agree") to assess 30 items of six constructs. The study has adapted the instrument from earlier recognized investigations. Additionally, CBT and ABT were measured using a 4-item scale of Kanawattanachai and Yoo (2002). Each construct was operationalized to capture respondents' perceptions of trust, knowledge-sharing processes, ICT support, and ADTP within digitally mediated work settings. To examine reliability, CBT showed α =0.87, and ABT showed α =0.72, which were used in earlier studies to assess the trust dynamic nature in high and low performance of distributed teams. Similarly, SOC and EXT were adapted from the 4-item scale of Schulze and Hoegl (2008). Creating relevance for the study, previous studies have reported Cronbach alpha values for SOC and EXT,0.83 and 0.78, respectively. These studies examined the product innovation process of the pre-project phase of new idea development. Finally, ICT and ADTP were measured using a 5-item scale (Lurey & Raisinghani, 2001). Previously, empirical investigations found the challenges of effectiveness among distributed teams and have also reported Cronbach's alpha above-threshold values of ICT and ADTP, 0.82 and 0.79, respectively. The complete survey instrument is provided in Appendix A.

3.4 Analytical Approach

The study applied the PLS-SEM, one of the latest and most comprehensive approaches, using the SmartPLS 4 application. The PLS-SEM technique is well-suited for a limited sample size, as it does not require a large dataset for analysis. Similarly, PLS-SEM does not require data normality and may manage unobservable constructs. SEM is particularly suitable for examining complex relationships involving mediation and moderation among latent variables. Its primary advantage lies in the ability to simultaneously estimate multiple interdependent relationships; however, PLS-SEM emphasizes prediction and does not provide global goodness-of-fit indices comparable to covariance-based SEM. These limitations were considered during results interpretation (Hair et al., 2019). Consistent with moderated mediation testing principles, the mediation and moderation effects were tested following established SEM guidelines, where interaction terms (ICT × SOC and ICT × EXT) were constructed using the product indicator approach with mean-centred variables to reduce multicollinearity (Müller, Judd & Yzerbyt, 2005).

4. Findings and Interpretations

The IBM SPSS Statistics version 29.0.2.0 (20) software was used to clean the study data before data analysis by examining missing values, data normality (to assess distributional assumptions), outliers, Harman's single-factor

test for common method bias, and multicollinearity through VIF values. A SmartPLS 4 two-step data assessment and hypotheses testing approach was employed to investigate the measurement model and structural model hypotheses and their prediction (Henseler, Ringle & Sarstedt, 2015). The data were gathered from 193 valid respondents from various agile distributed teams, and bootstrapping (10,000 resamples) was applied to assess the significance of direct, indirect (mediation), and interaction (moderation) effects, consistent with moderated mediation testing procedures (Hair et al., 2019).

4.1 Demographics

The study revealed that most respondents were male, accounting for 83.9% of the overall sample. A large portion of the respondents' ages fell between 31 and 40, and 59.5% of respondents held a master's degree. Moreover, a significant portion of respondents, 77.2%, were using the Scrum Agile framework, followed by Extreme Programming (XP). Most of them were software developers, comprising 26.4%. Furthermore, most data were collected from Karachi city, constituting 61.7 %, where the largest number of distributed teams was between 11 and 15, accounting 26.9%, followed by teams 16-20, which accounted for 22.3 % of the total sample. Table 1 presents demographic characteristics.

Table 1: Demographic Characteristics

Demographics	Categories	Frequency	Percentage
Gender	Male	162	83.9
	Female	31	16.1
	Other	0	0
Age	20 to 30 years	43	22.3
	31 to 40 years	114	59.1
	41 to 60 years	36	18.7
Qualification	PhD	8	4.15
	Masters	115	59.5
	Graduation	70	36.3
	Other	0	0
Agile Framework	Scrum	149	77.2
	Extreme Programming (XP)	33	17.1
	Crystal	0	0
	DSDM	0	0
	Lean development	0	0
	Scaled Agile Framework	11	5.7
	Other	0	0
Title of position	Project Owner	21	10.9
	Project Leader/Team Leader	25	13
	Project Manager	32	16.6
	Software Developer	51	26.4
	Software Testers	22	11.4
	System Administrator	6	3.1
	Consultant	36	18.7
Team location	Karachi	119	61.7
	Lahore	43	22.3
	Islamabad	31	16.1
Number of distributed teams	6-10	35	18.1
	11-15	52	26.9
	16-20	43	22.3

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Demographics	Categories	Frequency	Percentage
	21-30	35	18.1
	More than thirty	21	10.9

4.2 Measurement Model

The measurement model was evaluated using reliability, convergent validity (AVE), and discriminant validity (HTMT) criteria. To confirm the internal consistency reliability, the study used factor loading, which achieved the required threshold of 0.50. The study's constructs achieved a Cronbach's alpha value above 0.70, indicating a standard level of reliability. Similarly, the table.2 presents the study construct AVE (Average variance extracted), which met the threshold value above 0.50. The internal consistency and reliability were confirmed by achieving the study construct composite reliability values, which were likewise greater than 0.70 (Chin, 1998; Hair et al., 2019).

Table 2: Measurement Model

No	Construct	Loadings	Alpha	CR	AVE
1	***Cognitive-Based Trust***		0.731	0.832	0.553
	CBT1	0.759			
	CBT2	0.746			
	CBT3	0.770			
	CBT4	0.698			
2	***Affect-Based Trust***		0.862	0.906	0.706
	ABT1	0.864			
	ABT2	0.840			
	ABT3	0.825			
	ABT4	0.832			
3	***Socialization***		0.781	0.859	0.603
	SOC1	0.767			
	SOC2	0.790			
	SOC3	0.743			
	SOC4	0.805			
4	***Externalization***		0.770	0.852	0.590
	EXT1	0.773			
	EXT2	0.765			
	EXT3	0.807			
	EXT4	0.727			
5	***Information and Communication Technology***		0.759	0.838	0.510
	ICT1	0.681			
	ICT2	0.708			
	ICT3	0.673			
	ICT4	0.735			
		0.768			
6	***Agile Distributed Team Performance***		0.913	0.928	0.590
	ADTP1	0.797			
	ADTP2	0.777			
	ADTP3	0.730			
	ADTP4	0.732			

No	Construct	Loadings	Alpha	CR	AVE
	ADTP5	0.779			
	ADTP6	0.780			
	ADTP7	0.706			
	ADTP8	0.808			
	ADTP9	0.794			

4.3 Discriminant Validity

Discriminant validity was assessed using the Heterotrait-Monotrait Ratio (HTMT), which is a comparison of the square root of the Average Variance Extracted (AVE) for all constructs to their inter-construct correlations (Fornell & Larcker, 1981). The HTML values are considered unsatisfactory if they exceed the 0.85 threshold (Kline et al., 2012). Another study suggested that the acceptable threshold is greater than 0.90. However, the findings are presented in Table 3, which shows that HTMT values are below the 0.85 threshold, hence meeting the standard of discriminant validity criteria.

Table 3: Discriminant Validity

Construct	CBT	ABT	SOC	EXT	ICT	ADTP
Cognitive-Based Trust	_					
Affect-Based Trust	0.660	_				
Socialization	0.808	0.658	_			
Externalization	0.720	0.421	0.761	_		
ICT	0.544	0.461	0.567	0.655	_	
Agile Distributed Team Performance	0.800	0.641	0.806	0.828	0.690	_

4.4 Structural Model

This study performed the structural model assessment following the measurement model. Figure 3 shows the structural model diagram of the study, while Table 4 presents the results of all significant hypotheses. Hypothesis 1 shows a direct and significant positive association between CBT and SOC (β =0.623, $p < 0.001$). Hypothesis 2 proposed a positive relationship between CBT and ADTP (β =0.243, $p < 0.001$). Similarly, Hypothesis 4 shows a positive relationship between CBT and EXT (β =0.511, $p < 0.001$). The findings fully support Hypothesis 6, indicating a positive association between ABT and SOC (β =0.257, $p < 0.001$). Likewise, Hypothesis 7 claims a positive relationship between ABT and ADTP (β =0.133, $p < 0.001$). Substantially undertaken Hypotheses 11 SOC to ADTP (β =0.269, $p < 0.001$) and 12 EXT to ADTP (β =0.287, $p < 0.001$) also support positive relationships in the study. Among all direct hypotheses, only one was rejected, indicating a non-significant relationship between ABT and EXT (β =0.953, $p < 0.001$). Moreover, the empirical analysis confirms Hypothesis 3, a positive mediating association of SOC between CBT and ADTP (β = 0.149, $p < 0.001$). Similarly, Hypothesis 5 relationship examining the mediating role of EXT between CBT and ADTP (β =0.147, $p < 0.001$) and Hypothesis 8 relationship of SOC between ABT and ADTP (β =0.068, $p < 0.001$) support a positive mediating association. Furthermore, the findings confirm Hypothesis 14, confirming the moderate effect of ICT on the relationship between EXT and ADTP (β = 0.330, $p < 0.001$). Conversely, Hypothesis 13 showed that the moderating effect of ICT between SOC and ADTP (β =-0.310, $p < 0.001$) weakened the relationship. Figure 4 presents the structural model results, including path coefficients (β), R^2 values, significant and non-significant relationships, and boundary conditions discussed in subsequent sections.

Table 4: Direct, Mediation, and Moderation Relationships

Hypothesis	Path	Path Coefficient	t-value	BCI LL	BCI UL	Decision
H1	CBT → SOC	0.623	7.711	0.464	0.782	Accepted
H2	CBT → ADTP	0.243	4.479	0.135	0.351	Accepted
H3	CBT → SOC →ADTP	0.149	3.415	0.065	0.233	Accepted
H4	CBT → EXT	0.511	7.426	0.376	0.646	Accepted

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Hypothesis	Path	Path Coefficient	t-value	BCI LL	BCI UL	Decision
H5	CBT → EXT → ADTP	0.147	3.806	0.073	0.221	Accepted
H6	ABT → SOC	0.257	3.854	0.128	0.386	Accepted
H7	ABT → ADTP	0.133	2.416	0.027	0.239	Accepted
H8	ABT → SOC →ADTP	0.068	3.149	0.025	0.111	Accepted
H9	ABT → EXT	0.077	0.953	-0.076	0.230	Rejected
H10	ABT → EXT → ADTP	0.021	0.023	-0.024	0.066	Rejected
H11	SOC → ADTP	0.269	4.333	0.147	0.391	Accepted
H12	EXT → ADTP	0.287	4.882	0.173	0.401	Accepted
H13	ICT → SOC → ADTP	-0.310	2.992	0.514	-0.106	Accepted (Weaken)
H14	ICT → EXT → ADTP	0.330	3.574	0.149	0.511	Accepted (Strengthen)

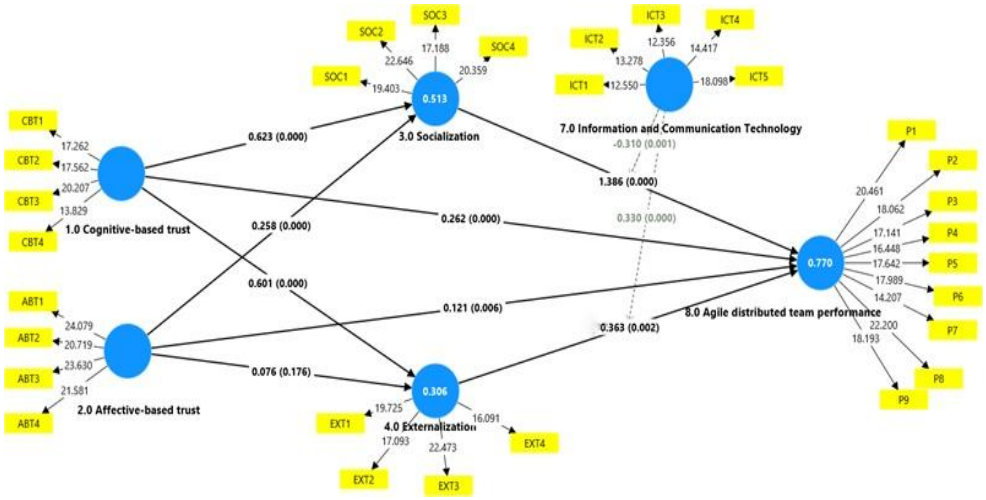


Figure 3: Structural Model

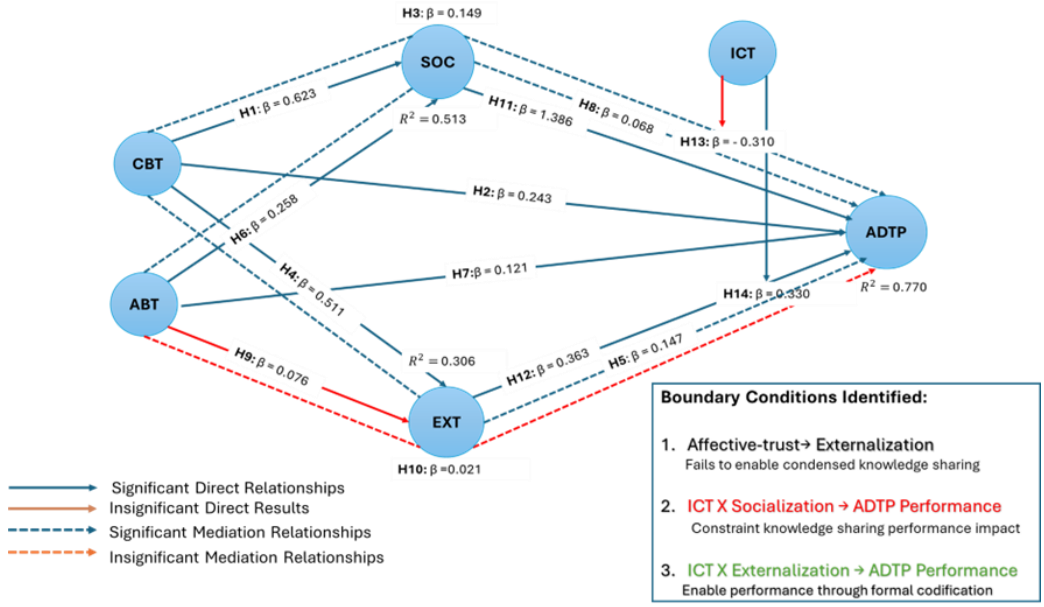


Figure 4: Structural Model Results Including Path Coefficients (β), R^2 Values, and Significant and Non-significant Relationships, with Identified Boundary Conditions

4.5 Explanatory Power of the Model

The structural model was evaluated using path coefficients and the coefficient of determination R^2 to assess the explanatory power. The study employed the PLS technique to establish a desirable standard threshold of R^2 above 0.10 for all results (Falk and Miller, 1992). Figure 4 presents the R^2 values of SOC (0.514), EXT (0.305), and ADTP (0.751). Moreover, the study calculated the variance accounted for (VAF) values to examine the indirect effects involving SOC and EXT on ADTP (Hair et al., 2019).

$$VAF = \frac{Indirect\ effect}{Total\ effect}$$

CBT → SOC → ADTP

$$VAF = \frac{0.149}{0.243 + 0.149} = 0.380 = 38\%$$

As shown in Eq. (1), VAF values represent a partial indication (20-80%).

CBT → EXT → ADTP

$$VAF = \frac{0.147}{0.243 + 0.147} = 0.377 = 37.7\%$$

As shown in Eq. (1), the VAF values represent a partial indication.

ABT → SOC → ADTP

$$VAF = \frac{0.068}{0.133 + 0.068} = 0.338 = 33.8\%$$

As shown in Eq. (1), the VAF values represent a partial indication.

ABT → EXT → ADTP

$$VAF = \frac{0.021}{0.133 + 0.021} = 0.136 = 13.6\%$$

As shown in Eq. (1), the VAF values represent no mediation (<20%)

Among the four mediation effects of the study, the VAF findings indicated partial mediation (20% to 80%) of all indirect relationships except for the impact of EXT on ABT and ADTP, which accounted for less than 20% of the variance.

4.6 The Moderating Effect of ICT

The study used the SEM technique to analyze the impact of the moderating relationships. The direct relationships between the exogenous variables and the interaction term's relationship with the endogenous construct were analyzed to ascertain the existence of a moderating effect (Hair et al., 2019). The moderator construct ICT weakens the influence of SOC on ADTP while strengthening the impact of EXT on ADTP, demonstrating its varied role in shaping team performance. The findings are illustrated through the graphical representation of the moderator construct ICT at low (solid line) and high levels (dashed line). Figure 5 shows that the positive moderator effect of ICT between EXT and ADTP, indicating that higher ICT levels strengthen the impact of EXT on ADTP.

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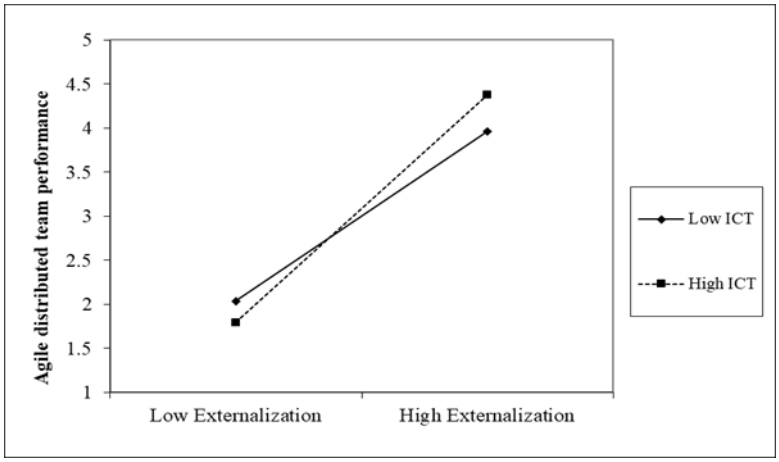


Figure 5: Moderating the Interaction effect of ICT on the Relationships between Externalization and Agile Distributed Team Performance

In contrast, Figure 6 illustrates a negative moderator effect of ICT on SOC and ADTP, indicating that higher levels of ICT attenuate the impact of SOC on ADTP.

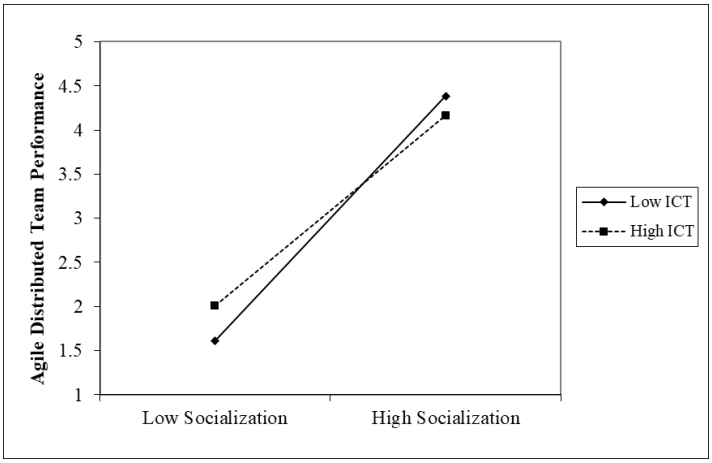


Figure 6: Moderating the Interaction effect of ICT on the Relationships between Socialization and Agile Distributed Team Performance

5. Discussion

The primary objective of the current research was to investigate the ADTP in IT-based companies in Pakistan, as discussed earlier. Henceforth, driven by the SECI model of KS, the study examines the influence of trust through ABT and CBT on team performance, with ICT tools moderating this relationship.

5.1 Cognitive-based Trust, Socialization, Externalization, and Agile Distributed Team Performance

The present study found a positive relationship between CBT and SOC within ADTP. These findings align with past investigations by Capestro et al. (2024) and Tyagi, Sibal and Suri (2018), who reasoned that trust significantly contributes to SOC. This form of trust reinforces coordination and shared understanding through task-focused interaction rather than affective bonding, indicating that the SOC benefits of CBT are bound by competence-driven collaboration. Similarly, CBT was found to have a positive effect on ADTP, demonstrating that trust based on skill, reliability, and ability reduces conflict and reinforces the common goal within distributed teams. This finding is consistent with Khan and Rehman (2025) and Zong and Guan (2025), who emphasize that competence-based trust among team members facilitates seamless teamwork and promotes successful agile projects in the IT industry, particularly through task alignment and execution reliability rather than relational motivation. This suggests that CBT enhances performance where coordination, clarity and role accountability dominate over emotional engagement.

In addition to its direct influence, the mediating effect of SOC between CBT and ADTP underscores that sharing tacit knowledge among distributed members in the presence of skilled and reliable trust boosts the overall team

performance. Rather, it must be channeled through SOC processes such as collaborative brainstorming and reciprocal knowledge-sharing, which convert individual expertise into collective coordination capacity. Accordingly, the findings imply that managers should structure interaction through virtual stand-ups, mutual retrospectives, and knowledge exchange meetings. This indicates a boundary condition whereby CBT contributes to performance only when SOC mechanisms are intentionally structured, and interaction is operationally focused. Further, the results demonstrate that CBT is positively associated with EXT.

The findings are supported by earlier investigations (Holste & Fields, 2010). Chen et al. (2021) suggested that team members who perceived mutual expertise are most likely to discuss and record their tacit knowledge explicitly. Agile distributed teams have a stronger tendency among members with high CBT, recording decisions, and knowledge through collaborative repositories (Razzak, Bhuiyan & Ahmed, 2014). Moreover, the mediation effect of EXT between CBT and ADTP enhances performance outcomes, as competence-based trust supports systematic knowledge codification and reuse, strengthening process reliability and reducing execution ambiguity rather than merely stimulating innovation (Buvik & Tkalich, 2022). It indicates that CBT-driven EXT is bounded by formalized documentation practices and does not automatically translate into broader relational learning outcomes.

Conclusively, these findings show that CBT enables SOC and EXT as structured coordination mechanisms, highlighting that its performance contribution is bound by competence-driven collaboration. These findings contribute to the theory by positioning cognitive-based trust as a structural coordination mechanism in distributed agile teams.

5.2 Affect-based Trust, Socialization, Externalization, and Agile Distributed Team Performance

The study found that ABT has a positive impact on SOC. This suggests that the emotional bond developed within agile distributed teams enables members to feel free to share their feedback and personal experiences in a supportive environment. This aligns with prior studies (Holste and Fields, 2010; Swift and Hwang, 2013). The present study extends this understanding by demonstrating that the effectiveness of ABT-driven socialization is conditioned by respondent characteristics. Most respondents (59.1%) are mid-career professionals (31-40), emphasizing task efficiency over relational bonding. The dominance of male respondents (83.9%) and technical roles (developers, testers, and Scrum Masters/project managers), which are representative of core agile team functions, further reinforces functional, goal-oriented interaction. These findings indicate that the influence of ABT on SOC is contextually bound; however, in this study, socialization is shaped by task-oriented interaction driven by respondent characteristics rather than purely relational environments. Similarly, ABT was found to have a direct positive association with ADTP, indicating that interpersonal care and bonding increase team cohesion and motivation, leading to improvements in interaction-level performance rather than codified knowledge reuse or execution reliability (McAllister, 1995). Thus, the performance contribution of ABT appears primarily rooted in motivational and relational dimensions rather than process-driven outcomes. ABT is particularly relevant in Pakistan's high-pressure, deadline-driven IT environment. In this context, ABT serves as a buffer against conflict and coordination breakdown, especially in a distributed setup where peer-to-peer contact is limited.

SOC mediates the ABT-ADTP relationship by enhancing coordination and shared understanding rather than formal knowledge articulation. This mediation pattern suggests that ABT motivates informal engagement but does not support the structured knowledge articulation required for performance. This is particularly evident in teams dominated by mid-career professionals and technical roles, who, according to Generational Cohort Theory Mannheim (1952), prioritize problem-solving interactions over socially embedded knowledge-sharing. By contrast, the study revealed that the relationship between ABT and EXT, as well as the mediating effect of ABT and ADTP, was insignificant.

These findings align with those of Chen et al. (2021), who contend that building emotional trust does not contribute to synthesizing explicit knowledge. Therefore, it constrains distributed team performance through limited EXT rather than diminishing overall effectiveness. This viewpoint is in line with the study of Capestro et al. (2024), who emphasize that knowledge codification is more related to the CBT than ABT relationships. Additionally, affect-based trust alone is insufficient for externalization and must be complemented by psychological safety and a supportive communication climate. In the absence of such conditions, emotional bonding may increase willingness to share, but does not translate into structured documentation and knowledge reuse. This indicates that ABT operates primarily at the interactional level, influencing willingness to share but lacking the structural and cognitive mechanisms required for formal knowledge articulation, which is essential for EXT in distributed agile environments.

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The insignificance of the ABT–EXT relationship can be more accurately explained by the demographic composition of the respondents rather than general cultural assumptions. Technical roles require clarity and structured documentation, emphasizing task-oriented communication where ABT does not sufficiently translate into formal knowledge articulation (EXT). This reinforces that in technically driven teams, knowledge articulation is governed more by competence validation than emotional bonding. Mid-career dominance further reinforces task-focused communication over emotional trust. Although ranked as the third fastest-growing IT industry worldwide, the sector continues to face challenges related to coordination, knowledge codification, and process standardization (Dhir, Kumar & Singh, 2018). These patterns remain consistent across major IT hubs such as Karachi, Lahore, and Islamabad. This is also reflected in the sample, where most respondents are from Karachi (61.7%), with representation from Lahore and Islamabad, indicating a shared professional subculture characterized by standardized workflows and ICT-mediated practices rather than location-specific cultural differences. Thus, the ABT–EXT insignificance reflects a structural, context-dependent boundary condition rather than a methodological limitation. These findings contribute to theory by demonstrating that ABT plays a conditional and indirect role in knowledge-sharing, rather than acting as a universal driver of performance in distributed agile teams.

5.3 Socialization, Externalization, and Agile Distributed Team Performance

The study affirms that SOC and EXT have a significant positive impact on ADTP. This underscores the role of knowledge-sharing processes in enabling effective coordination and outcomes. The findings are consistent with Contreras-Medina et al. (2024) and Schulze and Hoegl (2008), who consider a dynamic knowledge process in distributed teams, whereas Leal, Boccio and Jackson (2023) argue that SOC may limit innovation in certain contexts, highlighting its contextual dependence. Accordingly, operates as a stabilizing and reliability-enhancing mechanism rather than a driver of exploratory or creative performance, indicating a clear boundary condition.

In addition, EXT has a positive impact on the ADTP. The conversion of tacit into explicit knowledge supports knowledge reuse, task transparency, and execution reliability, reducing knowledge loss in distributed environments. Previous studies, Li et al. (2018) and Leal, Boccio and Jackson (2023), support this view, showing that EXT is significantly positively related to the performance of emerging firms in terms of novel ideas, in contrast to the study by Schulze and Hoegl (2008). However, EXT enhances ADTP by stabilizing coordination and reinforcing process reliability, consistent with prior studies, while showing that its performance contribution is execution-focused rather than innovation-driven in distributed contexts.

These findings extend prior literature by demonstrating that while both SOC and EXT positively influence performance, their roles differ significantly, with SOC supporting interaction-level coordination and EXT enhancing execution reliability, thereby highlighting a process-specific boundary condition in distributed agile teams.

5.4 ICT Moderates Socialization, Externalization, and Agile Distributed Team Performance

The study reveals mixed results regarding the moderating mediating effect of ICT on the relationship between the knowledge process and ADTP. ICT was found to significantly strengthen the relationship between EXT and ADTP, while no moderating effect was observed for SOC. The positive results of the role in the EXT and ADTP relationships are in line with Müller and Antoni (2022) and Davidavičienė, Al Majzoub and Meidute-Kavaliauskiene (2020), reinforcing that technologies support knowledge access and storage facilities conversion. Accordingly, the moderating role of ICT enhances the effectiveness of EXT, improving task transparency, reducing ambiguity, and enhancing execution reliability.

When ICT is synchronized with EXT practices, it strengthens systematic knowledge codification and reuse. This effect is reinforced by structured agile practices (e.g., Scrum), where ICT is integrated into routine documentation and coordination processes. By contrast, ICT does not moderate the relationship between SOC and ADTP. Prior research indicates that trust-based socialization is difficult to sustain in ICT-mediated environments (Maznevski & Chudoba, 2000). ICT tools are primarily used for coordination, task tracking, and monitoring, rather than relational or experiential exchange. In Pakistan's IT industry, ICT use is largely task-focused due to deadline-driven and resource-constrained environments (Wafa et al., 2022), which reinforces functional rather than relational uses of ICT across distributed teams. This constraint makes SOC more difficult to sustain within distributed teams, and asynchronous communication may introduce delays and fragmented knowledge exchange, thereby weakening the ICT to SOC and ADTP connections. The result, therefore, shows that ICT enhanced knowledge codification EXT; however, it constrains trust-based SOC processes, representing

a socio-technical boundary condition, supporting prior literature claims that ICT constraints emerge when tacit knowledge depends on interpersonal trust rather than structured performance mechanisms.

Overall, the findings demonstrate that ICT functions as a contingent socio-technical mechanism rather than a universal enabler, strengthening structured, documentation-driven knowledge processes (EXT) while constraining relational, trust-based socialization (SOC). This highlights a clear boundary condition in distributed agile teams, where the effectiveness of ICT depends on the nature of the knowledge process it supports.

Figure 7 illustrates that non-significant relationships are clustered around certain constructs rather than occurring randomly. ABT displays a weak relationship with the externalization of knowledge, and ICT shows a limited level of effectiveness in enabling tacit knowledge processes.

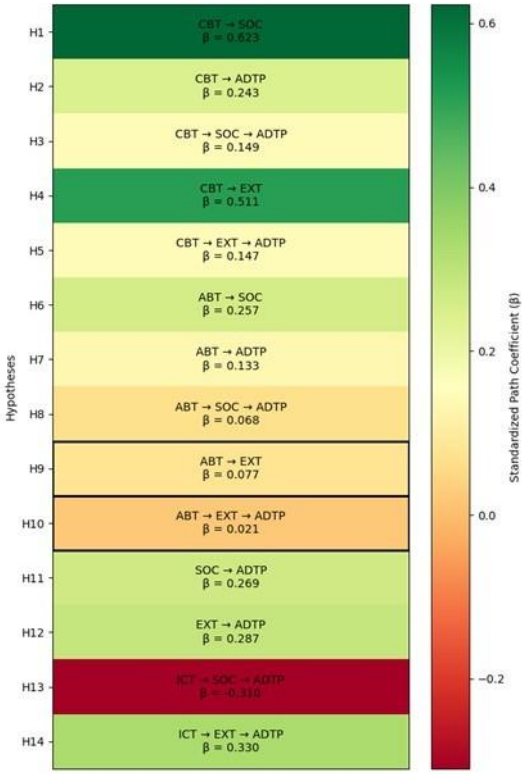


Figure 7: Heatmap of Structural Path Coefficients

6. Conclusion and Implications

6.1 Study Contributions

Theoretically, this study makes several contributions to the literature on trust dynamics, agile management, and knowledge-sharing processes. Firstly, by combining CBT and ABT as knowledge-sharing precursors, the study extends the SECI model by demonstrating that trust dimensions activate knowledge conversion processes in distinct ways, rather than uniformly. Secondly, the study advances trust research in distributed agile teams, where interpersonal communication is scarce due to distance and reliance on digital tools. By examining competent and emotional trust, the study clarifies their process-specific roles across SOC and EXT. Thirdly, it aligns the knowledge management theory with agile team performance outcome by linking the SECI-based knowledge process directly to ADTP. Past research has treated agility as a methodical procedure; however, this study bridges the knowledge-sharing theory by reframing agility as grounded in the SECI-based knowledge conversion process shaped by trust and ICT affordances. Finally, this study provides empirical evidence from the underexplored Pakistani IT industry, strengthening the understanding of boundary-conditioned interactions among trust, ICT, and knowledge-sharing in an emerging economy context. This research contributes to the theory relating to boundary-conditioned interactions among trust, ICT, and knowledge-sharing, specifically in an emerging economy setting.

Practically, this study offers actionable implications for agile practitioners, particularly in developing country contexts such as Pakistan. Firstly, Project managers in Pakistan IT industry should prioritize cognitive-based trust for structured knowledge-sharing (externalization), particularly in teams dominated by technical roles and mid-

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career professionals who emphasize task-oriented interaction over relational bonding. Secondly, the findings enable distributed team members to improve the knowledge-sharing processes within ICT-mediated environments in Pakistan's software houses. Specifically, distributing tacit knowledge through collaborative learning and explicit knowledge through documentation and knowledge-conversion guidelines helps to limit technical redundancy. Finally, the study provides practical directions for reducing IT project failure by improving documentation practices, trust alignment, and ICT-supported knowledge-sharing. This study supports management approaches with agile principles to improve project quality and strengthen competitiveness in global markets.

6.2 Limitations and Future Research

This study has several limitations. Firstly, a cross-sectional design limits the ability to capture temporal changes and causal dynamics in trust in development and knowledge-sharing processes. Secondly, this research reveals the role of ICT as a moderator, indicating that different ICT configurations and varying levels of digital maturity across software firms may influence the observed relationships. Similarly, adopting alternative knowledge-sharing frameworks beyond the SECI model is likely to generate alternative perspectives and findings in future research. Thirdly, this study reports findings from the quantitative phase of a broader sequential explanatory mixed-methods study, while in-depth qualitative explanations are addressed in a subsequent research phase.

Future research may extend this work by providing in-depth qualitative explanations and adopting longitudinal or experimental designs to examine causal mechanisms and temporal dynamics. Future research may further refine the identified boundary conditions and strengthen the theory on trust, ICT, and knowledge-sharing in distributed agile teams.

6.3 Conclusion

The study demonstrated that CBT operating through knowledge-sharing processes (SOC and EXT) is a primary driver of ADTP, while ABT plays a more limited context-dependent role. Furthermore, ICT enhances structured knowledge and processes (EXT) but provides limited support for trust-based socialization (SOC), indicating that its effectiveness is process-specific rather than universal. Overall, the findings highlight that performance in distributed agile teams depends on aligning trust mechanisms, knowledge-sharing processes, and ICT use, particularly in emerging IT contexts such as Pakistan.

Declaration of Conflict of Interest, Ethical Compliance, and Use of AI Tools: The authors declare that there are no conflicts of interest related to the publication of this research. They confirm compliance with all ethical standards, addressing concerns such as plagiarism, research misconduct, informed consent, data fabrication or falsification, duplicate publication or submission, and redundancy. Additionally, the authors state that basic AI tools were used solely to assist with paraphrasing and proofreading during the writing process. All content was thoroughly reviewed and edited by the authors to ensure accuracy, originality, and academic integrity.

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Appendix A: Survey Instrument

Cognitive-based Trust
The majority of my team members approach their jobs professionally and with commitment.
I have no reason to question the skill and competence of my team members for the task.
I can trust my team members not to complicate my task by performing irresponsible work.
The majority of my team members consistently follow through on their commitments as they have promised.
Affect-based Trust
I can communicate openly with my team about challenges I'm facing at work, confident that they will want to listen.
If one of us were relocated and together we were unable to continue, I would experience a feeling of loss.
If my team were aware of my concerns, I am convinced that they would respond with consideration and constructiveness.
I have to admit that my team has made significant emotional investments in our professional relationship.
Socialization
I spent a great deal of time outside of formal meetings with other team members discussing recommendations, ideas, and solutions.
Aside from formal meetings, I spent a great deal of time interacting with team members from different departments inside the organization in order to discuss recommendations, ideas, and solutions.
In face-to-face meetings with project/team leaders from other teams of the company, I spent a great deal of time in lengthy discussions about recommendations, ideas, or solutions.
With team members from various company teams, I spent a great deal of time intentionally developing a shared understanding of a problem.
Externalization
I spent a great deal of time collaboratively reflecting and formulating our thoughts or solutions in terms of customer requirements.
I spent a great deal of time speaking with knowledgeable people in order to get their suggestions for useful technological thoughts or solutions.
I spent a great deal of time interviewing knowledgeable people about thoughts or solutions related to customer requirements.
I spent a great deal of time developing comprehensive descriptions (e.g., protocols, presentations, and reports) containing newly acquired knowledge about customer requirements.
Information and Communication Technology
I have access to all of the data necessary to accomplish my duties.
The team has the necessary tools and technology to do our jobs.
Team members often communicate with one another in order to accomplish everyday business.

Team members are often in contact with one another for social or non-business activities.
The electronic means we employ to communicate with one another are efficient.
Agile Distributed Team Performance
In the past, the agile team has been successful in achieving its objectives.
The agile team is accomplishing its existing business objectives.
Generally, the agile team accomplishes its task on schedule.
Generally, the agile team accomplishes its task on a budget.
Within the agile team, there is respect for team members.
I believe my contribution is recognized by team members.
Team members have a high level of spirit.
I appreciate being a part of this team.
I would be eager to join another distributed agile team in the future.

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Knowledge Adoption in China: The Roles of Ganqing and Renqing

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Abstract: This study sought to advance our understanding of what affects knowledge adoption (a key process of knowledge sharing) in China by exploring the impact of two main affective determinants (ganqing and renqing) of Chinese interpersonal relationships on Chinese employees' adoption of explicit and tacit knowledge contributed by their peers. Compared with two other main processes (contribution and seeking) of knowledge sharing and their determinants, knowledge adoption and its contributing factors have received much less attention in the extant literature on knowledge sharing in China. The effects of ganqing and renqing on explicit and tacit knowledge adoption were examined and tested with the data from a survey of 243 MBA students in China. The results from the hierarchical regression analyses showed that ganqing was positively related to explicit knowledge adoption and tacit knowledge adoption. Renqing was also found to be positively related to the adoption of both types of knowledge. While effective knowledge sharing relies on both the 'supply of knowledge' through knowledge contribution and the 'demand of knowledge' via knowledge adoption, prior research on knowledge sharing in China has placed more emphasis on the supply side of knowledge sharing and its determinants. By linking knowledge adoption to two affective factors, the findings from this study help address this imbalance in the knowledge sharing research related to China and increase our knowledge of what might have hindered the diffusion of knowledge management in China and how to better promote it. Other research and practical implications from the study are discussed.

Keywords: Knowledge adoption, Knowledge sharing, Ganqing, Renqing, Interpersonal feelings

1. Introduction

In today's knowledge-based global economy, knowledge is well recognized as a critical resource that enables firms to gain and sustain competitive advantage. As a key activity in knowledge management, knowledge sharing helps a firm create and mobilize its knowledge resources for success in the global market (Block, 2017). Through knowledge transfer, integration, combination and application, the firm can achieve competitive advantage from knowledge sharing (Regner and Zander, 2011). Despite being exposed to knowledge management for over two decades and aspiring to become a knowledge-based economy (Augier, Guo and Rowen, 2016), China lags behind developed nations in embracing and practicing knowledge sharing (Liu et al., 2019; Milton, 2016). While numerous studies have shown that firms operating in China can benefit from increased knowledge sharing in managing innovation, productivity and an aging workforce (Akram et al., 2018; Jasimuddin, Li and Perdikis, 2019; Martinsons, Davison and Huang, 2017; Tang and Martins, 2021; Ye, Liu and Tan, 2021), how to promote and benefit from knowledge sharing remains poorly understood. Much of the previous China-based research has focused on knowledge hoarding and hiding as well as their determinants (Liu et al., 2025; Peng, 2013; Xiao and Cooke, 2018), even though lack of motivation to adopt knowledge from others was once found to be among the top three barriers to knowledge sharing in China (Su, Li and Chow, 2010). More recent research has shown that knowledge adoption in China can be influenced by not only the credibility of the knowledge source (Jin et al., 2021), but also interpersonal factors such as social trust and relationship (Huo, Zhang and Ma, 2018; Martinsons, Davison and Huang, 2017). In their research on knowledge management failures in China, Martinsons, Davison and Huang (2017) found that Chinese employees placed more value on knowledge obtained from informal exchanges than on knowledge from an impersonal knowledge management system. Huo, Zhang and Ma (2018) further showed that interpersonal trust could influence the relationship between knowledge source credibility and knowledge adoption. To the extent that effective knowledge sharing depends on knowledge adoption as well as knowledge contribution (Cleveland and Ellis, 2015; Jin et al., 2021), more knowledge of what determines the former process of knowledge sharing helps increase our understanding of how to promote and benefit from knowledge sharing in China. Toward this end, this study focused on the adoption process in knowledge sharing and explored the roles of two common interpersonal feelings (ganqing and renqing) among Chinese in knowledge adoption at the workplace. Despite their prominence in the Chinese society and influence on business activities in China (Chen and Bedford, 2022; Xie et al., 2023; Zhou et al., 2015), ganqing and renqing have received scant attention in previous studies on the determinants of knowledge adoption in China.

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2. Literature Review and Hypotheses

2.1 Knowledge Adoption and its Determinants

While receiving much less attention than knowledge contribution and seeking in the knowledge sharing literature, knowledge adoption or acceptance has been recognized as a key process in knowledge sharing. Valuable knowledge contributed by an employee must be adopted and applied by other employees to generate positive results (e.g., learning, innovation and increased productivity) for a firm (Adeyemi, Uzamot and Temim, 2022; Arsanti, Rupidara and Bondarouk, 2024; Srisamran and Ractham, 2020). At the same time, knowledge adoption is not automatic, as the knowledge recipient may not readily accept others' knowledge because of some potential obstacles (Desouza, Awazu and Wan 2006). Failure to accept and use knowledge from others thus hinders knowledge sharing (Sussman and Siegal, 2003) and makes efforts to facilitate knowledge contribution and seeking (e.g., knowledge capture and expert location) useless (Desouza, Awazu and Wan, 2006; Guo and Chelliah, 2024). Research on barriers to knowledge adoption has revealed several reasons for individuals' reluctance to accept or adopt knowledge from others. One of them is the 'not-invented-here' mentality (Davenport and Prusak, 1998). Preference for developing one's own ideas and knowledge, coupled with the lack of trust in the knowledge source, can lead to rejection of knowledge coming from an outside source (Husted and Michailova, 2002). Strong group affiliation and even group thinking are additional reasons for resisting knowledge from outside a department or a group, because the adoption of any outside ideas may disturb the stability of the group and undermine its possession of knowledge monopoly (Husted and Michailova, 2002). Adopting peer knowledge can also carry financial, psychological, social, and performance risks (Desouza, Awazu and Wan, 2006). For example, applying another person's ill advice may hurt one's job performance. Using help from others admits incompetence, ignorance, inferiority, and dependence, which may tarnish one's self-esteem and image within an organization (Nadler, Ellis and Bar, 2003).

Another stream of research rooted in the Technology Acceptance Model (Venkatesh and Davis, 2000) has identified additional key determinants of knowledge adoption. The Technology Acceptance Model (TAM) and its extension (TAM2) reveal two key factors underlying user acceptance of a new technology (e.g., a novel information system): user perceptions of the usefulness of the new technology, and the ease of using the technology. Perceived usefulness and ease of use were later applied to the research on information and knowledge adoption. For example, a study on intention to adopt knowledge in virtual communities found the perceived usefulness of knowledge as one of the contributing factors (Liao and Chou, 2012). Perhaps the main contributions from the studies that drew on the TAM framework to identify what influence information and knowledge adoption are the findings about the antecedents of perceived usefulness and their direct or indirect effects on knowledge adoption. One study of health knowledge adoption among social media users in China showed that the users' willingness to adopt health knowledge was influenced by its content and source credibility (Jin et al., 2021). A survey of information exchange in a large virtual travel community also found the quality of information salient in the participants' consumption of the information contributed by others (Zheng, Zhao and Stylianou, 2013).

In addition to the perceived usefulness of knowledge and its antecedents (e.g., content and source credibility), the knowledge recipient's personal relationship or experience with the knowledge contributor may affect the former's knowledge adoption attitudes and intentions (Hertzum, 2014; Liao and Chou, 2012). Extensive relationship or experience between the two parties is conducive to the extra efforts needed to ensure the knowledge recipient's understanding and use of the knowledge (Levin and Cross, 2004). Liao and Chou (2012) found virtual community participants' ties with others in the community network positively influencing their attitudes toward adopting knowledge from the network. Hertzum (2014) further maintained that even weak relationships may affect one's choice of knowledge sources. Experience with a knowledge source has also been found significant or very useful in choosing the source (Hirsh and Dinkelacker, 2004; Woudstra and van den Hooff, 2008).

Closely related to interpersonal relationships, interpersonal trust has received some attention in the knowledge adoption research. A survey of 275 legal professionals in a large Canadian law firm found knowledge recipients' trust in knowledge contributors' competency mediating the relationships between interpersonal ties and knowledge use (Evans, Frissen and Choo, 2019). Another survey on health knowledge adoption through social media in China showed a similar mediating effect of interpersonal trust on the relationship between perceived source credibility and knowledge adoption (Huo, Zhang and Ma 2018). In addition, a study conducted in a U.S. nonprofit organization found that interpersonal trust could be directly linked to the use of one type of knowledge: tacit knowledge (Holste and Fields, 2010). On the other hand, another study conducted in Nigeria

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did not support such a direct relationship (Balogun and Adetula, 2015). While the extant literature indicates the salience of interpersonal relationship, experience and trust in knowledge adoption, there has been scant attention to the potential roles of other important interpersonal factors, such as feelings between two people, in knowledge adoption. The next section discusses two prevalent interpersonal feelings (ganqing and renqing) in Chinese social exchanges and relationships as well as their influence on social and business activities in China.

2.2 Ganqing and Renqing

China is a relation-based society where personal relations (guanxi) play a critical role in the social and economic activities through their profound influence on how Chinese people behave in social exchanges and interactions at work and in spare time (Bedford and Hwang, 2013). In the discourse of Chinese business culture, guanxi has been deemed crucial to different business activities, such as management, marketing, purchasing and innovation (Leung et al., 2014; Ren et al., 2023; Wu, 2021; Zhang, Xu and Wu, 2022; Zhou et al., 2015). Guanxi has also been found salient in knowledge sharing among Chinese employees (Davidson, Ou and Martinsons, 2018; Liu and Zhai, 2024; Liu, Zhu and Yan, 2022; Qian et al., 2019). There is consensus in the literature that guanxi quality is mainly determined by the trust and feelings that two people in a relationship develop and hold for each other (Chen and Bedford, 2022; Chen and Chen, 2004). One main interpersonal feeling is ganqing that represents a persistent affection or emotional attachment and its sharing between the two parties (Berger et al., 2017). This affective connection also entails some obligations and commitments such as loyalty, solidarity and even unconditional sacrifice (i.e., taking care of each other no matter what) (Chen and Chen, 2004). While being inherent and thus more salient in guanxi among family members and relatives, ganqing can be formed between close friends, acquaintances or even strangers. In the workplace, employees and managers may develop deep ganqing for one another through a long history or a wide scope of work-related interactions, afterwork socialization and assistance with personal problems (Chen and Peng, 2008; Yen and Barnes, 2011).

Another main interpersonal feeling in China is renqing that consists of 1) a sense of obligation to provide and return favors to each other, and 2) empathy for each other's emotions, feelings and needs (Hwang, 1987). Chinese favor exchanges and the feeling of indebtedness they create are somewhat different from the Western reciprocal favors in several ways. First, the Chinese norm of reciprocity is dynamic, often involving unequal favor exchanges in which "both sides will practice trying to do more, improving with every new effort, in a system of escalating favors" (Hampden-Turner and Trompenaars 1997, p. 179). Returning greater favors demonstrates one's sincerity in valuing and maintaining the relationship with another person and "induces greater feeling of gratitude and indebtedness in the other party so that the other party will return the favor when needed later on" (Chen and Chen 2004, p. 318). Second, failure to reciprocate can result in more negative consequences in China. One can lose face (mianzi), be considered as immoral, or experience anxiety (worry about being punished) (Chen and Bedford, 2022; Deng et al., 2021). Conversely, returning a favor, especially a larger one, will give face to the recipient, enhancing his or her social status and reputation. Third, whereas Westerners tend to return favors within a short period of time, Chinese people often do not expect quick returns of favors and are willing to wait for a longer time before being paid back (Shi et al., 2011).

While renqing is often equated with instrumental exchanges based on dynamic reciprocity in the literature (Bobrucali, 2020), some Chinese scholars noted the affective aspect of renqing, i.e., an individual's sympathy for other people's emotional responses to various situations of daily life (Hwang, 1987; Zhang, Xu and Wu, 2022). A person having renqing would feel "happy or sad when and as others do" (Hwang 1987, p. 953). The strength of renqing thus also reflects the depth of the emotional commitment between the parties involved (Jacobs, 1979). An individual versed in such a feeling is more likely to sacrifice his or her personal interest in helping the other party (Kipnis, 1997). Hence, empathy for other people works in conjunction with dynamic reciprocity in influencing one's propensity to assist others (Wang, Siu and Barnes, 2008).

In business relationships that are essentially mixed ties involving mostly coworkers and business partners (Hwang, 1987), both renqing and ganqing are pivotal to guanxi development and maintenance in that they influence the affective and instrumental aspects of guanxi and their interplay. As many business activities involve instrumental interactions (e.g., work collaboration, information exchange, and business transactions) where mutual help is often needed (Chen and Chen, 2004), renqing influences the level of cooperation between the parties in a transactional activity and may even strengthen their emotional bonds (Chen and Bedford, 2022). Ganqing is equally influential, since expressive interactions (e.g., working lunches and birthday celebration parties) increasing the emotional connections between business partners during and after work can also reinforce or even increase renqing (Chen and Chen, 2004). Moreover, people who care about each other and treat their partners as friends are more inclined to help in times of difficulty (Zhou et al., 2015). Research on the

business influence of ganqing and renqing supports their importance to interpersonal relationships in various business settings, such as supervisor-subordinate and buyer-supplier relationships (Chen and Bedford, 2022; Xie et al., 2023).

2.3 Explicit vs. Tacit Knowledge

It is well recognized in the knowledge management literature that there are two main types of knowledge: explicit and tacit knowledge. Explicit knowledge can be easily explained and documented in reports, presentations, and formulas. In contrast, tacit knowledge (e.g., skills, expertise and "gut-feelings") is harder to articulate and capture (Polany, 1967) because it is "deeply rooted in action, commitment and involvement in a specific context" (Nonaka 1994, p.16). The distinction between these types of knowledge has been established as a contextual factor in the knowledge sharing research (e.g., Balogun and Adetula, 2015; Evans, Frissen and Choo, 2019). For example, research on the impact of interpersonal trust on knowledge contribution shows that different types of such trust (e.g., affect-based and cognition-based) affect explicit and tacit knowledge contribution in different manners (Chowdhury, 2020; Holste and Fields, 2010; Zhang and Chen, 2018). Accordingly, the potential effects of ganqing and renqing on adopting these two types of knowledge were examined and tested in this study.

2.4 Effects of Ganqing and Renqing on Explicit Knowledge Adoption

Since explicit knowledge is well-articulated and easy to understand, the ease of using such knowledge is not a major concern for the recipient. Rather, potential adoption considerations would focus on perceived knowledge usefulness determined by interpersonal relationships and their contributing factors. Strong ganqing and renqing can increase perceived knowledge usefulness by reducing any potential doubt or perceived risks regarding the knowledge source and its performance impact as well as any potential embarrassment or loss of face the knowledge recipient may feel. Deep ganqing and renqing can also strengthen and maintain the bond between the knowledge contributor and the knowledge recipient (Wang and Noe, 2010). Such a close tie provides the latter with support and experience for understanding the former and using his/her knowledge (Hertzum, 2014; Levin and Cross, 2004; Woudstra and van den Hooff, 2008), hence increasing the latter's knowledge adoption propensity (Liao and Chou, 2012). In their study of the impact of social ties on knowledge transfer in China, Zhou, Siu and Wang (2010) found that strong instrumental and expressive ties both facilitating knowledge transfer through increasing affect-based trust and cognition-based trust between the knowledge contributor and the knowledge recipient. Instrumental ties are heavily influenced by renqing, while expressive ties often involve ganqing (Chen & Chen, 2004). Moreover, since renqing is developed and maintained via exchanges of favors under the norm of dynamic reciprocity (Chen and Chen, 2004), the knowledge contributor may offer knowledge as a return of a favor or favors received from the knowledge recipient before (Serenko and Bontis, 2016). Hence, the knowledge recipient would likely feel obliged to accept the knowledge as a returned favor to avoid violating the norm of escalating reciprocity (Deng et al., 2021). Ganqing may also increase the chance for knowledge adoption to the extent that individuals with deep affection for others are likely to be loyal to them and accept their help without much hesitation. Based on the above analysis, stronger ganqing and renqing are expected to increase Chinese employees' propensity to adopt explicit knowledge from their peers.

Hypothesis 1: Ganqing is positively related to explicit knowledge adoption in China.

Hypothesis 2: Renqing is positively related to explicit knowledge adoption in China.

2.5 Effects of Ganqing and Renqing on Tacit Knowledge Adoption

As tacit knowledge often entails insights, beliefs and intuitions that are hard to articulate and tightly intertwined with the experience of the knowledge contributor, the process of learning and applying tacit knowledge is much more complex and demanding than that for explicit knowledge. Tacit knowledge adoption also depends on a shared experience through intense social collaborations between the knowledge contributor and the knowledge recipient (D'Eredita and Barreto, 2006; Nonaka, 1994). In order for the latter to internalize (fully understand and effectively apply) the tacit knowledge, both parties often need to interact with each other and create shared values, mental models and perceptions (Nonaka, 1994). During the internalization process, the knowledge recipient must not only trust the reputation of the knowledge contributor and the quality of his or her tacit knowledge (Desouza, Awazu and Wan, 2006), but also believe in the latter's willingness and ability to assist the former in absorbing the knowledge before applying it to a task. Both ganqing and renqing can increase the knowledge recipient's trust in the knowledge source. Research on the relationships between affect and trust shows that positive and negative feelings in a personal relationship can increase and diminish one party's belief in the other party's trustworthiness as well as the frequency of interactions between the two parties (Lee et al.,

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2023; Yang and Horak, 2018). Moreover, people emotionally connected in close personal relationships are more likely to be open with shared values, mental models and perceptions (Chowdhury, 2020). Previous research on the effects of instrumental and expressive ties on knowledge transfer in China implied the influence of ganqing and renqing on tacit knowledge adoption, as renqing enhances instrumental ties and ganqing strengthens expressive ties as noted before. From a survey of 212 business students from a Taiwanese university, Lin (2007) found both instrumental and expressive ties conducive to tacit knowledge transfer. In another study using 152 MBA students from China, Zhou, Siu and Wang (2010) reported similar effects of instrumental and expressive ties on tacit knowledge transfer. From the above analysis, it appears that both ganqing and renqing may exert positive effects on tacit knowledge adoption in China.

Hypothesis 3: Ganqing is positively related to tacit knowledge adoption in China.

Hypothesis 4: Renqing is positively related to tacit knowledge adoption in China.

3. Methodology

3.1 Sample and Data Collection

A survey was conducted in 2022 to collect the data for testing the research hypotheses. The sample frame consisted of 303 part-time MBA students at two universities in China. The students worked full-time in a variety of service and manufacturing industries, such as banking, real estate, transportation, machinery, consumer electronics and retailing. Most of them (78%) had worked full-time for at least three years, and some of them (37%) even had managerial experiences. This ensured the participants had had prior experience in sharing knowledge with others, strengthening the validity of the survey. The sample also reasonably represented different gender and age groups (38% males, 62% females, 48% under the age of 30 and 52% above the age of 30) in the population, thus maintaining the external validity of the study. While providing a convenient sample, the use of MBA students is adequate for the study since they all grew up in the Chinese culture and were likely to have experienced both ganqing and renqing in guanxi (Chen and Peng, 2008). The participants were instructed to take the survey voluntarily and anonymously. Out of 303 questionnaires distributed, 243 usable responses were returned, representing a response rate of 80%. Since the research model did not involve complex relationships, this sample size can be viewed as sufficient for the types of statistical analyses (structural equation modeling and regression analyses) used in the study (Kline, 2005).

3.2 Measurements and Instrument Validation

Based on the conceptualization by Chen and Chen (2004), ganqing was measured with two items that reflect the degree of feelings and emotions, and their sharing between two coworkers. For renqing, three items adapted from Zhou, Siu and Wang (2010) were used to measure the closeness of personal connection and the extent of favor exchanges between two parties at and outside of work. In keeping with Bock et al. (2005) who operationalized explicit knowledge as job-related reports, documents, manuals, models and methods, explicit knowledge adoption was measured with two items that captured the adoption of those materials. Tacit knowledge adoption was measured with three items similar to those developed by Holste and Fields (2010) who viewed spending significant time in learning tacit knowledge from the knowledge contributor as a key process of adopting tacit knowledge. While these authors used only one item to assess tacit knowledge as personal knowhow and expertise learned from experience and formal training, this knowledge was measured with two items in the current study. The ten items used in the survey can be found in the Appendix and were assessed on a Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). In answering each question related to an item, the respondents were instructed in the questionnaire to randomly pick another organizational member with whom they had worked in their companies during the previous three years. This instruction was intended to generate a sample of responses that would capture a wide range of interpersonal feelings developed from personal interactions and exchanges in real work settings. Without knowing the criteria (random selection of a coworker known for some time) for choosing another person in answering the questions, many respondents might be inclined to consider a well-acquainted coworker or a close friend who was not a coworker. As many respondents lacked a strong command of English, the questionnaire was presented in Chinese. To ensure equivalence of meaning, the English items were translated to Chinese first and then back translated into English. The questionnaire was also pretested with 27 employees from a local company in China for face-validity and item clarity.

To check the construct validity of the survey instrument, a confirmatory factor analysis (CFA) based on structural equation modeling (SEM) was conducted using AMOS 26.0 as the SEM software. In the analysis, the maximum likelihood estimation method was selected, and covariances between some error terms were allowed. To

confirm the measurement model, the hypothesized model (M0) was compared with three alternative nested models. As ganqing is often mixed with renqing in China (Chen and Chen, 2004), they were combined into one factor to form the first alternative model (M1). In the second alternative model (M2), the two types of knowledge adoption formed one factor. The third alternative model combined ganqing and renqing into one factor and the two types of knowledge adoption into another. As shown in Table 1, the default model (M0) fits the data better than the other three alternative models (M1, M2 and M3) with the best key good-fit ratios among the four models. Hence, the CFA provided empirical support for the convergent and discriminant validity of the four main constructs measured in this study. The reliabilities (Cronbach's alphas) of the four corresponding scales (ganqing, renqing, explicit knowledge adoption, and tacit knowledge adoption) were 0.82, 0.89, 0.98, and 0.97, respectively. Their bivariate correlations are presented in Table 2.

Table 1: Confirmatory Factor Analyses

Models	X^2	df	ΔX^2	X^2/df	GFI	CIF	TLI	IFI	RMSEA
Model (0)	47.1	28		1.68	.96	.99	.99	.99	.05
Model (1)	114.6	32	67.5	3.58	.91	.97	.96	.97	.10
Model (2)	545.9	32	498.8	17.06	.79	.80	.72	.80	.26
Model (3)	576.5	34	529.4	16.96	.78	.79	.72	.79	.26

Table 2: Means, Standard Deviations and Correlation Coefficients[a]

Variable	Mean	s. d.	1	2	3	4	5	6
1. Explicit knowledge adoption	5.77	1.31						
2. Tacit knowledge adoption	5.84	1.21	.70					
3. Ganqing	5.49	1.45	.47	.60				
4. Renqing	5.12	1.41	.44	.53	.72			
5. Gender[b]	.38	.49	.05	-.05	.02 -	.02		
6. Age[c]	2.55	.61	-.16	-.13	.13	-.15	.05	
7. Tenure	6.58	4.50	-.15	-.09	-.15	-.06	-.11	.27

[a] N = 243. Correlations greater than or equal to .13 are significant at the .05 level; $r \geq .21$ are significant at the .01 level; all two-tail tests.

[b] 0 = female and 1 = male

[c] 1 = under 20; 2 = 21-30; 3 = 31-40; 4 = above 40

3.3 Common Method Variance

As the data for the independent and dependent variables came from the same source, they might be subject to the influence of common method bias. Several measures employed to collect the data (protecting respondent anonymity, using multiple items to measure each key variable, and keeping the survey questions simple, specific, and concise) reduced this potential problem to some extent (Podsakoff et al., 2003). To check for potential common method variance in the data, Harman's single factor test was performed, which showed that the first factor in an exploratory factor analysis accounted for approximately 43% of the total explained variance of 90%. Potential common method variance was further assessed using the marker-variable technique (Lindell and Whitney, 2001; Malhotra, Kim and Patil, 2006). A demographic variable, the gender of the respondents, included in the survey questionnaire was chosen as the marker variable because it is theoretically unrelated to at least one research variable in this study (Lindell and Whitney, 2001). Holste and Fields (2010) also empirically found gender unrelated to knowledge use. Because the marker variable is assumed to have no relationship with the research variables, common method variance can be assessed based on the correlations between the marker

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variable and the indicators of a research variable (Lindell and Whitney, 2001). No significant correlations were found between the gender variable and the indicators of either dependent variable. Hence, the assessments from the Harman's test and the marker-variable analysis did not show a strong presence of common method bias in the data.

3.4 Hypothesis Testing and Results

The four research hypotheses were tested using two hierarchical regression analyses. In the first step of each regression analysis, the control variables were entered into a regression model. In keeping with Holste and Fields (2010), age and tenure were used as the control variables. In the second step of the analysis, the two independent variables were added to the equation together. The results from the hierarchical regression analyses are shown in Table 3. Ganqing and renqing together substantially increased the explained variances in both explicit knowledge adoption (ΔR^2 = .21) and tacit knowledge adoption (ΔR^2 = .36). Moreover, renqing was significantly and positively related to both explicit knowledge adoption (b = .20, p < .01) and tacit knowledge adoption (b = .20, p < .01). Ganqing was also significant in predicting explicit knowledge adoption (b = .31, p < .01) and tacit knowledge adoption (b = .45, p < .01) in the expected directions. These results provided support for all the four hypotheses. Despite the high correlation between ganqing and renqing (r = .72), their VIFs (2.12 and 2.14) in the regression models were below the conservative benchmark of 2.5, suggesting a low level of multicollinearity in the data.

Table 3: Regression Results[a]

	EKA[b]		TKA[b]	
Variables	**Model 1**	**Model 2**	**Model 3**	**Model 4**
Age	-.13+	-.07	-.11	-.04
Tenure	-.11+	-.07	-.06	.01
Ganqing		.31**		.45**
Renqing		.20**		.20**
R^2	.04	.25	.02	.38
ΔR^2		.21		.36
Adjusted R^2	.03	.24	.01	.37
F	4.58*	20.21**	2.38+	36.75**
ΔF		34.56**		1 69.75**

[a] N = 243. Standardized regression coefficients are shown. +p<.10, *p < .05, **p < .01

[b] EKA = explicit knowledge adoption; TKA = tacit knowledge adoption

4. Discussion

This study represents one of the few recent investigations of knowledge adoption and its affective determinants in China. While effective knowledge sharing relies on both the 'supply of knowledge' through knowledge contribution and the 'demand of knowledge' via knowledge adoption, prior research on knowledge sharing in China has placed more emphasis on the supply side of knowledge sharing and its determinants. By assessing the current status of knowledge adoption and exploring two of its affective determinants, the present investigation and its findings help address this imbalance in the knowledge sharing research related to China and increase our knowledge of what might have hindered the diffusion of knowledge management in China and how to better promote it. By focusing on knowledge contribution and its barriers, previous studies did not pay sufficient attention to problems and issues related to knowledge adoption, which may affect our thinking about and practice of knowledge sharing in China. Evident in our findings, certain affective factors closely related to guanxi may determine knowledge adoption and therefore effective knowledge sharing in China. Since the current study was based on a small sample, more data are needed to help us further assess the relative importance of knowledge adoption to knowledge sharing in China and obtain a fuller understanding of the motivational factors of knowledge adoption in the Chinese society.

The findings from this study also highlight the need of and benefit from understanding the roles of the key affective drivers of Chinese guanxi in knowledge sharing. Given the critical role of social relationships in a relation-based society like China, linking the affective elements in guanxi to the key processes of knowledge

sharing enriches our knowledge of certain fundamental social forces (e.g., long-term interpersonal feelings) that may influence knowledge sharing in China. Our findings echo the observation by van den Hooff, Schouten and Simonovski (2012) that social relationships between two individuals may affect their knowledge sharing behaviors through the feelings and emotions they hold for each other. Consequently, future research on how relational factors influence knowledge sharing in China needs to recognize and explore the affective states of the parties involved, which has been downplayed in conventional social network and exchange theories largely based on Western cultures (Yang and Horak, 2018). Moreover, it is worthwhile for future studies to investigate the interaction between ganqing and renqing in influencing knowledge adoption and other main processes of knowledge sharing. The strong relationship between ganqing and renqing was evidenced in our sample (r = .72) and a previous study (Zhou et al., 2015). Finding the high correlation between ganqing and renqing in this study was somewhat expected in that these two qualitatively different feelings are often closely intertwined in workplace guanxi (Chua, 2012; Zhang, Xu and Wu, 2022). Reciprocal exchanges of favors between two coworkers at or outside of work can breed affection to each other (Chua, Morris and Ingram, 2009; Hwang, 1987) and such emotional attachment can in turn increase each party's propensity to help the other out in job-related and personal matters (Chen & Peng, 2008; Kipnis, 1997). The interplay between ganqing and renqing may then have a potential bearing on knowledge exchange at the workplace.

Since ganqing and renqing represent personal feelings people hold towards others, their effects on knowledge adoption behaviors found in this study add to a body of research investigating the affective aspects of motivation for knowledge sharing (Casciaro and Lobo, 2008; Liang, Li and Shao, 2025; Ma et al., 2025; Trevinyo-Rodriguez and Bontis, 2010; Van den Hoof, Schouten and Simonovski, 2012). Trevinyo-Rodriguez and Bontis (2010) and Van den Hoof, Schouten and Simonovski (2012) showed emotions such as pride and empathy could facilitate the knowledge transfer process. Casciaro and Lobo (2008) found that an individual with a negative sentiment for a knowledge source was less likely to seek knowledge from that person. While demonstrating the connections between certain affective states (e.g., liking or disliking, pride, and sympathy) and some knowledge sharing activities, this stream of research has focused on emotions and sentiments that tend to be instantaneous or transient. Formed and accumulated through numerous social interactions over time, ganqing and renqing are more durable and stable. Therefore, their impacts on knowledge sharing may be more robust than those of short-lived emotions and sentiments. It then appears that the impact of long-term interpersonal feelings on knowledge sharing is worth more attention in future research.

For Chinese firms interested in better managing their knowledge resources, one practical insight from this study is that knowledge adoption should be viewed as important as knowledge contribution to effective knowledge sharing. Managerial support of knowledge sharing should then include efforts (e.g., policies and rewards) that encourage adopting knowledge from others. Of equal importance, knowing that ganqing and renqing may affect knowledge adoption, Chinese firms can leverage them to reduce potential hesitance of their employees to accept and use useful knowledge from coworkers, hence increasing knowledge sharing. To increase the development and maintenance of ganqing and renqing at the workplace, management should support and even encourage more interactions and exchanges among employees through such activities as cross-functional collaborations or team projects, which involve working with colleagues they do not meet on a daily basis. These measures can also reduce the influence of potential not-invented-here syndrome on employees who lack ganqing and renqing with knowledge contributors. At the same time, firms should be mindful of one downside of strong ganqing and renqing for knowledge adoption. An employee with high emotional attachment or indebtedness to a knowledge contributor may blindly accept his or her knowledge without evaluating its credibility. To prevent irrational acceptance of inferior knowledge due to the emotional influence or the pressure to return favors, clear company policies should be established to forbid knowingly adopting inadequate knowledge and require considering the usefulness of the knowledge before using it. To help employees separate emotions from good ideas, training should be provided on unconscious bias caused by ganqing and renqing in guanxi. In addition, employees can be required to report critical or high impact knowledge obtained from others and provide a rationale for adopting it. Firms from other Asian countries such as Japan, South Korea, Singapore and Vietnam can also benefit from the above insights and manage knowledge sharing in similar ways. Most of the populations in those countries are under the influence of the Confucian values of collectivism and may develop and experience interpersonal feelings similar to ganqing and renqing in social interactions and relationships (Yang and Horak, 2018).

This study had some limitations that should be acknowledged. First, conclusions regarding the causal relationships between ganqing or renqing and knowledge adoption could not be drawn due to the cross-sectional nature of the study. On the other hand, the correlations found in the study suggest two important

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interpersonal factors in knowledge adoption and their potential causal links for further testing and study in controlled, experimental settings. Secondly, although several measures were taken to detect and reduce potential common method variance, the influence of common method bias could not be completely ruled out, and more data collected with additional measures and checks can increase our confidence in the relationships found in the study. Thirdly, since the data of the study was drawn from a small sample reflecting a relatively high level of interpersonal feelings, broad generalizations of the findings to different patterns of dyadic interactions should be cautioned. While the subjects of the study were instructed to randomly consider a coworker in the survey, most of them tended to pick one with whom they had developed strong ganqing and renqing. Hence, the impact of these two feelings on knowledge adoption needs to be further validated with additional data capturing lower levels of interpersonal feelings. Finally, since the norm of reciprocity underlining renqing in China can be different from those experienced in other countries under less influence of the Confucian values, caution should be taken before generalizing the current findings to those countries. Notwithstanding these limitations, this research suggests that the influence of interpersonal feelings on knowledge adoption in China warrants further research and managerial attention.

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Appendix: Measurement items

Ganqing

1. I can freely share feelings and emotions with this person.
2. We have fond feelings for each other.

Renqing

3. We often help each other out in work-related matters.
4. We often help each other out in personal matters.
5. I am well acquainted personally with this person.

Explicit knowledge adoption

6. If relevant to my work, I would welcome and use any work reports and official documents this person shares with me.
7. If relevant to my work, I would welcome and use any manuals, methodologies and models this person shares with me.

Tacit knowledge adoption

8. If relevant to my work, I would welcome and adopt any personal practical know-how this person shares with me.
9. If relevant to my work, I would welcome and adopt any expertise from education or training this person shares with me.
10. If relevant to my work, I would welcome an opportunity to spend significant time observing and collaborating with this person in order for me to better understand and learn from his/her know-how.

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Strengthening Youth Farmer Regeneration Through Knowledge Management Practices in Farmer Communities

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Abstract: This study discusses how knowledge management (KM) practices at the community level can help regenerate youth in farming communities as part of the farmers. The study is based on the KM model proposed by Probst (1998), which comprises the identification, acquisition, development, distribution, use and preservation of knowledge as interrelated processes that maintain intergenerational sustainability of the agricultural sector. By filling a major research gap, the study relates to the paucity of empirical research specifically examining farmer regeneration through a KM lens, the dearth of understanding how KM practices are lived differently by generations and the dearth of research on how Indonesian farming communities experience indigenous, formal and digital knowledge systems in sustaining agriculture across generations. These observations indicate that KM activities in the community, such as knowledge sharing through participation, intergenerational learning, mentoring, and leadership opportunities, are at the centre stage in influencing youth engagement and their motivation to join the agricultural sector. As much as structural barriers remain, such as a lack of access to land, failure to change perceptions about agricultural work, and dissimilar exposure to modern agricultural knowledge, farmer groups can entice and keep young farmers by promoting collaborative learning settings and utilising both traditional and new sources of knowledge. On the whole, this paper contributes to a clear understanding of the importance of a community-based approach to knowledge management around the area of youth unemployment in agriculture and provides conceptual and practical recommendations to policymakers, non-governmental organisations, and agricultural institutions to enhance farmer regeneration and intergenerational agricultural knowledge.

Keywords: Farmer communities, Farmer regeneration, Intergeneration knowledge sharing, Knowledge management, KM in agriculture, Youth farmer regeneration

1. Introduction

Across many regions of the world, the agricultural sector is experiencing a demographic and structural crisis. The populations involved in farming are also ageing, and fewer youths see agriculture as a desirable or viable source of livelihood. Research in different settings, such as Africa and Asia, has indicated that they tend to view agriculture as a low-status, low-paying, and physically challenging work experience, which is uncertain and risky (Giwu *et al.*, 2025). Young people also have limited access to land, capital, and infrastructure, which discourages entry or stay in farming despite agriculture being the main source of food and rural livelihoods (Boye *et al.*, 2024). Concurrently, it is increasingly acknowledged that youth participation in agriculture is highly crucial for food system resilience, innovation, and rural development. The younger farmers are often depicted as the possible agents of change that can bring new technologies, business models, and approaches to sustainability (Geza *et al.*, 2023). Their involvement can be used to curb rural-urban migration, spur local economies and work towards wider development objectives. However, in many situations, these expectations are not met since structural constraints and societal stigmas restrict the beauty of agriculture among them (Giuliani *et al.*, 2020).

Falling farmer regeneration has become a strategic concern in several countries, most notably Indonesia, in which the agricultural sector employs young rural workers even as it faces rapidly growing non-agricultural employment options (Mendoza and Garcia, 2023; Ngadi *et al.*, 2023; Ambarwati *et al.*, 2024; Tikum and Ahmad, 2024). The role of youth in national food security, as well as the sustainability of the rural labour force, is emphasised by various studies; however, problems of access to land, the absence of enough job opportunities, and insufficient social security have been tremendous obstacles (Geza *et al.*, 2023; Karahan, Abay and Ito, 2023; Pathma *et al.*, 2025). Although this is the overall trend, certain farming towns have managed to attract youth participation and achieve successful regenerations. It happened, which shows that the process of regeneration is not only determined by the structural problem, but also by the internal community processes, in terms of how the agricultural knowledge is managed, communicated, and used to address the younger generation (Effendy,

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Rohmatika and Musyarofah, 2023; Pathma *et al.*, 2025). This peculiar situation renders the context of this research interesting and worth exploring.

In this study, farmer regeneration is understood as the process of sustaining agricultural activities by involving younger generations in farming, either by inheriting family farming enterprises or by entering the agricultural sector independently (Anwarudin *et al.*, 2020). In practice, farmer regeneration is closely related to farm succession within families, in which the older generation transfers farm ownership, production responsibilities, and practical agricultural knowledge to the next generation or younger generation (Firman A *et al.*, 2018; Firman, Daud and Arief, 2023). Regeneration is seen not only as a generational shift in farming activities but also as a social process that facilitates the transfer of knowledge, skills, and farming experience from senior to younger generations. Various studies show that low rates of farmer regeneration are often associated with structural factors such as limited land access, low agricultural sector incomes, and limited social security for workers in this sector (Geza *et al.*, 2023; Pathma *et al.*, 2025). Nevertheless, several farming communities have relatively succeeded in maintaining youth involvement in agriculture (Darmawan *et al.*, 2024). It indicates that farmer regeneration is influenced by not only structural factors but also the internal dynamics of the community, including the way agricultural knowledge is managed, shared, and transmitted to the younger generation (Borec *et al.*, 2013). In this context, understanding KM practices in farming communities is essential for explaining how young people acquire skills and motivation to engage in farming activities. The processes of identifying knowledge, learning from experience, sharing farming practices, and utilising knowledge in decision-making are important elements in building the capacity of younger generations to be involved in agriculture. The knowledge management perspective provides an analytical framework for understanding these processes. Referring to the Building Blocks model of Knowledge Management developed by Probst (1998), knowledge in a social system is understood through a series of interconnected processes, such as knowledge identification, knowledge acquisition, knowledge development, knowledge sharing, knowledge utilisation, and knowledge preservation. In the context of farming communities, these processes help to explain how agricultural knowledge is learned and transmitted across generations, thus potentially supporting the continued involvement of young people in agricultural activities.

Although a number of studies have identified the limitations of farmer regeneration and the need to involve youth in the study, limited research has examined how these phenomena relate to knowledge management techniques applicable at a community level. Research on knowledge management in agriculture has always been centred on aspects of technology, institutionalised or extension schemes, with no analysis of how communities in farming-related practice autonomously locate, generate, disseminate and store knowledge as part of regeneration. Moreover, little work has been done on how intergenerational contacts, local culture (indigenous knowledge) and community social processes may become important determinants in the attraction and retention of young farmers. The fact that farming communities can sustain youth engagement, unlike the rest of the nation, provides a rich context for comprehending how KM practices that are community-based can promote farmer regeneration. It is this context that offers the possibility, empirically, of unravelling social, cultural, and knowledge processes that facilitate regeneration at a natural level.

Past studies have revealed useful information on youth involvement in agriculture and associated knowledge processes, but they have been discussed independently. Knowledge management, participatory extension, and citizen science work on the idea of farmer involvement in the co-production of locally relevant knowledge (Mourad, Hosseini and Avery, 2020; Prajapati *et al.*, 2025). Nevertheless, when combined, this literature discloses gaps that are specifically applicable to Indonesia. To begin with, there is a dearth of empirical studies that directly investigate the concept of farmer regeneration as generations of continuity as an actual farmer based on the model of KM proposed by Probst (1998). The research on youth participation lists the barriers and drivers, but it does not evaluate how certain KM building blocks in the farmer community determine whether young people continue to farm when the older ones retire or not (Saint Ville *et al.*, 2016; Ansong Omari *et al.*, 2018; Triste *et al.*, 2018). Second, despite the prevalence in the promotion of participatory approaches, there is a lack of understanding of how community KM practices are realised in dissimilar ways across generations, and how they shape the attitude of young people, perceived norms, and perceived control over farming as a long-term livelihood (Prajapati et al., 2025; Waters-Bayer et al., 2015). According to the background, the study is guided by the following research questions:

RQ1: How do farmer communities apply KM practices to support youth farmer regeneration?

RQ2: How do KM practices in farmer communities support or hinder youth farmer regeneration?

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This study uniquely incorporates KM and farmer regeneration perspectives within rural farming communities. Unlike previous research, which focused on technology, extension or policy, this study promotes social interaction, community mechanisms, and youth involvement in the KM cycle as key regeneration factors. The research provides insights on the use of KM as a social process for agricultural sustainability across generations.

2. Theoretical Background

2.1 Farmer Regeneration

The regeneration of farmers refers to the process by which a new generation enters agricultural activities and ensures the continuity of agriculture across generations within a community. The term "regeneration" in agriculture carries the same meaning as succession or inheritance in farming. Farmer regeneration is the process of bringing new farmers into the agricultural business (Darmawan *et al.*, 2024). Farmer regeneration is closely related to the succession process of agricultural enterprises within families, in which the older generation transfers ownership, responsibility, and farming practices to the younger generation (Conway *et al.*, 2021). Therefore, farmer regeneration is not limited to the inheritance of family businesses; it encompasses the entry of young individuals into the agricultural sector and their involvement in production, farm management, and agricultural innovation.

This regeneration process has become crucial because many countries are facing the challenge of declining interest among the younger generation in the agricultural sector, including Indonesia (Mendoza and Garcia, 2023; Ngadi *et al.*, 2023; Ninson and Brobbey, 2023). Without adequate farmer regeneration, the sustainability of food production, rural development, and the survival of agricultural communities can be threatened (Mpanga, Schuch and Schalau, 2021). Farmer regeneration is generally reflected through several indicators, such as the involvement of young people in agricultural activities, the continuity of farming enterprises across generations within families or communities, as well as the existence of learning processes and knowledge transfer between senior farmers and the younger generation (Van Niekerk J.A, Mahlobogoane M. and Tirivanhu P., 2015; Dayat, Anwarudin and Makhmudi, 2020; Tolinggi *et al.*, 2023). These conditions indicate that regeneration is not only about land ownership or farming businesses but also about youths' acquisition of the knowledge, skills, and experience required to independently carry out agricultural activities.

In many farming communities, knowledge about cultivation practices, land management, and strategies for dealing with agricultural risks is largely tacit and is acquired through experience and social interaction among farmers (Tolinggi *et al.*, 2023). Therefore, the process of knowledge sharing, joint learning, and interaction between senior farmers and the younger generation supports the sustainability of farmer regeneration. Thus, farmer regeneration can be understood as a process of transferring and reproducing agricultural knowledge within the community. The way the community identifies, shares, develops, and maintains agricultural knowledge is an important factor influencing youths' involvement in agricultural activities. This perspective opens up space to understand farmer regeneration through a knowledge management framework, particularly how community-level knowledge management practices can support the sustainability of agricultural activities across generations.

2.2 Knowledge Management in Agricultural Communities

Knowledge management practices have evolved in their application, extending beyond corporate organisations to also encompass the agricultural sector and communities (Risidi and Abdullah, 2008; Palma-Huertas and Nova, 2025). This condition reinforces that the fundamentals of KM are not limited by the object but rather by the subject, the presence of a group of individuals (Merali, 2000). The emergence of KM practices in farming groups is inseparable from the knowledge dynamics within farming communities. Changes in agricultural practices often occur through collaborative learning, sharing of experiences among farmers, and the creation of new knowledge through field experiments (Akpo *et al.*, 2015). Therefore, the development of agriculture is influenced not only by technological or economic factors but also by how knowledge is created, shared, and utilised within the farming community.

Knowledge exchange across generations of farmers, manifested through approaches such as mentoring, apprenticeships, discussion forums, and other engagement activities, has proven beneficial and influences the motivation of young people to get involved (Dayat, Anwarudin and Makhmudi, 2020; DeMarsh, 2022). This positions the KM approach as a viable instrument for encouraging farmer engagement and supporting farmer regeneration. This is because collective knowledge sharing empowers the agricultural industry, which will be regenerated and sustainable for future generations (Saint Ville *et al.*, 2016).

2.3 Building Blocks Model of Knowledge Management by Probst

Probst's building block model is a framework for guiding KM activities. These processes include knowledge identification, acquisition, development, distribution, utilisation, and preservation, among others (Probst, Raub and Romhardt, 2000). (1) knowledge identification, which is mapping existing knowledge; (2) knowledge acquisition, which is accessing external knowledge through acquisition, collaboration, or recruitment of experts; (3) knowledge development, which focuses on creating new knowledge through creativity, problem solving, and collective learning; (4) knowledge dissemination/distribution, which is ensuring knowledge flows and can be used widely within the organization; (5) knowledge utilization, which emphasizes the effective application of knowledge in work processes; and (6) knowledge preservation, which includes storing and updating important knowledge to prevent the loss of critical experience. Although this model was originally developed in an organisational context, the basic concepts of how knowledge is identified, shared, and utilised can also be used to understand knowledge dynamics in broader social systems, including farming communities (Buitendag and Hattingh, 2024).

To clarify how the KM building blocks framework is understood in the context of agriculture, previous studies indicate that KM processes can also be observed in the practices of farming communities (Lwoga, Ngulube and Stilwell, 2010; Tandi Lwoga, 2011; Vangala, Hiremath and Banerjee, 2014; Buitendag and Hattingh, 2024). For instance, Tandi Lwoga (2011) shows that agricultural knowledge is acquired from local sources such as family, personal experience, and community interactions. In addition, knowledge sharing occurs through farmer groups and social practices within the community, while agricultural knowledge is often preserved through the experience of senior farmers and passed down to the next generation. These findings show that various processes within the KM framework—such as knowledge acquisition, sharing, utilisation, and preservation—also occur within agricultural communities. Based on these findings, the processes in Probst's model can be interpreted from the context of farming communities as summarised in the following Table 1.

Table 1: Probst's KM Model Process in Farmer Communities

KM Process by Probst's Model	Translation in the agricultural community	Practice
Knowledge Identification	The process of identifying knowledge sources available within the community	Senior farmers are recognised as sources of knowledge and references when dealing with agricultural problems
Knowledge Acquisition	The process of acquiring agricultural knowledge from various sources, both internal and external to the community	Learning from family, neighbours, personal experience, field demonstrations, and farmer groups
Knowledge Sharing/Distribution	The process of knowledge exchange among members of the farming community	Discussion among farmer groups, interaction between farmers, and informal learning within the community
Knowledge Development	The process of developing or adapting knowledge through experience and field practice	Experimentation with cultivation techniques and adaptation of agricultural practices to local conditions
Knowledge Preservation	The process of preserving and maintaining the sustainability of agricultural knowledge within the community	Transfer of knowledge from senior farmers to the younger generation through practice and experience
Knowledge Utilisation	The process of applying knowledge in everyday agricultural practices	Disease control, soil fertility management, and the application of cultivation techniques

Sources**:** Adapted from Lwoga (2011) with some elaboration

Thus, the KM framework is relevant not only in formal organisations but also in farming communities. In this study, the framework is used to analyse how KM processes within farming communities contribute to the sustainability of farmer regeneration.

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3. Research Methodology

3.1 Methodology

We used a qualitative research design to answer our research questions. This method was chosen for the following reasons: (a) limited literature on KM practices that support the regeneration efforts within agricultural communities. A discovery-based approach in qualitative research is suitable for exploring phenomena that have not been explained in depth, in line with the qualitative objective of understanding complex and contextual phenomena (Ograjenšek, 2016). (b) As an effective method to find answers to the questions "how" and "why" (Rogo, 2024). The qualitative method allows us to develop a detailed and contextual understanding of KM practices implemented in farming communities and their impact on the regeneration of young farmers. (c) Because qualitative methods acknowledge the diversity of realities and the holistic, constructive nature of knowledge. They allow us to integrate the various experiences and perspectives that exist within farming communities. In doing so, we can provide a meaningful and in-depth picture of knowledge management risks and how these practices support or hinder the regeneration of young farmers.

3.2 Sampling, Data Collection, and Interview Instrument Development

3.2.1 Sampling and data collection

Considering the aim of this study, which is to investigate knowledge management practices that facilitate the regeneration of young farmers in communities, as well as establish which factors enable or inhibit this, we chose to use farmer group leaders as informants. In particular, the qualitative data required was gathered using an open-ended essay format that implies descriptive responses to a number of questions. Under this procedure, the informants are requested to respond to every question in their own language and interpretation. It has been employed in a number of earlier research studies (Dhir et al., 2024; Sithipolvanichgul et al., 2025). In this study, 13 key informants were involved, including farmer group leaders, as presented in Table 2.

Table 2: Key Informant

Farmer Group	Key Informant	Range Age	Composition of member in Farmer Group	
			Senior	Youth
Village1	Group Leader	>50	60%	40%
Village2	Group Leader	>50	70%	30%
Village3	Group Leader	>50	80%	20%
Village4	Group Leader	>50	65%	35%
Village5	Group Leader	>50	60%	40%
Village6	Group Leader	40 - 50	60%	40%
Village7	Group Leader	40 - 50	60%	40%
Village8	Group Leader	40 - 50	65%	35%
Village9	Group Leader	40 - 50	65%	35%
Village10	Group Leader	30 – 40	65%	35%
Village11	Group Leader	30 – 40	65%	35%
Village12	Group Leader	40 – 50	65%	35%
Village13	Group Leader	40 – 50	70%	30%

Source: Authors' own work

3.2.2 Interview instrument development

We developed the interview instrument as a semi-structured guide divided into three main sections: introduction, core, and closing. This three-part structure ensures that the interview is systematic, comprehensive, and participant-centred. This approach aligns with the iterative and flexible nature of qualitative research in exploring respondents' experiences and perspectives in depth (Hamblin, 2024).

The introduction section explores the respondent's background, farming experience, involvement in farmer groups/communities, and views on youth engagement in agriculture. The core section was developed based on Probst's KM Building Blocks framework, particularly its dimensions of knowledge identification, acquisition, development, sharing, preservation, and utilisation. The questions in the core section are formulated with reference to the conceptual definitions of each knowledge management dimension; this is in line with the exploratory nature of open-ended interviews to gain an initial understanding of a topic, identify relevant dimensions, and capture the terms used by respondents to describe their experiences (Schlütz and Möhring, 2015). Thus, each item is derived from KM dimensions, which serve as an analytical framework for understanding KM practices within agricultural communities. Furthermore, it explores how these practices relate to youth participation in agriculture and how they are understood to support farmer regeneration. Meanwhile, the closing section contains reflective questions regarding the challenges/support of involving the younger generation and the role of knowledge management in promoting youth participation in agriculture. It also provides respondents the opportunity to give ideas on agricultural knowledge and the sustainability of young farmers.

The conceptual definition of the KM process in the Table 3 was used as a reference for formulating core questions to identify KM practices in farming communities and explore their relationship with the regeneration of young farmers. It provided a clear basis for the data collection process and analysis of the findings. The complete guide and list of interview questions are presented in Appendix 1.

Table 3: Conceptual Definition of KM Processes

Dimension	Conceptual Definition	Exploration
Knowledge Identification	The process of identifying what knowledge is available and who the sources of knowledge are in the community. (Probst, Raub and Romhardt, 2000; Lwoga, Ngulube and Stilwell, 2010)	Identifying how knowledge and knowledge sources are recognised in farming communities, and how these processes relate to the involvement of young farmers in learning about agriculture.
Knowledge Acquisition	The process of acquiring knowledge from internal and external sources within the community (Probst, Raub and Romhardt, 2000; Lwoga, Ngulube and Stilwell, 2010)	Exploring how agricultural knowledge is acquired in farming communities, whether from group members, senior farmers, or other learning sources, and how this acquisition process is accessed and followed by young farmers in agricultural learning activities.
Knowledge Development	The process of developing or adapting knowledge through experience, learning, and experimentation. (Probst, Raub and Romhardt, 2000; Lwoga, Ngulube and Stilwell, 2010)	Explores how farming communities develop and adapt agricultural knowledge through experience, experimentation, and shared learning, and how this process creates space for young farmers to learn, innovate, and engage more actively in farming practices.
Knowledge Sharing	The process of exchanging and distributing knowledge between community members (Probst, Raub and Romhardt, 2000; Lwoga, Ngulube and Stilwell, 2010)	Explores how agricultural knowledge is shared between farmers, both through direct interactions and group activities, and how this process provides learning opportunities for young farmers and encourages their participation in agriculture.
Knowledge Preservation	The process of maintaining and preserving knowledge so that it remains available within the community. (Probst, Raub and Romhardt, 2000)	Exploring how farming communities (senior farmers) maintain and pass on agricultural knowledge between members and between generations, and how this preservation process contributes to the sustainability of learning and regeneration of young farmers.
Knowledge Use	The process of utilising knowledge in practice and decision-making. (Probst, Raub and Romhardt, 2000)	Explores how agricultural knowledge is applied in everyday practice and decision-making, and how the use of this knowledge influences young farmers' engagement, learning experiences, and confidence in agricultural activities.

Sources: (Probst et al., 2000; Lwoga et al., 2010)

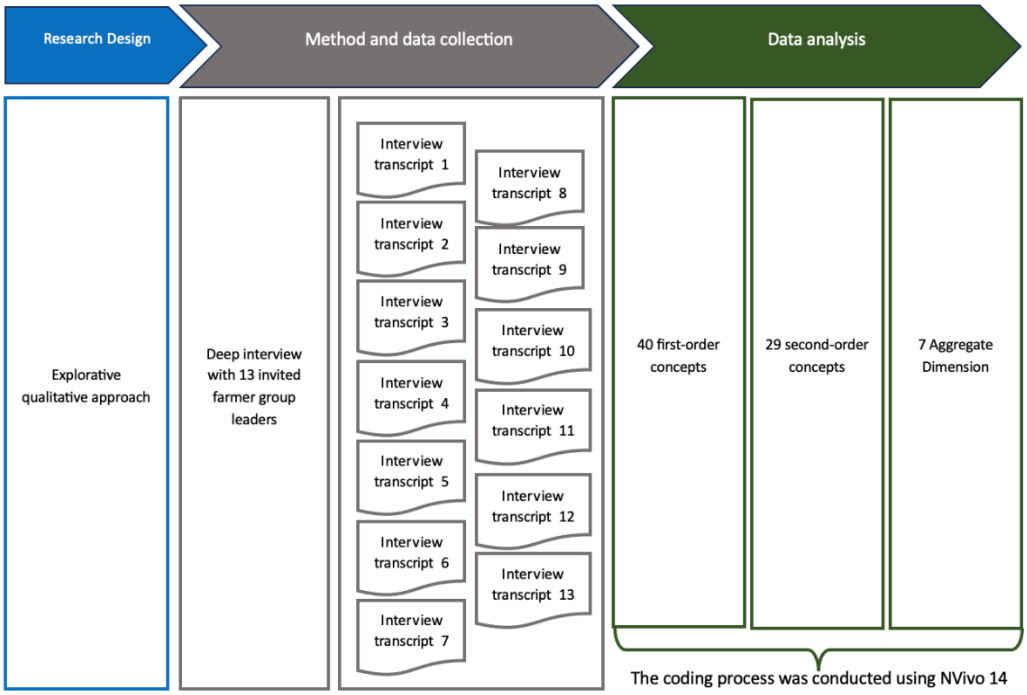
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3.3 Data Analysis

Our data analysis was conducted manually with an iterative coding process (Gioia, Corley and Hamilton, 2013). This process began with an in-depth reading of all interview data, which was then visualised as a data structure diagram. In constructing this data structure, the researchers first formulated first-order concepts based on the expressions, terms, and experiences conveyed by the informants. These concepts were then grouped into second-order themes through researcher interpretation, before finally being distilled into aggregate dimensions as the main thematic categories in the research findings.

Coding began with open coding, in which two authors performed it separately. First, we conducted preliminary coding using an inductive approach. The themes were then individually formulated and subsequently combined into broader dimensions. This iterative approach ensured that the developed themes shared a similar perspective. Figure 1 shows the steps of coding and data analysis.

This analysis process considered the conceptual dimensions previously used in developing the interview instrument: knowledge identification, acquisition, development, sharing, preservation, and utilisation. Thus, there was a relationship between the conceptual framework, interview items, and the analysis process. Although the analysis remained open to themes emerging from the data, these dimensions were used as initial analytical categories to trace how knowledge management practices occurred within the farming community and how they were perceived to support or hinder the regeneration of young farmers.



Source: Authors' own work

Figure 1: Coding and Data Analysis Process

Figure 1 presents the coding and data analysis process. Through the coding process, this study identified seven aggregate dimensions that represent the main thematic structure of the findings. They are the first six dimensions reflecting KM main processes in farming communities: knowledge identification, knowledge acquisition, knowledge development, knowledge sharing, knowledge preservation, and knowledge utilisation, as they relate to supporting the participation and regeneration of young farmers. The seventh dimension summarises the conditions that support and hinder knowledge management practices in strengthening farmer regeneration.

3.4 Validity and Reliability Measurement

The credibility of this research was strengthened by developing interview instrument based on conceptual dimensions in the KM literature, specifically Probst's Building Blocks framework. By referencing the conceptual definitions of each dimension in developing core questions, this research maintained a clear link among the

theoretical framework, data collection instruments, and the analysis process. The mapping between interview sections, conceptual dimensions, exploration objectives, and the literature base is presented in Table 3.

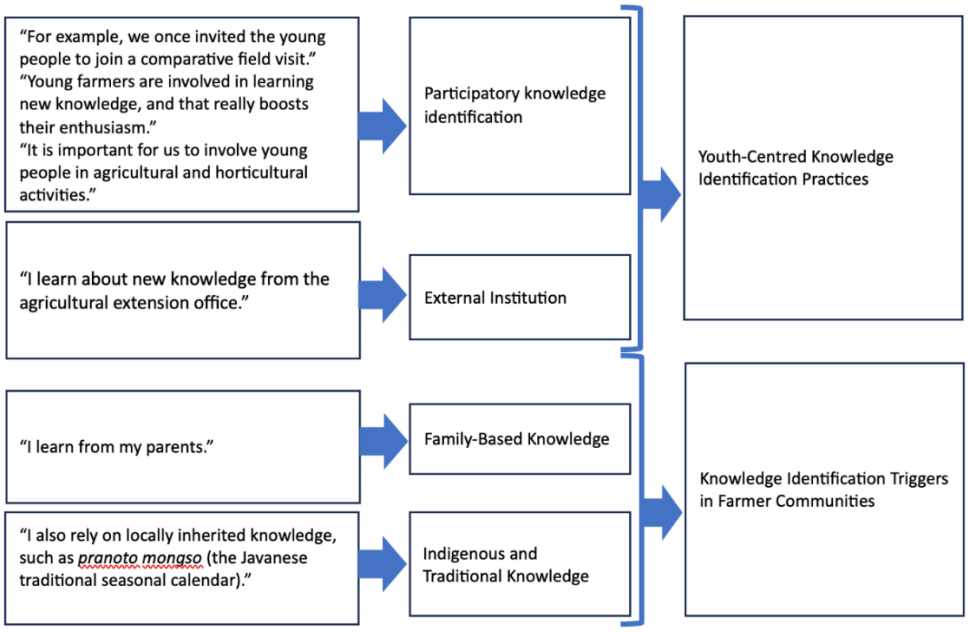
To improve the validity and reliability of the findings, the study triangulated data from sources of information so that the findings could be compared and validated to reduce bias. Moreover, literature triangulation was used to compare the results of the research with available theories and studies, and it increased the external validity and credibility. The data coding was conducted collaboratively by different analysts, which minimised bias because all the analysts were consistent in categorising and interpreting the data. Combining data and literature triangulation strengthened the reliability of the results, and in fact, the conclusions reflected the empirical data and were consistent with the existing literature.

4. Result

The findings of the qualitative data analysis reveal how farmer groups apply KM practices in their environments towards regenerating farmers. Based on the KM process, comprising knowledge identification, knowledge acquisition, knowledge development, knowledge sharing and preservation, and knowledge utilisation, we could identify the farmer groups' practices at a given stage and analyse the types of practices geared towards the regeneration of young farmers. The most prominent processes facilitating the involvement and regeneration of young farmers are knowledge sharing, knowledge acquisition, and knowledge development. Nevertheless, there are other stages in the KM process which also have their role, but to a lesser degree. Thus, the next section elaborates on the practices developed at each stage of KM, as well as the factors that facilitate or impede the participation of young farmers. The important findings are as follows and are based on the aggregate dimension:

4.1 Youth-centred Knowledge Identification Practices Support Farmer Regeneration

Figure 2 illustrates the knowledge identification process supporting farmer regeneration. The finding show how farmer groups of 20-75 members systematically acquire knowledge through field experience and credible sources, such as parents, peers, and agricultural extension workers. Local knowledge, especially the practices – for example, *Selapanan, Pranoto Mongso* and *Titen Telaten* – is essential in this process as it helps farmers balance traditional agricultural wisdom and modern knowledge, hence enhancing their techniques in land management, fertilisation and crop care.



Source: Authors' own work

Figure 2: Knowledge Identification Process Supporting Farmer Regeneration

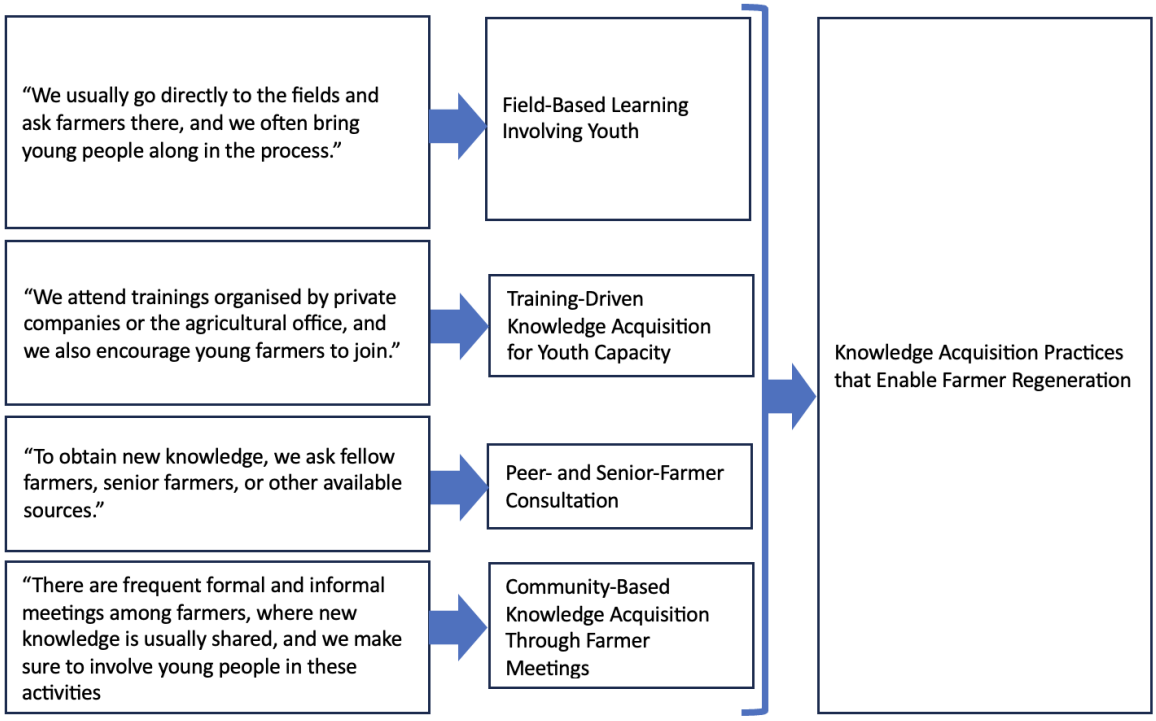
The question then is, how is this practice regenerating young farmers? The analysis shows that all the identified themes are based on activities that specifically focus on the roles and engagement of young people in the village in which the farmer group is emerging. The actors have been introduced to the youths and the farmers at an early age as relevant sources or references with which knowledge can be identified. Besides, local youth were

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invited and engaged in learning local agricultural knowledge, which has been passed down across generations in the village. The condition affects the delivery of knowledge applied by young generations entering agriculture. The farmer groups engage youth in awareness of issues and information that can enhance the effectiveness of agricultural activities.

4.2 Participatory Knowledge Acquisition as a Pathway to Farmer Regeneration

Figure 3 presents the modes of knowledge acquisition, showing how these modes support youth engagement in farming and contribute to farmer regeneration. The farmer cooperatives have also gained new knowledge that strengthens their farming methods through interested parties, including the government, outside farmers, the private sector, and fellow farmers. The two approaches to knowledge acquisition include group practices, such as comparative studies, training, and meetings, as well as individual questioning of senior and peer farmers. Also, technology is influential, and farmers can use such platforms as YouTube and WhatsApp as sources of information. The knowledge acquisition approach also focuses on experiential learning, using field trips to senior and peer farmers and real-world farming experiences.



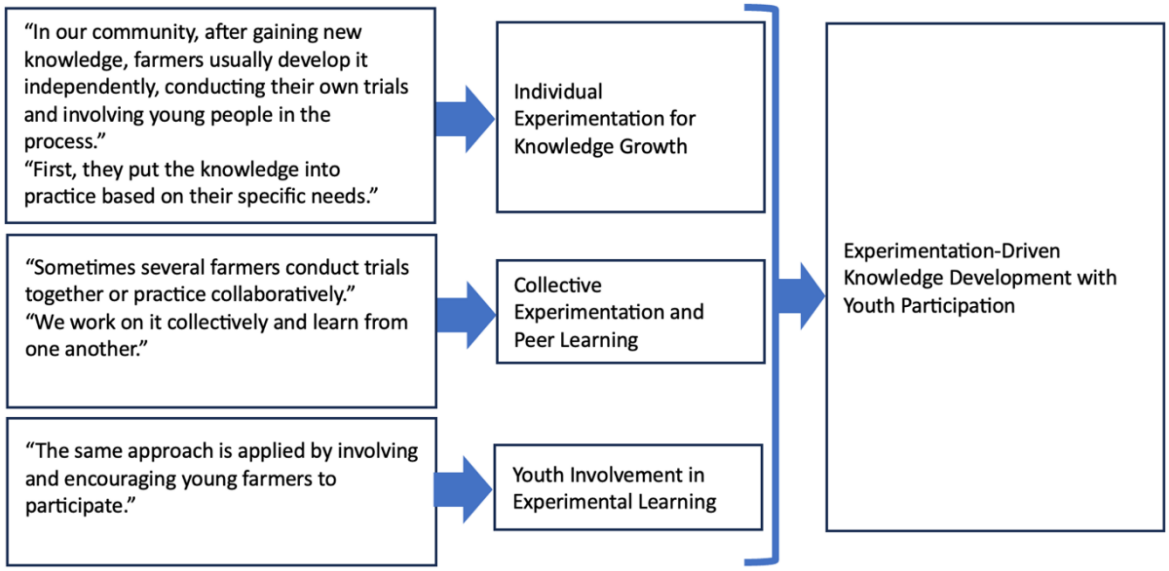
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Figure 3: Modes of Knowledge Acquisition Supporting Youth Engagement

In knowledge acquisition, young people were supported by farmer groups to facilitate regeneration by involving them in knowledge acquisition activities, including study tours. This continues in the training process, where youth participation is prioritised. The farmer group members also encourage young people to ask older farmers agricultural questions. They involve youth in these knowledge-acquisition activities during meetings.

4.3 Engaging Youth in Experimental Knowledge Development for Farmer Regeneration

Figure 4 presents the knowledge development practices that support youth engagement in farming. The findings indicate that knowledge development among horticultural farmers is mainly achieved through direct practice and experiential learning. Experimental learning is done by farmers both individually and in groups, as they test and adjust their newly learned knowledge to suit the circumstances of the area. This involves the creation of methods for fertilising, soil preparation, and planting patterns, which have been improved through applied training outcomes. Outsourcing support, including highly professional training and interaction with the government and the private sector, makes this a dynamic process in which farmers are expected to actively develop and construct knowledge in response to the needs of their community.



Source: Authors' own work

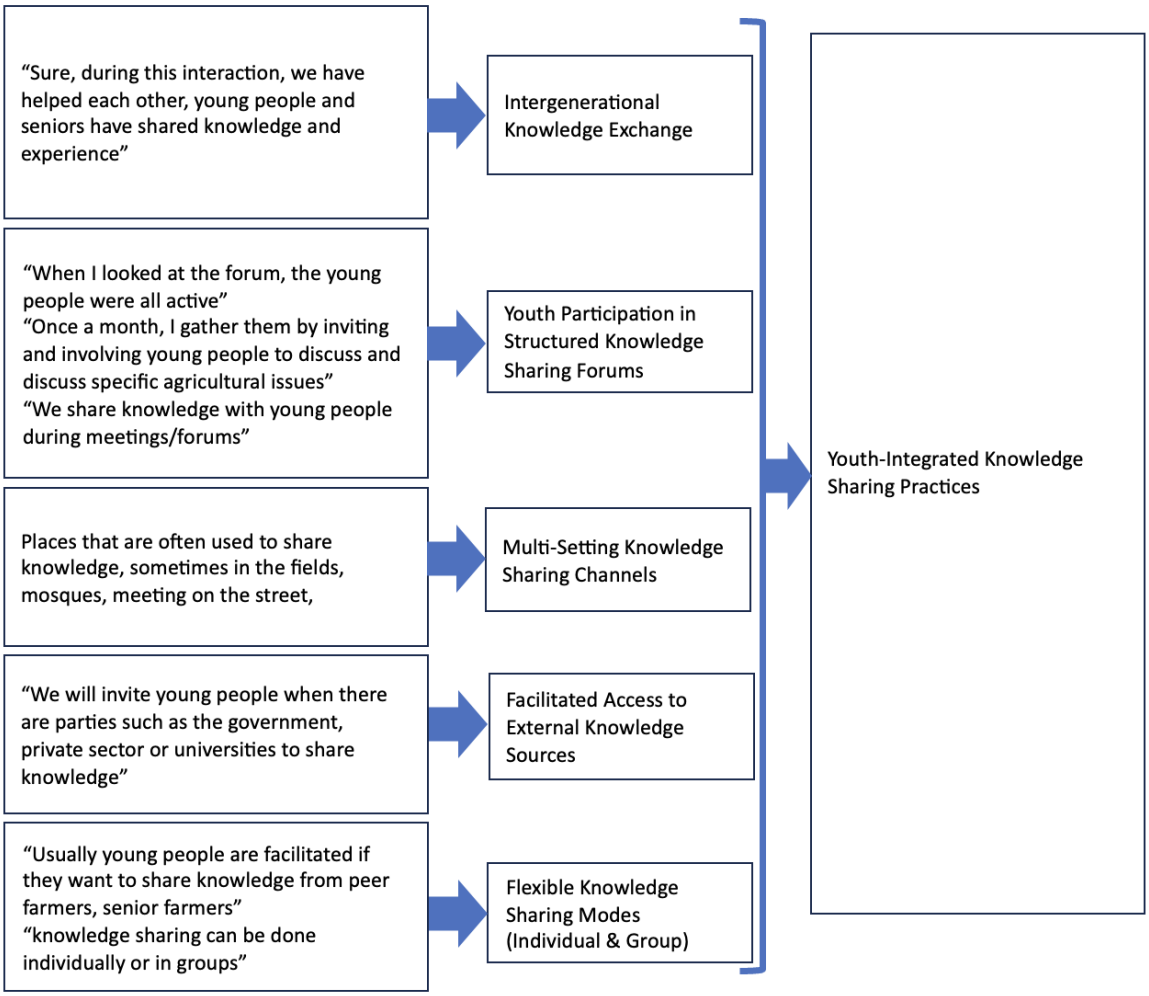
Figure 4: Knowledge Development Practices and Their Role in Youth Engagement

The practices in the development of science acquired by the members of the farmer group are through trials and experiments with their agricultural media. The farmers did not do it in isolation, but they also included young people. In the case of parents, they will carry their children along. The participation of the youth in the trial. This was achievable due to the dedication of the farming group to retaining the zeal and spirit of youth in agriculture. Besides these activities, young people/farmers were also allowed freedom to utilise the knowledge acquired, not only to innovate but also to practice it personally. Therefore, young individuals are not restricted in their knowledge application.

4.4 Co-creating Knowledge through Youth-led Sharing Activities

Figure 5 presents the knowledge sharing practices that facilitate youth farmer regeneration by integrating young farmers into knowledge exchange withing farmer group. Farmers share knowledge in both informal and formal ways, with a focus on young farmers. Informal sharing happens on the streets, in mosques, and during home visits. Formal sharing occurs in meetings in villages or homes through joint training, group talks, and practical demonstrations. Farmers share knowledge directly with one another through informal chats and discussions. Formal sharing is commonly organised by external groups such as the government or private companies, sometimes at regular farmer meetings. Sharing knowledge works best in person, but they also use social media, for example, WhatsApp. Individuals who acquire new knowledge from training or programs are expected to share it with their peers in the group.

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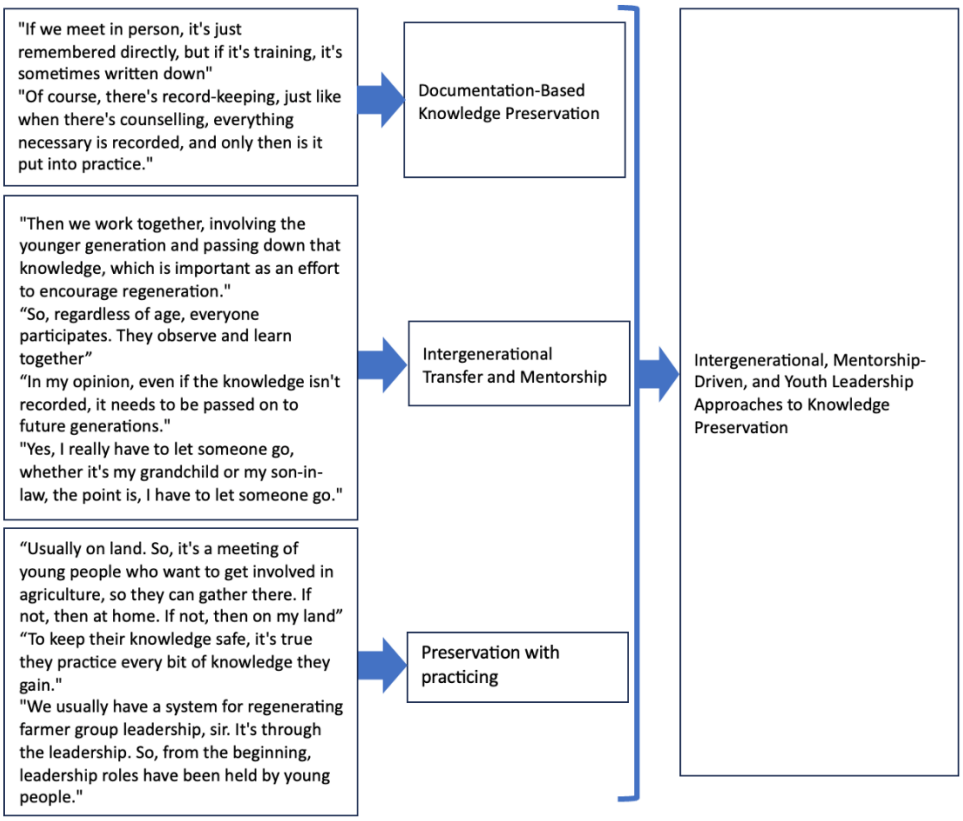
Source: Authors' own work

Figure 5: Knowledge Sharing Practices Facilitating Youth Farmer Regeneration

The farming group has developed a culture of knowledge sharing through informal and formal forums. Young farmers and youth are given space to participate by group members. Peasants are invited to regular meetings and engaged in forums where youth can communicate about agriculture. In knowledge sharing and training activities, preference is given to young people's participation. Farmers prioritise youth engagement for agricultural discussions and question-answer sessions.

4.5 Intergenerational, Mentorship-Driven, and Youth Leadership Approaches to Knowledge Preservation

Figure 6 presents knowledge preservation practices that ensure youth involvement in farming through intergenerational learning, mentorship and youth leadership. Practice-based learning, intergenerational transmission, mentorship, and documentation are some of the ways of knowledge preservation among the farmer groups. The older farmers spend time with younger farmers during the soil preparation and planting process, which enables the transfer of practical skills and farming concepts, such as responsibility and perseverance, through daily interaction. This process is further reinforced through mentorship, whereby young farmers are encouraged by senior farmers to learn new methods, receive cultivation guidance and emotional support. Leadership and documentation practices are also used in engaging youth. The young members are used as section leaders in the group, which builds leadership capacity and a sense of responsibility for the sustainability of agriculture. Simultaneously, they record training outcomes and cultivation methods and establish knowledge archives that are easy to access and prevent any dependence on oral knowledge transfer. In combination, intergenerational transfer, mentorship, and youth leadership assure the preservation of agricultural knowledge and actively contribute to the regeneration of farmers.

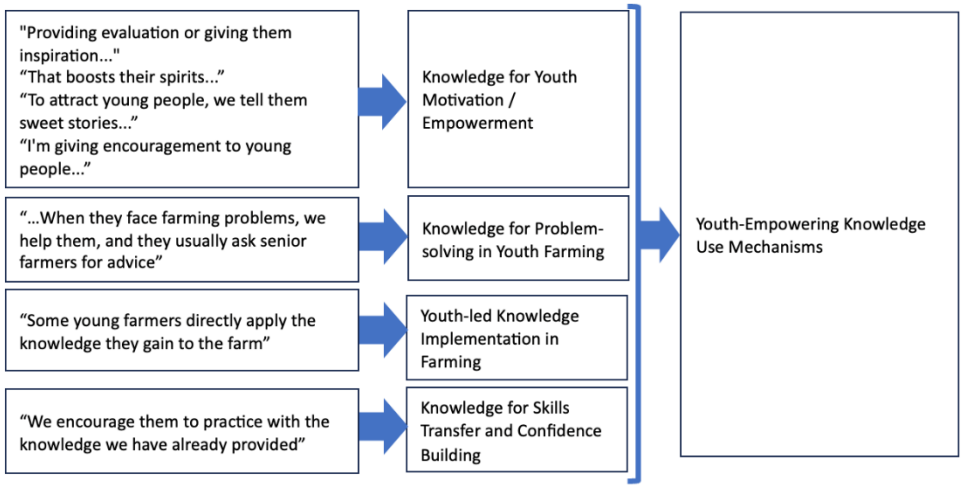


Source: Authors' own work

Figure 6: Preserving Knowledge to Ensure Youth Involvement in Farming Practices

4.6 Utilising Knowledge to Inspire and Motivate Young Farmers

Figure 7 illustrates youth empowering knowledge use practices, showing how young farmers use farming knowledge to strengthen their roles and participation in agricultural activities. The information acquired by farmer groups is integrated into daily farming practices and facilitates sustainability and decision-making in problem-solving. It involves land management, crop maintenance, and other techniques. This knowledge enables farmers to be emotionally stable and confident to tackle challenges. The knowledge is practised by incorporating traditional and modern methods. When the farmers plant crops, irrigate land, and apply fertiliser, they combine proven past practices with new efficient technologies to enhance agricultural performance.



Source: Authors' own work

Figure 7: Youth-empowering knowledge use practice

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According to the research results, the members of the farmer group apply the knowledge they have gained to motivate and inspire the young farmers. This is not only used in farming activities but also helps impart skills and confidence among young farmers. The elder farmers educate using real-life examples, which assist young farmers in defeating technical difficulties in farming and reinforcing their commitment even in the face of failure. Moreover, the knowledge facilitates decision-making among young farmers since they can apply the knowledge in their farms. The knowledge enhances their involvement in agriculture and the sustainability of the farming profession in future. In general, the knowledge use practices are vital to aiding in the regeneration of young farmers, focusing on the transfer of skills, confidence, and the implementation of knowledge in the agricultural sector.

4.7 KM Supporting and Hindering Conditions in Strengthening Farmer Regeneration

The analysis of interviews with key informants shows what helps or hinders farmers. Creating an environment where farmers care and have places to talk, especially involving young farmers, is important. Involving young people in all aspects of knowledge management in farmer groups should be a priority. The attitude of the managers and the head of the farmer group is crucial for this atmosphere. Therefore, the main factor that supports knowledge management and brings in new farmers is the group's leadership. Another important factor is the principle of cooperation across generations, a tradition among farmer groups. This value encourages all generations to completely participate in the group's activities.

KM for helping farmers is blocked by several issues. First, there is a significant age gap between old and young farmers. It leads to differences in how they share and understand traditional knowledge. Young farmers can access new information and think that methods should change. But older farmers prefer to stick to old ways. Second, old farmers may not have the knowledge that young farmers want to learn. The biggest problem is the lack of resources, especially farmland, for young farmers to put what they learn into practice.

5. Discussion

5.1 Reconnecting KM to Farmer Regeneration

Knowledge management (KM) is a recent and lesser-known concept in agricultural settings. However, farmer groups have demonstrated aspects of KM through their activities. The KM process involves knowledge identification, acquisition, development, sharing, preservation and utilisation through various practices. As explained in the findings, KM among farmer groups includes mapping knowledge sources for identification and acquisition, developing a culture of mutual learning, and using local knowledge as a key driver (Tandi Lwoga, 2011). The mapping of pertinent knowledge sources is a crucial base of effective knowledge identification and acquisition. With the systematic listing and classification of these sources, organisations and communities can establish a catalogued storage system that allows easy access to the necessary information. This mapping can not only identify the current sources of knowledge but also show areas of deficiency and opportunities for new learning. It serves as a guide that directs the stakeholders to the most applicable and trustworthy knowledge.

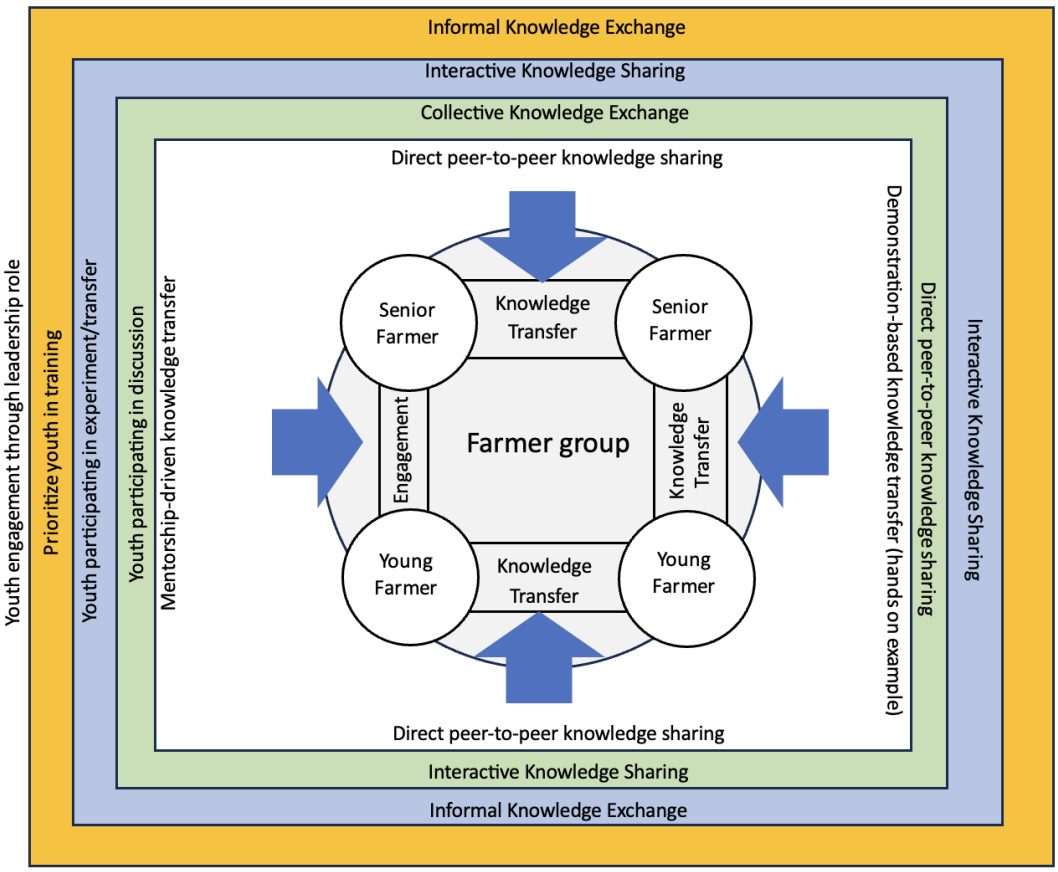
Development of a culture of mutual learning also enhances the power of knowledge identification as it promotes the ongoing interaction, communication, and cooperation between individuals and groups (Booth, 2012). This culture builds trust and openness vital for sharing tacit and explicit knowledge. Local knowledge is essential as it provides context through experiences and insights that are often lost with external sources. It forms a dynamic ecosystem that combines mapped knowledge, reciprocal learning, and local experience, where knowledge is co-constructed and improved to promote sustainable development and adaptive capacity. (Curry and Kirwan, 2014; Vičič Krabonja *et al.*, 2024). Moreover, there are various sources of knowledge, practices and experiments applied as a way of knowledge development (Hunter, 2005). The exchange of new information and knowledge among members is highlighted, as is the maintenance of knowledge through practical processes, mentorship, intergenerational transfer, and documentation. This body of knowledge is then used in their farming activity (Iniesta-Arandia *et al.*, 2015; Masenya, 2023).

The results of the data analyses indicate that the outcomes of the social system of teaching and learning between generations are represented by the members of the farmer group. This process incorporates elder farmers, young farmers, and youth from the nearby agricultural region, in collaboration to develop and share knowledge through different practical approaches. The active engagement of youth farmers and local youth in the whole knowledge lifecycle, including the process of identifying, seeking, obtaining, developing, exchanging, preserving, and application of knowledge, is a key factor that contributes to the development of ownership and enthusiasm in the community (Faithfull *et al.*, 2019). They are also armed with theoretical concepts, practical expertise and first-hand experience in the agricultural sector to maintain their agricultural activities. In addition, this

involvement could inspire young people to participate in agriculture. This observation is relevant when knowledge management within a given organisation affects career progression. Good KM practice will make knowledge available, disseminated, and used to equip potential successors sufficiently, hence impacting positively on succession planning and implementation.

With the system of knowledge sharing and management, organisations can enhance the succession processes, which will eventually lead to an increase in performance and stability (Groves, 2017). Moreover, the application of extensive career management practices, such as training and performance reviews, increases job satisfaction and decreases turnover intentions by matching career development with the goals of the organisation. This alignment is essential in succession planning because employees are highly ready to occupy various positions in the company in the future (de Oliveira, Cavazotte and Alan Dunzer, 2019). Additionally, the use of knowledge management in the virtual organisation creates significance in allowing anytime and anywhere access to organisational knowledge, which can build a virtual team and community of practice. This methodology is critical towards equipping individuals to succeed in a more digital and geographically spread workplace. In general, companies that invest in the strength of knowledge management systems have a better chance of handling succession in places where emerging leaders are prepared to assume important positions with the knowledge and skills required (Ho et al., 2012).

Community practice can also be witnessed in the activities of the farmer groups regarding knowledge sharing. We all know that COP is one of the useful means of knowledge sharing and skill improvement. When they have an excellent skill, they are prepared to be farmers. Figure 8 summaries the social learning processes within farmer groups as communities of practice, illustrating how knowledge exchange takes place among senior farmers, between senior and young farmers, and among young farmers in supporting farmer regeneration. These interactions reconnect knowledge management with farmer regeneration by enabling intergenerational learning and youth participation in farming practices.



Source: Authors' own work

Figure 8: Social Learning Processes within the Community of Practice of Farmer Groups

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5.2 Linking KM Practices and Regenerative Outcomes

Youths' role in the transfer and development of knowledge positively influences the motivation, confidence, and long-term participation in agriculture. Previous research suggests that interpersonal knowledge networks, such as those seen in the Caribbean, increase farmer-to-farmer exchange, offer social services, and provide opportunities to be more innovative, which develops self-efficacy among young farmers (Saint Ville, Hickey and Phillip, 2017). The Ghana case shows that the involvement of young people in knowledge networks among farmers leads to adaptability, development of leadership qualities, and an increased sense of belonging within farming communities (Cadger *et al.*, 2016). This learning experience in the form of study tours and benchmarking exercises can also boost the eagerness of the youth, as it opens up to them the current practices and effective agricultural examples. This exposure enhances their level of awareness of the possibilities in agriculture and their determination to embrace new practices. Mentorship among the young and senior farmers also comes out as one of the most important mechanisms. Mentorship leads to curiosity, skill-building, and reciprocal learning, which are identified with the benefit of both the mentor and the mentee (Burgess, van Diggele and Mellis, 2018; Byars-Winston and Dahlberg, 2019). The interaction in an agricultural setting enhances applied learning and promotes innovation and intergenerational continuity. These three KM practices, when combined, empower young farmers, contribute to farm regeneration, and significantly influence motivation, capability, and commitment across generations.

5.3 Supporting and Hindering Factors in KM Practices for Farm Regeneration

This study outlines some of the enablers of youth farmer regeneration, such as a supportive environment that facilitates intergenerational collaboration through mentoring. Young people's confidence and skills in agriculture improve knowledge management and decision-making. Capacity and continuity in farming practices are guaranteed by leadership opportunities. *Gotong royong* is the concept that supports mutual co-operation and the transmission of culture. Also, young farmers have access to agricultural land where they can use their knowledge in practice and ensure the sustainability of their contributions to the agricultural economy. A combination of these aspects reinforces the continuity of knowledge and involvement of the youth in agricultural societies.

This study presents several measures that prevent the rejuvenation of young farmers. To begin with, there exists a lack of understanding of indigenous knowledge among younger farmers, who underestimate the traditions of the older generations. Also, elderly farmers have a poor understanding of modern agricultural challenges, including climate change and modernised pest control, which influence the mentoring of young farmers. Lastly, limited access to farmland is a major problem for young farmers, which hinders their practical learning and innovation. These aspects suggest finding strategies that combine traditional and modern knowledge and ensure that the resources are accessed without giving preference to a particular group, for sustainable regeneration.

6. Conclusion

The results show that knowledge management practices within farmer groups can regenerate young farmers when practised with local youth participation. By identifying, developing, sharing, and applying knowledge, farming communities sustain agricultural knowledge and create intergenerational learning spaces that foster enthusiasm for farming and knowledge acquisition. The research finds that a collaborative environment, youth leadership, and cooperation are key factors that promote younger generation participation. However, generational differences in perceptions of local knowledge, poor adaptation among older farmers to current agricultural problems, and land inaccessibility remain significant barriers to regeneration. Hence, this research study can be added to theoretical knowledge management and the regeneration of young farmers, as well as give practical implications for policymakers and stakeholders on how to empower the younger generation and maintain knowledge across generations as a means of resilience in agricultural systems. The theoretical and practical implications of the findings of this study are also concrete.

This work contributes to community-based KM by showing that KM processes - identification, acquisition, development, sharing, preservation and utilisation - are social systems organising youth involvement and intergenerational continuity in farming communities. Farmer regeneration emerges from thriving community KM systems, not merely from economic stimuli or policy interventions. The paper highlights indigenous, tacit, and culturally embedded knowledge (*selapanan, pranoto mongso,* and experiential learning) as strategic resources, enhancing KM theory that emphasised formal knowledge. The results demonstrate how community leadership, mentoring networks, and youth-based practices sustain collective learning and the transfer of agricultural knowledge.

These results, as a practical implication, emphasise the importance of village governments, agricultural institutions, and other stakeholders in enhancing the inclusive and accessible knowledge-dissemination systems among the younger generation. These not only guarantee the sustainability of intergenerational knowledge transfer, but they also foster active participation of youth in the agricultural sector through the provision of information, training and mentoring that are applicable to them.

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Ethics Statement: Ethics approval was not required under the applicable institutional guidelines. The study involved non-invasive qualitative data collection, participation was voluntary, participants were informed about the purpose of the study, and the confidentiality of responses was maintained.

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Appendix 1: Interview Guide and Question Items

A. Interview Section: Opening

A.1. Dimension/Focus: Respondent's Profile and Context
Interview questions/items:
May I know your name and age? Then, could you tell me how you first got involved in farming here (including in the farmers' group)?
Could you describe your daily activities in this village? (What kind of farmer are you, and how long have you been farming? What are you currently growing)
Are you a member of a farmers' group here? If so, how long have you been a member (name of the group and your role)?
How many young farmers are members of the farmers' group you belong to?
What are your views on the involvement of the younger generation in agricultural activities in this village/farmers' group? (enthusiastic/other perspectives)

B. Interview Section: Main Body

B.1. Dimension/Focus: Knowledge Identification
Interview questions/items:
Where do you or the members of the farmers' group usually gain new agricultural knowledge or skills (how do you identify and where do you get farming knowledge)?
What sources of knowledge do you consider important in daily farming practice/learning (do young farmers also make use of those sources)?
In your opinion, what can be considered as knowledge within this farmers' group? Why is it important for (members of) the group to know the expertise of its members?
In the farmers' group you are a part of, how do you usually encourage young people to learn or seek knowledge about agriculture?
If young people are invited to seek agricultural knowledge, can this make them more enthusiastic to get involved/participate in agriculture as well?

B.2. Dimension/Focus: Knowledge Acquisition
Interview questions/items:
How does the farmers' group acquire knowledge from its members?
For young farmers in the group, how do they usually gain knowledge from other members or from more senior farmers?
From where do members of the farmers' group usually learn new things about agriculture?
Are young people here usually active in learning new things in agriculture? And do they usually like to ask questions, practice directly, or just observe?
Where does new knowledge or information acquired usually come from?

B.3. Dimension/Focus: Knowledge Development
Interview questions/items:
Is there further development from the knowledge that has been obtained?
How is new or acquired knowledge developed, either individually or together?
Do young people here also try out new methods or create innovations from the knowledge they have previously acquired in agriculture? Could you share an example?
How does the farmers' group support young people so they become more skilled? Do senior farmers also help in the creation of new knowledge?
Are young people given the opportunity to participate in developing knowledge in this group? Are they free to create and find their own solutions?
B.4. Dimension/Focus: Knowledge Sharing
Interview questions/items:
Based on your experience and that of members of the farmers' group, how is agricultural knowledge usually shared among farmers in this group?

Is it through special records/documents or more through storytelling and direct conversation? Do young people here learn directly from senior farmers? And what does the interaction process usually look like? Are there special activities or meetings for exchanging knowledge among farmers in the group? And do young people usually participate? How often are these activities held? In your opinion, does the knowledge shared in the farmers' group make young people more interested in becoming farmers/participating in agricultural activities?

B.5. Dimension/Focus: Knowledge Preservation
Interview questions/items: How can agricultural knowledge from senior farmers be preserved when they are no longer actively farming? Are there specific ways for young people to learn agricultural knowledge? Could you describe the habits usually practised to ensure knowledge is maintained? In your opinion, how important is it to pass down or record agricultural knowledge for the younger generation, so they can continue the group's/local knowledge?

B.6. Dimension/Focus: Knowledge Use
Interview questions/items: What is the knowledge gained in the farmers' group usually applied/used for? Are there joint programs or activities utilising the new knowledge? Can young people here try to use that knowledge themselves? How is their enthusiasm in practising/using the knowledge from the group? To what extent does this experience help young people become more independent or innovative as farmers? What usually motivates farmers, especially young people, to want and be enthusiastic about using knowledge from the farmers' group?

C. Interview Section: Closing/Conclusion

C.1. Dimension/Focus: Reflection (closing)
Interview questions/items: In your opinion, what are the biggest challenges for encouraging young people to want to engage in farming and learn agricultural knowledge (supporting & hindering factors)? What is your opinion about the role of knowledge that has been identified, created, developed, preserved, shared, and used in encouraging youth involvement in agriculture? Is there anything else you would like to convey about agricultural knowledge and the next generation of young farmers in this village?

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High Performance Work Systems and Innovative Work Behavior: The Mediating Role of Knowledge Sharing in Vietnam's Logistics Sector

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Abstract: This study examined how high-performance work systems (HPWSs) shape employees' innovative work behaviour through knowledge sharing in Vietnam's logistics sector. Building on the knowledge-based view, knowledge management literature, and the ability–motivation–opportunity (AMO) framework, we developed and tested a model in which HPWSs influence innovative work behaviour indirectly via knowledge sharing at the individual level of perception. A quantitative survey of 782 employees in Vietnam's logistics sector was conducted, and the data were analysed using structural equation modelling (SEM). The results indicate that HPWSs significantly enhance employees' willingness to share knowledge, and in turn, knowledge sharing strongly promotes innovative work behaviour. However, the direct effect of HPWSs on innovative work behaviour was not significant, which suggests that supportive human resource management (HRM) practices alone do not inherently foster innovation unless employees actively engage in knowledge sharing and application. Mediation analysis confirmed that knowledge sharing fully mediates the relationship between HPWSs and innovative work behaviour. These findings suggest that supportive HRM practices do not automatically foster innovation unless they activate knowledge-sharing processes among employees. The study contributes to the knowledge management literature by conceptualising knowledge sharing as a core transformation mechanism that converts HRM-enabled organisational conditions into innovative work behaviour. It also links strategic HRM and knowledge-based perspectives by showing that HPWSs become valuable for innovation when they facilitate the exchange, recombination and application of employee knowledge. The findings suggest that logistics managers should align HPWSs with practices and routines that encourage knowledge sharing and cross-functional knowledge exchange.

Keywords: High-performance work systems, Knowledge sharing, Innovative work behaviour

1. Introduction

Knowledge sharing is widely recognised as a central process in knowledge management that enables the transfer, integration, and recombination of knowledge across organisational members (Wang and Noe, 2010, Foss, Husted and Michailova, 2010, Serenko and Bontis, 2016). From the perspective of the knowledge-based view of the firm (KBV) (Grant, 2002), knowledge constitutes a strategic organisational resource, but its value depends on the extent to which it can be mobilised, exchanged, and applied within organisational systems. In this sense, knowledge sharing is not merely an interpersonal behaviour; rather, it represents a core knowledge process through which dispersed individual expertise is transformed into collective insight, problem-solving capacity, and innovation-related outcomes. Through knowledge sharing, employees access diverse expertise, refine insights, and transform dispersed knowledge into innovative ideas and practices. Empirical research consistently shows that knowledge sharing enhances organisational learning and facilitates innovative outcomes at both the individual and organisational levels (Radaelli et al., 2014, Le and Lei, 2019, Akram et al., 2020). However, while the positive consequences of knowledge sharing are well established, less clarity exists regarding the structural organisational conditions that systematically enable sustained knowledge sharing behaviours (Kianto, Sáenz and Aramburu, 2017).

Recent scholarship has begun to consider the broader systems that shape knowledge processes. High-performance work systems (HPWSs), which are designed to enhance employees' abilities, motivation, and opportunities (Jiang et al., 2012, Appelbaum, 2000), have been linked to innovation and performance outcomes. However, existing studies have primarily treated HPWSs as direct predictors of innovation, rather than as structural enablers of core knowledge processes. Furthermore, knowledge sharing research often emphasises individual or relational drivers, leaving the integration of human resource management system configurations and knowledge processes underdeveloped.

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Addressing this gap, this study examined whether HPWSs foster innovative work behaviour through the mediating role of knowledge sharing among employees in Vietnam's logistics industry. By positioning knowledge sharing as the central knowledge management mechanism and HPWSs as an antecedent organisational enabler, this research advances the knowledge-based view of the firm and the knowledge management processby clarifying the knowledge-based pathway through which human resource management systems shape employee innovation.

2. Literature Review and Hypotheses

2.1 Knowledge Sharing

Knowledge sharing plays an important role in how organizations use what their members know to solve problems, improve work practices, and sustain performance over time. It is commonly understood as a social process through which employees exchange experiences, skills, insights, and work-related expertise (Yeboah, 2023, Castaneda and Cuellar, 2020). This view suggests that knowledge sharing should not be understood simply as the transfer of information from one person to another. Rather, it is an ongoing interaction that depends on employees' willingness to contribute what they know and to seek knowledge from others when facing work-related challenges. In this sense, knowledge sharing involves both knowledge donating and knowledge collecting, and its value lies in its capacity to turn individual knowledge into a resource that can be used collectively (Lin, 2007, Nguyen, Siri and Malik, 2022).

The effectiveness of knowledge sharing also depends on the kind of knowledge being exchanged. Explicit knowledge, such as formal procedures, reports, or documented guidelines, can usually be communicated through written language and organizational systems. Tacit knowledge, by contrast, is more personal and experience-based, and is therefore harder to articulate and transfer (Smith, 2001). This distinction is important because tacit knowledge often requires richer forms of interaction, such as face-to-face communication, mentoring, or informal discussion, where trust and mutual understanding can develop (Trong Tuan, 2012, Hau et al., 2013). In addition, employees may benefit from knowing not only what knowledge exists, but also who possesses particular expertise within the organization.

Prior studies have shown that knowledge sharing is shaped by both individual and organizational conditions (Yeboah, 2023). At the individual level, employees are more likely to share knowledge when they trust their colleagues, expect reciprocity, or believe that sharing will enhance their reputation and professional standing (Zhang and Jiang, 2015, Anand, Walsh and Moffett, 2019). At the organizational level, knowledge sharing is supported by open communication, supportive leadership, top management commitment, flexible structures, HRM practices and ICT technologies that make knowledge easier to access and disseminate (Podrug, Filipović and Kovač, 2017, Jeong, Lee and Kim, 2024). However, these conditions do not automatically guarantee sharing. Highly centralized structures, excessive control, weak interpersonal ties, or a lack of psychological safety may discourage employees from sharing what they know, particularly when the knowledge is tacit or strategically valuable. Under such conditions, employees may become more inclined toward knowledge hoarding and knowledge hiding (Oliveira, Curado and De Garcia, 2021).

When organizations create conditions that encourage employees to share knowledge, knowledge sharing can contribute to valuable organizational outcomes. It contributes not only to financial performance, such as profitability, market growth, and long-term viability, but also to non-financial outcomes, especially innovation capability (Yeboah, 2023). By allowing employees to combine different perspectives and experiences, knowledge sharing helps organizations generate new ideas, improve existing products and processes, and respond more effectively to complex problems. Nevertheless, the literature still pays more attention to the factors that enable knowledge sharing than to the barriers that prevent it. Less is also known about how different types of knowledge support different competencies across markets and organizational contexts (Santhose and Lawrence, 2023). Accordingly, greater attention is needed to the context-specific nature of knowledge sharing, especially in logistics, where the value of distributed operational knowledge depends on organizational conditions that facilitate its exchange as well as on the barriers that may lead employees to retain or conceal what they know (Pfohl, 2023).

2.2 Theoretical Background

From the knowledge-based view, knowledge is a strategically significant resource because it is embedded in individuals, routines, relationships, and organisational systems, and is therefore difficult to imitate or substitute (Grant, 2002). Yet knowledge creates value not through possession alone, but through a firm's capacity to mobilise, integrate, and apply dispersed expertise to problems and opportunities (Kogut and Zander, 1992,

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Grant, 2002). This logic is central to employee innovation, since innovative work behaviour requires employees to access, recombine, and use knowledge in novel and useful ways. Knowledge sharing therefore functions as a key micro-foundation through which individual knowledge is converted into innovation-relevant resources (Chatterjee, Chaudhuri and Vrontis, 2022).

Complementing the KBV, the knowledge management process explains how knowledge becomes valuable within organizations. Knowledge management comprises interrelated processes of knowledge creation, acquisition, storage, access, dissemination, conversion, application, and protection (Antunes and Pinheiro, 2020, Kalpič and Bernus, 2006, Alavi and Leidner, 2001). Importantly, these processes cannot be reduced to technological repositories, because knowledge is created, interpreted, shared, and applied by human actors (Yeboah, 2023). As much organisational knowledge resides in individuals, knowledge sharing enables employees to externalise expertise, exchange experience, combine tacit and explicit insights, and transform individual knowledge stocks into collective knowledge flows (Nonaka, 1994, Antunes and Pinheiro, 2020). To ensure that knowledge management processes operate proactively and continuously, organisations increasingly invest in integrated HRM practices. HRM and knowledge management are therefore complementary because HR practices shape employees' skills, motivation, and behaviours, while employees remain the primary carriers and users of organisational knowledge (Minbaeva, Foss and Snell, 2009). Through the Ability–Motivation–Opportunity framework (Appelbaum, 2000), HR practices integrated into HPWSs enhance employees' ability to articulate know-how, strengthen their motivation to contribute knowledge, and provide opportunities for interaction through teamwork, participation, empowerment, and information sharing (Jiang et al., 2012, Bos-Nehles et al., 2023). Because knowledge sharing is effortful and context-dependent, such systems reduce perceived costs, support trust, and reinforce collective benefits (Razmerita, Kirchner and Nielsen, 2016, Siachou et al., 2021). Thus, HPWSs promote knowledge sharing as the mechanism through which human resource investments are translated into organisational knowledge flows and innovative work behaviour at the employee level within organisations.

2.3 HPWSs and Knowledge Sharing

HPWSs refer to coherent bundles of human resource practices designed to enhance employees' ability, motivation, and opportunity to contribute, typically through staffing and training systems, performance management and rewards, and participative work design (Huselid, 1995, Sun, Aryee and Law, 2007). In organisational settings, this matters because knowledge sharing is rarely automatic; knowledge flows can be fragile when withholding occurs, and employees' participation depends on whether the organisational arrangements reduce perceived costs and risks while increasing expected benefits (Razmerita, Kirchner and Nielsen, 2016, Siachou et al., 2021). By combining development practices, supportive performance management and rewards, and participative work design, HPWSs can lower barriers to exchange and build relational conditions (e.g. trust, cohesion, and social connections) that support effective internal knowledge flows (Evans and Davis, 2015, Mooradian, Renzl and Matzler, 2006, Cabrera, Collins and Salgado, 2006). Empirical evidence also links HPWSs to improved knowledge sharing and integration across units, as employees are encouraged to connect, exchange, and combine their knowledge resources (Bhatti et al., 2021, Michaelis, Wagner and Schweizer, 2015). Thus, by improving ability, motivation, and opportunity through specific human resource practices, HPWSs create the optimal conditions for knowledge sharing within organisations. Consequently, the following hypothesis is formulated:

H1: High-performance work systems positively influence knowledge sharing.

2.4 Knowledge Sharing and Innovative Work Behaviour

Innovative work behaviour refers to employees' intentional efforts to generate, promote, and implement new ideas in their work roles (Janssen, 2000, De Jong and Den Hartog, 2010). Because these processes require both new inputs and coordination with others, innovative work behaviour is difficult to sustain when employees rely only on their own experience or information from immediate coworkers. Knowledge sharing plays a core enabling role because it increases employees' access to diverse and non-redundant knowledge, supports the recombination of internal and external insights into novel solutions, and helps employees mobilise support to move their ideas forward (Popadiuk and Choo, 2006, Koruna, 2004). Beyond idea generation, knowledge sharing is also critical for the later stages of innovative work behaviour: during idea promotion, employees must translate and communicate ideas in a convincing way to different audiences (Caniëls, De Stobbeleir and De Clippeleer, 2014), and during idea implementation, to routinise the innovation in practice, they often need to integrate and coordinate different types of information across teams (Tucker, Nembhard and Edmondson, 2007). In this sense, knowledge sharing activates the type of cognitive elaboration processes that help

employees refine understanding and mobilise innovative behaviour. Recent empirical research has consistently found that employees who engage more actively in knowledge sharing exhibit more innovative work behaviour, including stronger idea generation and implementation (Pian, Jin and Li, 2019, Kmieciak, 2021, Wang et al., 2021, Arain et al., 2020). Thus, the following hypothesis is presented:

H2: Knowledge sharing positively influences innovative work behaviour.

2.5 HPWSs and Innovative Work Behavior

HPWSs can encourage employees' innovative work behaviour because they reflect a deliberate organisational investment in people through a coordinated set of human resource practices that shape what employees are able, willing, and enabled to do at work. When employees experience strong HPWSs, they are more likely to feel they have the ability to innovate, the motivation to invest effort in new ideas, and the opportunity to act. This logic is consistent with AMO-based evidence that human resource systems can be organised into ability-, motivation-, and opportunity-enhancing dimensions (Jiang et al., 2012). It is also consistent with research showing that employees' interpretations of HPWSs matter, because human resource systems send signals that shape employees' attitudes and discretionary contributions (Van De Voorde and Beijer, 2015). When employees perceive these human resource investments as supportive rather than purely control-oriented, they are more likely to reciprocate with extra-role contributions, such as proposing and implementing improvements (Kim, Kwon and Jung, 2023). Empirically, prior studies consistently report a positive association between HPWSs and innovative work behaviour (Arshad, Hassan and Azam, 2024, Escribá-Carda, Balbastre-Benavent and Canet-Giner, 2017, Ahmed et al., 2018, Do and Shipton, 2019). Thus, the following hypothesis is proposed:

H3: High-performance work systems positively influence innovative work behaviour.

2.6 The Mediating Role of Knowledge Sharing

From a knowledge management perspective, HPWSs are designed to strengthen employees' ability, motivation, and opportunity, but these resources translate into innovative work behaviour only when they are activated through knowledge flows in daily work. Knowledge sharing is the key conversion mechanism because it moves dispersed individual know-how into collective use, enabling others to access, integrate, and recombine knowledge for problem-solving and improvement purposes. This matters because knowledge exchange is effortful and context-dependent: employees participate more when the context reduces perceived costs and risks and increases expected benefits, whereas withholding behaviours can emerge when those conditions are absent (Razmerita, Kirchner and Nielsen, 2016). When knowledge exchange is constrained, innovation suffers. For example, evidence shows that supervisors' knowledge hiding reduces subordinates' innovative work behaviour partly through lower self-efficacy, which suggests that restricted knowledge access undermines confidence to innovate (Arain et al., 2020). Conversely, when knowledge sharing occurs, it supports both idea generation and implementation by broadening employees' access to diverse inputs and facilitating coordination, which suggests that different sharing behaviours relate to different stages of innovative work behaviour (Pian, Jin and Li, 2019). Therefore, knowledge sharing is necessary to carry the influence of HPWSs from strengthened AMO conditions into employees' innovative actions (Ahmed et al., 2018, Bhatti et al., 2021). Therefore, the following hypothesis is suggested:

H4: Knowledge sharing mediates the relationship between HPWSs and innovative work behaviour.

Based on the above discussion, the proposed theoretical model is presented in Figure 1:

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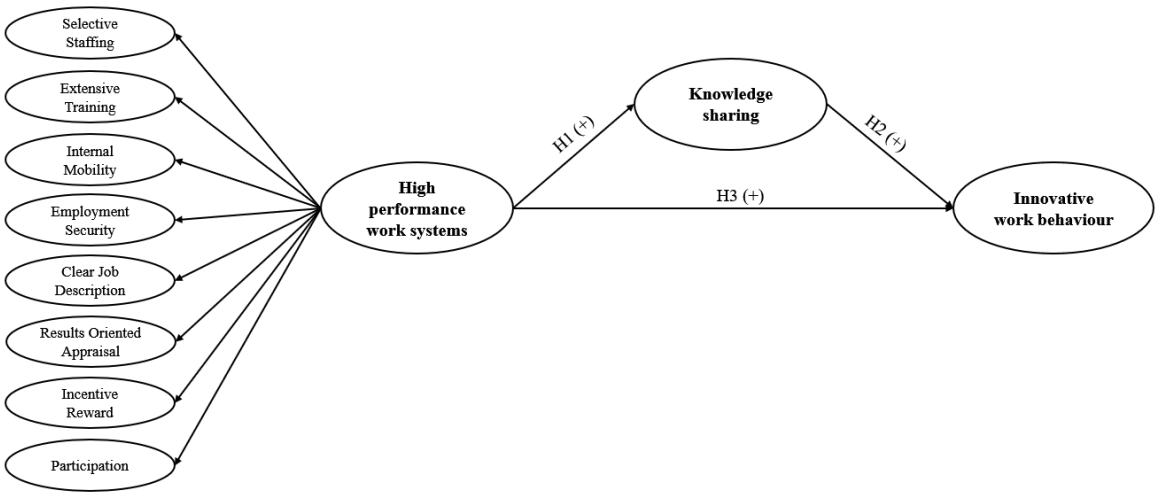


Figure 1: Research model (Source: authors' own)

3. Methodology

3.1 Sample and Data Collection

In this study, a quantitative approach was adopted to examine the research hypotheses. The data were collected through a structured questionnaire, with measurement scales adapted from prior validated studies to ensure the reliability and validity of the instrument. Stratified sampling was utilised to ensure that the sample represented the logistics industry in Vietnam (Groves et al., 2009). The sample proportions were based on official statistics from Vietnam's Ministry of Industry and Trade (2023) and General Statistics Office, as of 31 December 2021. Within each group, respondents were randomly selected from logistics firms to participate in the survey.

The questionnaire was developed in English based on validated measurement scales from prior studies and then translated into Vietnamese by two lecturers in the business field. To enhance linguistic accuracy and conceptual equivalence, the Vietnamese version was subsequently back-translated into English. To ensure consistency and content validity, both versions were then reviewed by two lecturers and a manager in the logistics and supply chain sector, following recommended translation procedures (Bracken and Barona, 1991). The finalised questionnaire was distributed directly via the alumni network of the university where the authors are affiliated, targeting alumni currently employed in the logistics sector. All the participants received clear information about the study's objectives and procedures, and their rights, including the right to withdraw at any time without consequences. Written informed consent was obtained prior to participation. To address ethical requirements, the study maintained strict confidentiality and anonymity procedures: no identifying information was collected for analysis, the participants' responses were securely stored, and the data were used solely for research purposes. After collection, the completed questionnaires were screened for completeness and response consistency before being included in the final dataset.

A total of 782 respondents, representing multiple departments in Vietnam's logistics industry, were analysed. Most of the respondents had a university degree (80.8%) as their highest level of education, followed by an intermediate or college-level diploma (10.2%), or a postgraduate qualification (8.6%). The dominant occupational groups were business and market development (21%), information and data management (11.6%), and import/export documentation and customs clearance (9.1%). In terms of work experience, 42.8% had been employed for 3–5 years and 36.4% for 1–3 years, indicating a relatively stable and experienced workforce. Most participants reported their monthly income as 10–50 million VND. These demographic features reflect the sector's demand for highly qualified and experienced professionals and support the sample's suitability for advanced statistical analysis (Hair et al., 2019, Tabachnick, Fidell and Ullman, 2018).

3.2 Measures

All the construct measures employed a 7-point Likert scale, ranging from 1 (strongly disagree) to 7 (strongly agree).

HPWSs were measured using a multidimensional scale adapted from Sun, Aryee and Law (2007), which comprises eight human resource management practice bundles: selective staffing (SS1 – SS4), extensive training

(ET1 – ET4), internal mobility (IM1 – IM5), employment security (ES1 – ES2), clear job description (JD1 – JD3), results-oriented appraisal (RO1 – RO3), incentive reward (IR1 – IR2), and participation (PA1 – PA3). Cronbach's alpha = 0.910.

Knowledge sharing was measured using an 8-item scale developed by Van Den Hooff and De Ridder (2004). Cronbach's alpha = 0.921. This scale captures two key dimensions: knowledge donating, which reflects the act of providing one's knowledge to others (KS1 – KS4), and knowledge collecting, which involves seeking and acquiring knowledge from colleagues (KS5 – KS8).

IWB was measured using a 10-item scale developed and validated by De Jong and Den Hartog (2010). Cronbach's alpha = 0.940.

3.3 Data Analysis

Several tests were conducted to examine our proposed model. Descriptive statistics were used to assess the demographic characteristics and general nature of the data. The reliability of the measurement scales was evaluated using Cronbach's alpha. An exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) were then conducted to assess the factor structure and model fit, while convergent and discriminant validity were also examined. To test the hypotheses and estimate the direct and indirect effects, structural equation modelling (SEM) was performed using AMOS.

4. Findings

4.1 Exploratory Factor Analysis (EFA)

EFA was used to assess the underlying structure of the measurement scales. The EFA results and scale reliability are summarised in Table 1. The EFA results showed that the Kaiser–Meyer–Olkin (KMO) measure of sampling adequacy was 0.948, which indicated that the data had excellent suitability for factor analysis. Bartlett's Test of Sphericity was significant (p = 0.000), confirming that the correlation matrix was not an identity matrix and that the dataset was appropriate for factor extraction. Ten factors were extracted with eigenvalues greater than 1, which collectively accounted for 69.91% of the total variance. This value was well above the commonly accepted minimum threshold of 50% for social science research (Hair et al., 2019), and demonstrated that the extracted factors adequately represented the underlying structure of the dataset. The factor loadings for all the retained items were above 0.4, providing strong item reliability and substantial contributions of the observed variables to their respective latent constructs (Nunnally and Bernstein, 1994). Moreover, the items loaded cleanly onto their intended factors without significant cross-loadings, indicating a clear and consistent measurement structure.

Overall, these findings provided robust evidence of the measurement model's internal consistency and construct validity. Consequently, all the items were retained for subsequent analyses.

Table 1: Exploratory factor analysis results

	IWB	DONA	COL	IM	ET	SS	JD	PA	RO	IR	ES
IWB3	0.839										
IWB8	0.836										
IWB9	0.802										
IWB10	0.797										
IWB1	0.784										
IWB2	0.773										
IWB6	0.762										
IWB5	0.741										
IWB7	0.736										
IWB4	0.711										
KS7		0.873									
KS8		0.667									
KS5		0.576									

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	IWB	DONA	COL	IM	ET	SS	JD	PA	RO	IR	ES
KS6		0.546									
KS2			0.786								
KS1			0.436								
KS4			0.429								
KS3			0.396								
IM1				0.792							
IM5				0.788							
IM2				0.768							
IM4				0.758							
IM3				0.690							
ET3					0.812						
ET4					0.810						
ET1					0.774						
ET2					0.759						
SS3						0.827					
SS2						0.791					
SS1						0.758					
SS4						0.721					
JD2							0.837				
JD3							0.792				
JD1							0.742				
PA2								0.790			
PA1								0.779			
PA3								0.766			
RO1									0.873		
RO2									0.769		
RO3									0.693		
IR1										0.849	
IR2										0.691	
ES1											0.770
ES2											0.671

Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO)	0.948
Sig. of Bartlett's Test of Sphericity	0.000
Cumulative %	69.909
Eigenvalues	1.076

Note: ***N = 782***

4.2 Confirmatory Factor Analysis (CFA)

CFA was used to validate the measurement model. The results in Table 2 demonstrate that the model achieved a good fit to the data, as indicated by multiple fit indices: $\chi^2(889) = 1414.916$ ($p < 0.001$), $\chi^2/df = 1.592$, GFI = 0.925, TLI = 0.971, CFI = 0.973, RMSEA = 0.028. These values meet or exceed commonly accepted thresholds (CFI/TLI > 0.90, RMSEA < 0.06), supporting the adequacy of the measurement model (Hair et al., 2019, Hu and Bentler, 1999).

Table 2: The CFA goodness-of-fit statistics for the final models

Test	Acceptable cut - off value	Tested value for final model
Absolute Fit Measures		
Chi-Square		1414.916
P-value	< 0.001	0.000
Chi-Square/df	< 3	1.592
GFI	> 0.9	0.925
CFI	> 0.9	0.973
TLI	> 0.9	0.971
RMSEA	< 0.08	0.028

Table 3 reports the standardised regression weights (factor loadings) and associated significance levels for the observed variables within the measurement model. All the observed indicators loaded significantly onto their respective latent constructs, as evidenced by p-values consistently below 0.001 (***). These results, along with elevated critical ratio (CR) values, indicate that the relationships between the observed indicators and their associated constructs were robust and not due to random sampling variation (Hair et al., 2019).

Most items displayed loadings above the commonly recommended threshold of 0.70, which provides strong support for the convergent validity of the constructs. For instance, KS8 (0.828), ET4 (0.822), and SS1 (0.819) showed particularly high associations with their respective latent variables. Several items, such as ES1 (0.684) and IR1 (0.711), had slightly lower loadings. However, these values are acceptable within the context of social sciences research, especially when dealing with multidimensional constructs or newly refined scales (Fornell and Larcker, 1981).

Overall, these findings confirm that the items represented their intended constructs well, thereby supporting the reliability and convergent validity of the measurement model.

Table 3: Regression weights and factor loadings for measurement items

Latent Construct	Item		Factor loading	S.E.	C.R.	p-value	Latent Construct	Item		Factor loading	S.E.	C.R.	p-value
Knowledge sharing (KS)	DONA	KS1	0.778	–	–	–	High performance work system (HPWSs)	SS	SS3	0.806	–	–	–
		KS2	0.733	0.042	21.539	***			SS2	0.771	0.042	22.439	***
		KS3	0.758	0.044	22.442	***			SS1	0.819	0.038	23.970	***
		KS4	0.727	0.044	21.335	***			SS4	0.724	0.043	20.870	***
	COL	KS5	0.784	–	–	–		ET	ET3	0.807	–	–	–
		KS6	0.797	0.041	21.539	***			ET4	0.822	0.048	24.459	***
		KS7	0.809	0.041	22.442	***			ET1	0.758	0.040	22.207	***
		KS8	0.828	0.044	21.335	***			ET2	0.787	0.040	23.261	***

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Innovative work behaviour (IWB)	IWB	IWB6	0.792	–	–	–		IM	IM1	0.749	–	–	–
		IWB7	0.768	0.039	23.754	***			IM2	0.755	0.047	20.505	***
		IWB8	0.804	0.041	25.221	***			IM5	0.800	0.05	21.738	***
		IWB9	0.794	0.041	24.781	***			IM4	0.779	0.046	21.152	***
		IWB10	0.796	0.046	24.873	***			IM3	0.721	0.048	19.532	***
		IWB5	0.745	0.041	22.854	***		ES	ES1	0.684	–	–	–
		IWB4	0.743	0.045	22.755	***			ES2	0.788	0.111	12.142	***
		IWB1	0.752	0.04	23.118	***		JD	JD2	0.843	–	–	–
		IWB2	0.783	0.037	24.333	***			JD3	0.794	0.048	22.120	***
		IWB3	0.839	0.046	26.691	***			JD1	0.733	0.041	20.662	***
								RO	RO1	0.807	–	–	–
									RO2	0.776	0.045	21.449	***
									RO3	0.791	0.049	21.804	***
								IR	IR2	0.887	–	–	–
									IR1	0.711	0.046	15.440	***
								PA	PA2	0.783	–	–	–
									PA1	0.783	0.049	19.642	***
									PA3	0.744	0.06	20.82	***

Note: All factor loadings are standardised estimates; All p-values (***) indicate significance at $p < 0.001$.

Table 4 presents the composite reliability (CR) and average variance extracted (AVE) for all the constructs, adhering to the Fornell and Larcker (1981) criterion. There was strong evidence of convergent validity across the measurement model. Specifically, all the constructs revealed CR values above the recommended threshold of 0.70, confirming adequate internal consistency and reliability for each latent construct (Hair et al., 2019).

Regarding the AVE values, the majority of the constructs exceeded the commonly accepted threshold of 0.50, indicating that each construct accounted for an adequate level of variance explained by its measurement items. Two exceptions were the two dimensions of knowledge sharing – knowledge donating (AVE = 0.562) and knowledge collecting (AVE = 0.647) – which slightly fell below ideal discriminant standards when compared against their squared correlations with other constructs. Nevertheless, both constructs retained high CR values (0.896 and 0.880, respectively), and their item loadings were significant, which supports their retention in models involving multidimensional constructs within social science research contexts (Fornell and Larcker, 1981).

Discriminant validity was also demonstrated. For most constructs, the square root of the AVE exceeded the inter-construct correlations, suggesting that each construct was more closely associated with its own indicators than with those of other constructs. The only notable exception was the association between knowledge donating (√AVE = 0.750) and knowledge collecting (√AVE = 0.805), where the intercorrelation (0.966) surpassed both AVE square roots. This high correlation is theoretically plausible given that both constructs represent dimensions of knowledge sharing and, in practice, are often conceptually intertwined.

In sum, the results presented in Table 4 offer support for the convergent and discriminant validity of the measurement model, confirming the suitability of the constructs for subsequent structural equation modelling.

Table 4: Convergent and Discriminant Validity

	CR	AVE	MSV	MaxR (H)	IM	ET	SS	JD	PA	RO	IR	ES	DONA	COL	IWB
IM	0.873	0.579	0.208	0.875	**0.761**										
ET	0.872	0.630	0.243	0.874	0.441***	**0.794**									
SS	0.862	0.610	0.279	0.866	0.332***	0.427***	**0.781**								
JD	0.834	0.626	0.252	0.842	0.359***	0.307***	0.417***	**0.791**							
PA	0.825	0.612	0.224	0.829	0.388***	0.407***	0.384***	0.315***	**0.782**						
RO	0.834	0.626	0.252	0.835	0.456***	0.433***	0.431***	0.502***	0.460***	**0.791**					
IR	0.784	0.648	0.280	0.830	0.358***	0.373***	0.467***	0.490***	0.352***	0.482***	**0.805**				

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	CR	AVE	MSV	MaxR (H)	IM	ET	SS	JD	PA	RO	IR	ES	DONA	COL	IWB
ES	0.704	0.544	0.246	0.715	0.302***	0.365***	0.400***	0.494***	0.353***	0.452***	0.426***	**0.738**			
DONA	0.837	0.562	0.934	0.838	0.388***	0.493***	0.527***	0.397***	0.473***	0.482***	0.518***	0.496***	**0.749**		
COL	0.880	0.647	0.934	0.881	0.371***	0.489***	0.520***	0.408***	0.433***	0.478***	0.529***	0.461***	0.966	**0.805**	
IWB	0.940	0.612	0.428	0.942	0.235***	0.222***	0.406***	0.222***	0.283***	0.238***	0.366***	0.271***	0.654	0.610***	**0.782**

The structural equation model demonstrated an adequate overall fit to the data, as indicated by the following fit indices: χ^2 = 1414.916, df = 889, χ^2/df = 1.592, GFI = 0.925, TLI = 0.971, CFI = 0.973, RMSEA = 0.028. All the indices met or exceeded the recommended thresholds (TLI, CFI > 0.90, RMSEA < 0.08), supporting the suitability of the model for hypothesis testing (Hair et al., 2019).

The results of the path analysis are presented in Table 5. Of the three hypothesised relationships, two were found to be statistically significant, offering partial support for the proposed structural model. Firstly, HPWSs exhibited a strong and significant positive influence on knowledge sharing (β = 0.744, p < 0.001), indicating that employees who perceived higher levels of HPWSs were more likely to engage in knowledge sharing. Secondly, knowledge sharing also showed a significant positive effect on innovative work behaviour (β = 0.705, p < 0.001), indicating that individuals who actively shared knowledge were more likely to demonstrate innovative work behaviour. In contrast, the direct effect of HPWSs on innovative work behaviour was not statistically significant (β = −0.083, p = 0.183).

Table 5: Results of the structural equation model

Hypotheses	Hypotheses path	B	β	SE	CR	p-value	Conclusion
H1	HPWSs ➔ KS	0.838	0.744	0.055	1	***	Supported
H2	KS ➔ IWB	0.715	0.705	0.063	2	***	Supported
H3	HPWSs ➔ IWB	-0.095	-0.083	0.073	0.5	0.183	Rejected

4.3 Mediation Effects of Knowledge Sharing

To assess the mediating role of knowledge sharing between HPWSs and innovative work behaviour, the bootstrapping approach was employed using AMOS. Bootstrapping is a nonparametric resampling procedure that avoids the assumption of normality in the sampling distribution (Preacher and Hayes, 2008). This method repeatedly draws resamples from the dataset to estimate indirect effects, thereby generating an empirical approximation of the distribution of a x b, which is subsequently used to build confidence intervals. In this study, the bootstrapping procedure was performed with 5000 resamples and a 90% confidence interval level (Mackinnon, Lockwood and Williams, 2004).

The results of the structural equation model (Table 5) indicated that HPWSs had a strong positive effect on knowledge sharing (β = 0.744, p < 0.001), and knowledge sharing significantly influenced innovative work behaviour (β = 0.705, p < 0.001). However, the direct effect of HPWSs on innovative work behaviour was not statistically significant (β = - 0.083, p = 0.183). Further evidence was provided through the mediation analysis

(Table 6). The indirect effect of HPWSs on innovative work behaviour via knowledge sharing was both positive and significant (β = 0.599, p = 0.001), with the bias-corrected confidence intervals (0.491–0.740) excluding zero, thereby confirming the mediating role of knowledge sharing. Consequently, H4 was accepted. This result indicates that, in this study, knowledge sharing fully mediated the relationship between HPWSs and innovative work behaviour.

Table 6: Mediation analysis for HPWSs, KS, and IWB

Hypotheses	Hypotheses path	Indirect estimate	Bias-corrected confidence intervals		P-value	Conclusion
			Lower	Upper		
H4	HPWSs➔KS➔IWB	0.599	0.491	0.74	0.001	Accepted

5. Discussion and Conclusion

Grounded in a knowledge management perspective, this study examined whether knowledge sharing served as the central mechanism through which HPWSs translated into employees' innovative work behaviour in Vietnam's logistics industry. First, the strong linkage between HPWSs and knowledge sharing reinforces the view that human resource systems shape the conditions under which knowledge flows emerge and stabilise (Bhatti et al., 2021, Michaelis, Wagner and Schweizer, 2015). As coherent bundles of ability-, motivation-, and opportunity-enhancing practices, HPWSs provide structural and relational infrastructures that reduce the perceived risks and opportunity costs associated with sharing. This aligns with the social dilemma perspective, which posits that employees engage in knowledge exchange when contextual arrangements minimise personal costs and strengthen expected collective benefits (Razmerita, Kirchner and Nielsen, 2016). It also resonates with evidence suggesting that knowledge hiding is sensitive to organisational antecedents and can undermine collective outcomes when structural support is weak (Siachou et al., 2021).

Second, the positive association between knowledge sharing and innovative work behaviour corroborates previous findings that knowledge exchange functions as a micro-foundation of innovation by expanding access to non-redundant expertise and enabling recombination and coordination (Pian, Jin and Li, 2019, Kmieciak, 2021, Wang et al., 2021). Knowledge sharing expands access to non-redundant expertise and facilitates recombination and coordination, which ultimately strengthens innovative work behaviour, especially when sharing occurs through both donating and collecting knowledge in ongoing work interactions (Pian, Jin and Li, 2019). This interpretation is also consistent with evidence that constrained knowledge flows undermine innovation-related behaviours; when knowledge is withheld, employees lose access to inputs that support confident experimentation and implementation, and innovative behaviour declines (Arain et al., 2020).

Third, the non-significant direct effect of HPWSs on innovative work behaviour departs from studies that report a straightforward positive relationship (Escribá-Carda, Balbastre-Benavent and Canet-Giner, 2017, Do and Shipton, 2019, Ahmed et al., 2018). However, rather than contradicting these studies, the present findings refine them. The full mediation pattern suggests that HPWSs contribute to innovative work behaviour only through the specific knowledge-flow channel they activate. In other words, HPWSs may strengthen employees' ability, motivation, and opportunity, but these resources remain potential rather than actual drivers of innovation unless they are mobilised through day-to-day knowledge exchange. Therefore, knowledge sharing operates as the key conversion mechanism that moves dispersed know-how into collective use and enables access, integration, and recombination for problem solving and improvement (Bhatti et al., 2021). Because knowledge exchange is effortful and context-dependent, employees share more when organisational conditions reduce perceived costs and risks and increase expected benefits; in contrast, unfavourable conditions can trigger withholding and knowledge hiding, which ultimately restrict knowledge access (Razmerita, Kirchner and Nielsen, 2016). Once activated, knowledge sharing supplies the diverse inputs and coordination needed for both idea generation and implementation, and different sharing behaviours can support different stages of innovative work behaviour (Pian, Jin and Li, 2019).

5.1 Theoretical Implications

The results of this research contribute to the knowledge-based view and knowledge management literature by reinforcing the view that knowledge is an important resource for innovation and that innovation depends on the knowledge created and shared within organizations. By examining employees in Vietnam's logistics industry, this study provides further evidence that knowledge sharing is important for innovative work behaviour in a context where employees need to coordinate information, experience, and operational know-how across different logistics activities (Pfohl, 2023). More importantly, the finding of full mediation suggests that

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knowledge sharing is the main process through which HPWSs influence innovative work behaviour. HPWSs can create favourable conditions by improving employees' ability, motivation, and opportunity to exchange knowledge, but these conditions alone do not directly lead to innovative work behaviour. Employees become more innovative when they actually share knowledge with others, combine different sources of knowledge, and apply this knowledge to solve problems and improve work processes. In this respect, this study conceptualises knowledge sharing as a core transformation mechanism that converts HRM-based organisational conditions into innovative action. This finding extends existing HRM, knowledge management, and innovation research by showing that the key issue is not only whether HPWSs are implemented, but also whether they are able to activate knowledge sharing among employees. Thus, the study adds to previous research by identifying knowledge sharing as the point at which HRM practices become useful for innovation. Without knowledge sharing, the effect of HPWSs on innovative work behaviour does not appear to materialise.

5.2 Pratical Implications

The full mediation pattern observed here means that, in Vietnam's logistics industry, HPWSs will translate into employee innovation only if they encourage employees to engage consistently in knowledge donating and knowledge collecting in day-to-day operations. Practically, managers should treat knowledge sharing as a core operational output of HPWSs, because it is the mechanism that makes dispersed operational know-how accessible for recombination and coordinated implementation, which is essential for innovative work behaviour in interdependent logistics processes.

First, HPWS design should be evaluated and adjusted through a knowledge-flow lens. Training and development should explicitly build employees' capacity to articulate tacit operational know-how, document lessons learned, and convert fixes into reusable guidance, while performance management should make knowledge contribution and knowledge seeking visible and rewarded, to ensure that sharing becomes part of normal performance, rather than discretionary extra work. At the work design level, firms should institutionalise structured interaction opportunities, where cross-functional knowledge can circulate during execution and exception handling. Evidence from a global logistics provider shows the practical value of deliberately addressing knowledge sharing practices as a work system issue, rather than leaving sharing to informal communication (Wong and Davison, 2018).

Second, managers should actively reduce the costs and risks that discourage knowledge exchange. Knowledge sharing requires time, effort, and trust, and employees are more likely to participate when perceived risks and opportunity costs are lowered (Razmerita, Kirchner and Nielsen, 2016). This is particularly important when the work environment in the logistics sector is time-pressured and error-sensitive, and employees may avoid sharing to protect themselves from blame or reputational loss (Pfohl, 2023). Practical actions include building psychologically safe norms for raising exceptions, discussing failures and clarifying reciprocity expectations, and making supervisor support visible in how leaders respond to questions, mistakes, and improvement suggestions.

Third, logistics firms should embed knowledge sharing into operational improvement routines so that shared knowledge consistently converts into implemented innovation. Because knowledge exchange facilitates recombination and coordination across innovation stages, organisations should institutionalise routines that turn dispersed know-how into actionable changes, such as structured after-action reviews for service failures, cross-team problem-solving huddles for recurring bottlenecks, and lightweight mechanisms to capture and reuse solutions across teams (Wang et al., 2021). This matters because constrained knowledge access can suppress innovative work behaviour, while active knowledge flows provide the inputs and confidence needed for experimentation and implementation (Arain et al., 2020).

5.3 Limitations and Future Research

This study has several limitations that should be considered in future research. First, the model focused on a single mediator, knowledge sharing, to explain how HPWSs relate to innovative work behaviour. Although this focus was theoretically aligned with knowledge management and strongly supported by the resulting full mediation pattern, future research can incorporate additional knowledge management mediators that capture later stages of the knowledge-to-innovation chain, such as knowledge integration, knowledge application, knowledge reuse, knowledge hiding, and absorptive capacity. Including multiple mediators would provide a more comprehensive account of how human resource management system configurations are converted into innovation through interconnected knowledge processes.

Second, the empirical context is limited to Vietnam's logistics industry. Logistics is theoretically appropriate due to operational interdependence and dispersed expertise, but the same mechanism may vary across industries

with different knowledge regimes and coordination demands. Future studies should replicate the model in other sectors and countries to examine whether the full mediation pattern holds under different institutional and technological conditions.

Third, the cross-sectional survey design limits causal inference. Future research could adopt multi-wave time-lagged designs and multi-source assessments of innovative work behaviour, such as supervisor ratings or objective improvement outcomes, to better capture the temporal sequence and reciprocity through which HPWSs shape knowledge sharing, and knowledge sharing subsequently shapes innovative behaviour.

AI statement: The authors declare that no generative artificial intelligence (AI) tools were used in the creation or preparation of this manuscript.

Ethics statement: This study employed anonymous self-administered questionnaires. Participation was entirely voluntary, and respondents completed the questionnaires based on their own willingness. Thus, it was not necessary to apply for ethical approval for research involving animal or human subjects.

Conflict of interest statement: The authors declare that they have no conflicts of interest associated with the publication of this research.

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Appendix: Measurement Items

1. HIGH-PERFORMANCE WORK SYSTEMS (HPWSs) - *Adapted from Sun et al. (2007)*	
SS	**Selective staffing**
SS1	Great effort is taken to select the right person.
SS2	Long-term employee potential is emphasized.
SS3	Considerable importance is placed on the staffing process.
SS4	Very extensive efforts are made in selection.

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ET	**Extensive training**
ET1	Extensive training programs are provided for individuals in customer contact or front-line jobs.
ET2	Employees in customer contact jobs will normally go through training programs every few years.
ET3	There are formal training programs to teach new hires the skills they need to perform their job.
ET4	Formal training programs are offered to employees in order to increase their promotability in this organization.
IM	**Internal mobility**
IM1	Employees have few opportunities for upward mobility.
IM2	Employees do not have any future in this organization.
IM3	Promotion in this organization is based on seniority.
IM4	Employees have clear career paths in this organization.
IM5	Employees in customer contact jobs who desire promotion have more than one potential position they could be promoted to.
ES	**Employment security**
ES1	Employees in this job can be expected to stay with this organization for as long as they wish.
ES2	Job security is almost guaranteed to employees in this job.
JD	**Clear job description**
JD1	The duties in this job are clearly defined.
JD2	This job has an up-to-date description.
JD3	The job description for a position accurately describes all of the duties performed by individual employees.
RO	**Results-oriented appraisal**
RO1	Performance is more often measured with objective quantifiable results.
RO2	Performance appraisals are based on objective quantifiable results.
RO3	Employee appraisals emphasize long term and group-based achievement.
IR	**Incentive reward**
IR1	Individuals in this job receive bonuses based on the profit of the organization.
IR2	Close tie or matching of pay to individual/group performance.
PA	**Participation**
PA1	Employees in this job are often asked by their supervisor to participate in decisions.
PA2	Individuals in this job are allowed to make decisions.
PA3	Employees are provided the opportunity to suggest improvements in the way things are done.
2. KNOWLEDGE SHARING - ***Adapted from Van Den Hooff and De Ridder (2004)***	
Knowledge donating	
KS1	When I have learned something new, I tell my colleagues about it.
KS2	I share the information I have with my colleagues.
KS3	I think it is important that my colleagues know what I am doing.
KS4	I regularly tell my colleagues what I am doing
Knowledge collecting	
KS5	When I need certain knowledge, I ask my colleagues about it.
KS6	I like to be informed of what my colleagues know.
KS7	I ask my colleagues about their abilities when I need to learn something.
KS8	When a colleague is good at something, I ask them to teach me how to do it.
3. INNOVATIVE WORK BEHAVIOUR - ***Adapted from De Jong and Den Hartog (2010)***	
IWB1	I search out new working methods, techniques or instruments.
IWB2	I generate original solutions for problems.

IWB3	I find new approaches to execute tasks.
IWB4	I pay attention to issues that are no part of his daily work.
IWB5	I wonder how things can be improved.
IWB6	I make important organizational members enthusiastic for innovative ideas.
IWB7	I attempt to convince people to support an innovative idea
IWB8	I systematically introduce innovative ideas into work practices.
IWB9	I contribute to the implementation of new ideas.
IWB10	I put effort in the development of new things.

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Knowledge Sharing Drivers Among Legal Professionals: Insights from Thailand's Intellectual Property Law Firms

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Abstract: This study explores the motivations influencing knowledge sharing among lawyers and legal counsels in intellectual property (IP) law firms in Thailand. IP law firms represent a knowledge-intensive professional service context in which legal professionals must combine legal knowledge, procedural knowledge, client-related experience, and business-oriented IP strategy. Using a qualitative research approach, this study conducted semi-structured in-depth interviews with ten legal professionals from five leading Thai IP law firms, including partners and senior associates/associates. Thematic analysis was employed to identify the types of knowledge shared, existing knowledge sharing practices, and motivational factors affecting knowledge sharing behavior. The findings reveal four categories of knowledge shared in Thai IP law firms: legal knowledge, professional practical knowledge, IP-driven business strategy knowledge, and personal skill knowledge. The study further identifies two groups of motivational factors. The key extrinsic factors are organizational culture, team interaction, management involvement, technology, business development, and institutional sustainability. The key intrinsic factors are recognition, professional reputation, altruism, trust, and reflexive self-development. Three important context-specific insights emerged from the data: knowledge sharing supports business development through professional visibility and client trust; institutional sustainability depends on transferring knowledge across generations of lawyers; and reflexive self-development shows that lawyers also learn and improve through the act of sharing knowledge with others. The study contributes to knowledge management research by extending understanding of knowledge sharing in a specialized legal context in an emerging economy. It also provides practical implications for law firm management. Thai IP law firms should not treat knowledge sharing merely as informal cooperation among lawyers, but as a strategic management practice. Firms should strengthen leadership involvement, create regular formal and informal sharing opportunities, improve searchable knowledge repositories, support mentoring and cross-team discussion, and recognize knowledge sharing as part of professional development and succession planning. Technology should be used not only for document storage, but also to improve knowledge retrieval and reuse. By developing more systematic knowledge management practices, IP law firms can reduce knowledge loss, improve consistency of legal service, support junior lawyer development, and enhance long-term competitiveness.

Keywords: Knowledge management, Knowledge sharing, Motivational factors, Intellectual property law firm, Lawyer, Legal Counsel

1. Introduction

In the knowledge-based economy, professional service firms, particularly law firms, are quintessential knowledge-intensive organizations (Gottschalk, 1999). Their success depends not on tangible assets, but on the knowledge capital embodied in their personnel (Forstenlechner et al., 2007). Intellectual Property (IP) law firms, the context of this study, present a particularly complex case that is significantly distinct from general law firms. They require a deep integration of both legal and diverse technical knowledge across various scientific and technological fields (Hislop, 2023). This necessitates a high degree of collaboration and expertise sharing among professionals, distinguishing them from general law firms where lawyers often work independently (Levin & Cross, 2004). The rapid pace of technological change and globalization has increased the demand for adaptable and continuously learning lawyers (Flood, 2012), making effective knowledge sharing an essential mechanism for maintaining a competitive edge and facilitating mutual learning (Gardner, 2019).

Knowledge sharing is the process of exchanging both explicit knowledge, such as legal statutes and court precedents, and tacit knowledge, which includes experiences in case analysis and negotiation tactics (Nonaka &

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Takeuchi, 1995). While the importance of knowledge management in the legal sector is well-recognized (Zeide & Liebowitz, 2012), the implementation of new systems often faces challenges, particularly a lack of acceptance from professionals who may perceive them as disruptive to traditional practices (Schulz & Klugmann, 2005).

While existing literature has examined motivational factors for knowledge sharing in professional service firms or large law firms more broadly (Holinde, 2015; Kabene, King & Skaini, 2006), empirical research remains limited (Forstenlechner, 2005). Critically, a significant research gap persists regarding in-depth studies within the specific context of "IP lawyers and legal consultants in IP law firms," whose work relies on a unique hybrid of highly specialized legal and technical expertise. This specialized context, particularly within an emerging economy like Thailand, remains largely unexplored.

In Thailand, IP legal practice requires lawyers and legal counsels to combine legal knowledge with the Department of Intellectual Property (DIP) procedures, prosecution experience, enforcement strategies, client portfolio management, and advice on emerging technologies and IP commercialization. Much of this knowledge is tacit and experience-based, and is often shared through mentoring, case discussions, informal consultation, internal meetings, templates, shared drives, email, and messaging applications rather than formalized knowledge management systems. This makes Thailand a meaningful context for examining knowledge sharing motivations, particularly as many Thai IP law firms remain people-dependent and face risks of knowledge loss, inconsistent practice, and limited junior professional development. This issue is significant because ineffective knowledge sharing may affect service consistency, junior lawyer development, retention of specialized expertise, and the competitiveness of Thai IP law firms in a technology-driven legal market. Moreover, despite the practical importance of knowledge sharing in this context, there remains limited empirical research specifically examining knowledge sharing among IP lawyers and legal counsels in Thai IP law firms. Preliminary interviews with managing partners in Thailand also confirm that most IP law firms still lack a systematic, formalized knowledge-sharing system.

This study presents an extended analysis that builds upon a preliminary conceptual framework first introduced at a conference (Ariyahchatraweekul, Wiriyapinit & Khlaisang, 2024). It therefore aims to fill the aforementioned knowledge gap by presenting the findings of a qualitative study that deeply explores knowledge sharing within the specialized context of IP lawyers and legal counsels in IP law firms. The study addresses the following research objectives: (1) to understand the characteristics of the knowledge being shared; (2) to explore current knowledge-sharing processes; and (3) to identify and analyze motivational factors affecting knowledge sharing. The findings will offer valuable new knowledge, contributing to a deeper understanding of the drivers and barriers of knowledge sharing among highly specialized professionals and providing a crucial foundation for developing information management strategies that promote legal professional development in an emerging economy.

2. Literature Review

2.1 The Unique Knowledge Landscape of IP Law Firms

Law firms are widely recognized as knowledge-intensive organizations, whose competitive advantage depends on their ability to create and leverage knowledge (Forstenlechner, 2005). The context of an Intellectual Property (IP) law firm, however, is uniquely complex. The knowledge required for operations is not limited to explicit, declarative knowledge in the form of statutes or legal precedents (Apistola & Gottschalk, 2012; Edwards & Mahling, 1997). It also demands sophisticated tacit knowledge, developed through experience, which includes procedural knowledge (e.g., processes for working with government agencies) and analytical knowledge (e.g., applying legal principles to complex facts to devise client strategies) (Apistola & Gottschalk, 2012). This hybrid nature of knowledge presents distinct challenges for knowledge management and sharing compared to other professional service firms.

2.2 Types of Knowledge in the Law Firm Context

The knowledge within a law firm is diverse and complex; understanding its different types is essential for effective management and sharing. The literature classifies knowledge across several dimensions, but the most widely accepted distinction is between explicit and tacit knowledge (Apistola & Gottschalk, 2012). Explicit knowledge is formal, codified knowledge that can be systematically stored and easily communicated (Alavi & Leidner, 1999). In the legal context, this includes, declarative knowledge or "know-what," such as statutes, court precedents, and legal principles (Edwards & Mahling, 1997). It also encompasses, administrative data, like client information and case details (Terrett, 1998). Explicit knowledge forms the foundational layer and is relatively straightforward to share via information technology. Conversely, tacit knowledge is highly personal, experiential

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knowledge that is difficult to articulate or codify in writing (Nonaka, Toyama & Konno, 2000). This type of knowledge is crucial for a firm's competitive advantage as it is hard to imitate. For lawyers, tacit knowledge comprises procedural knowledge, such as the skills for drafting legal documents or navigating bureaucratic processes (Du Plessis, 2004; Fombad, 2008). Even more complex is analytical knowledge, which is the ability to creatively apply legal principles to complex factual scenarios to devise solutions for clients (Edwards & Mahling, 1997). Sharing this tacit knowledge typically requires close social interaction, such as mentoring or collaborative teamwork. Therefore, the central challenge for knowledge management in law firms lies not merely in archiving explicit knowledge, but in creating the mechanisms and culture that facilitate the transfer and sharing of valuable tacit knowledge, which is the true source of the organization's expertise.

2.3 Knowledge Sharing as a Mechanism for Development

In a rapidly changing knowledge environment, the act of sharing knowledge has become more critical than merely possessing it (Van den Hooff, de Ridder & Vijvers, 2002). For law firms, knowledge sharing helps reduce redundant work, prevent the use of outdated information and support the development of learning organizations (Apistola, 2007; Farooq, 2018; Turner & Makhija, 2006). However, previous research also highlights barriers to knowledge sharing in law firms, including limited time among senior lawyers and cultures that restrict sharing within departments (Rusanow, 2003; Gottschalk & Khandelwal, 2003). These challenges show that knowledge sharing in law firms depends not only on the availability of knowledge, but also on the organizational conditions and individual motivations that encourage lawyers to share it.

2.4 A Review of Motivational Factors for Knowledge Sharing

To foster knowledge sharing, understanding motivational factors is essential. The literature generally categorizes these factors into extrinsic and intrinsic motivations. Extrinsic factors refer to organizational and environmental conditions that support knowledge sharing, such as an open organizational culture, management involvement, time allocation and enabling technology (Wong, 2005; Connelly & Kelloway, 2003; Terrett, 1998; Deng, Duan & Wibowo, 2023). Intrinsic factors refer to internal psychological drivers, including altruism, recognition, reputation and trust, which encourage individuals to share knowledge voluntarily (Holinde, 2015; Evans, Wensley & Frissen, 2015; Van den Brink, 2003). Recent research also suggests that autonomous motivation can influence knowledge sharing intentions by mediating the relationship between environmental factors and actual sharing behavior (Nguyen, Malik & Sharma, 2021).

While this literature provides an important conceptual foundation, it is largely based on general law firms or broader professional service firms. A gap remains in understanding how these motivational factors manifest in the specific context of IP lawyers and legal counsels in Thai IP law firms, where legal, technical, procedural and client-related knowledge are closely intertwined. An in-depth qualitative exploration is therefore necessary to examine this phenomenon in its real-world context.

2.5 Social Exchange Theory and Knowledge Sharing Behavior

Social Exchange Theory (SET) is a foundational framework for explaining knowledge sharing behavior in organizations. Drawing on classic social exchange literature, including Homans (1958), Emerson (1976) and Blau (1986), SET views social interaction as an exchange process in which individuals evaluate expected benefits and costs. In knowledge sharing, this explains why individuals do not automatically share knowledge, particularly tacit knowledge, which may involve risks such as loss of power or misuse. Employees are therefore more likely to share when perceived benefits outweigh costs, including reputation, trust and reciprocal support (Bock et al., 2005; Wasko & Faraj, 2005). Reciprocity is central to SET, as it reflects a social norm requiring benefits to be returned (Gouldner, 1960), and has been shown to positively influence knowledge sharing intentions (Bock et al., 2005). However, reciprocity may also be indirect, such as sharing knowledge to build reputation within broader networks (Wasko & Faraj, 2005).

Trust further supports knowledge sharing by reducing uncertainty and perceived risk. Prior studies show that trust, together with intrinsic motivations such as enjoyment in helping others, enhances knowledge contribution (Kankanhalli, Tan & Wei, 2005; Chiu, Hsu & Wang, 2006). Consistent with SET, intrinsic motivations are often more influential than extrinsic rewards (Lin, 2007), suggesting that knowledge sharing is largely a socioemotional exchange. SET also highlights the role of social context, including organizational culture, communication climate and social norms (Van den Hooff & De Ridder, 2004). More recent work extends SET by incorporating psychological exchanges, including implicit perceptions and emotions that may appear as inactive exchanges or knowledge withholding (Ahmad et al., 2023). It also suggests that exchange processes involve rules beyond reciprocity, including altruism and rationality (Ahmad et al., 2023).

3. Methodology

3.1 Research Design

This study employs a qualitative research methodology to gain an in-depth understanding of a new phenomenon in a previously un-researched context and to discover emergent variables from empirical data. This design emphasizes the importance of collecting direct opinions and experiences from professionals, managers, and executives within organizations, which is critical for generating new knowledge (Bruner, 1990; Scholes, 1981; Swap et al., 2001; Tulving, 1972, as cited in Evans & Price, 2017).

3.2 Site and Participant Selection

This study utilized purposive sampling for participant selection. The sampling frame consisted of five small and medium-sized intellectual property (IP) law firms in Thailand, registered as juristic persons with the Department of Business Development, Ministry of Commerce, Thailand, that met five specific inclusion criteria:

- Membership in the Intellectual Property Association of Thailand.
- A specialized focus on providing IP legal services.
- Having registered patent agents among their staff.
- Possessing industry recognition, such as awards or rankings.
- Employing lawyers with advanced degrees or specialized training in IP law.

The selection of ten participants was considered appropriate because the study aimed to obtain in-depth insights from a focused and specialized group rather than statistical representation. Selecting one partner and one senior associate or associate from each selected IP firm allowed the study to capture both strategic/managerial perspectives and practical/operational experiences of knowledge sharing within IP law firms, as shown in Table 1.

Table 1: Participant Characteristics

Code	Gender	Position	Experience (Years)	IP Practice Areas
IPFIRM 1	Male	Partner	20	TM, CR
IPFIRM 1.1	Male	Senior Associate	9	PT
IPFIRM 2	Male	Partner	30	TM, PT, DP, CR
IPFIRM 2.1	Female	Senior Associate	13	TM
IPFIRM 3	Male	Partner	13	TM, PT, DP, CR
IPFIRM 3.1	Female	Senior Associate	9	TM
IPFIRM 4	Female	Partner	15	TM, PT, DP, CR
IPFIRM 4.1	Female	Senior Associate	13	DP
IPFIRM 5	Male	Partner	35	TM, PT, DP, CR
IPFIRM 5.1	Female	Senior Associate	15	PT

Note: TM = Trademark, PT = Invention Patent, DP = Design Patent, CR = Copyright

3.3 Data Collection

Data was collected through face-to-face, semi-structured in-depth interviews. Potential participants were contacted via email with a formal letter requesting an interview. The interviews were conducted from 1st June to 30th October 2025. Each interview lasted approximately 45-60 minutes and was guided by an interview protocol and questions.

3.4 Data Saturation, Analysis and Credibility

The interview data were analyzed using thematic analysis, which is suitable for identifying and reporting recurring patterns in qualitative data (Braun & Clarke, 2006). The analysis followed an iterative process: repeated reading of transcripts, initial open coding, grouping related codes into categories, and refinement of categories into final themes. The analysis was conducted manually without NVivo or ATLAS.ti. Manual coding was appropriate given the focused sample size and allowed close engagement with the meaning and context of participants' responses.

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Although the study involved 10 participants, the sample was considered sufficient because it focused on a clearly bounded and specialized group: IP lawyers and legal counsels from recognized Thai IP law firms. In qualitative research, sample adequacy is determined by data richness and saturation rather than statistical representativeness. Saturation is reached when additional interviews no longer generate substantially new codes or themes (Guest, Bunce & Johnson, 2006). In this study, recurring themes became evident after the eighth interview, and the ninth and tenth interviews confirmed and refined existing themes without producing new categories.

To enhance transparency in the manual thematic analysis, a thematic matrix was developed to document how initial codes were consolidated into broader categories and final themes. As shown in Table 2, the matrix demonstrates the analytical progression from participants' interview responses to the final thematic structure. This helped ensure that the themes were grounded in the interview data and were not based solely on the researcher's subjective interpretation. Trustworthiness was further strengthened through role-based triangulation between partners and associates, the use of direct quotations, and the maintenance of coding notes and analytical memos as an audit trail (Lincoln & Guba, 1985; Nowell et al., 2017).

Table 2: Thematic Matrix Used in Data Analysis

Final Theme	Sub-theme / Category	Analytical Evidence
Types of knowledge shared	Legal knowledge	References to statutes, regulations, court judgments and IP practice-area specialization.
Types of knowledge shared	Professional practical knowledge	References to Department of Intellectual Property (DIP) or procedures, database searching, application preparation and e-filing updates.
Types of knowledge shared	IP-driven business strategy knowledge	References to IP commercialization, licensing, technology transfer and emerging technologies.
Types of knowledge shared	Personal skill knowledge	References to problem-solving, client communication, language skills and relationship management.
Knowledge sharing processes	Formal processes	References to meetings, lunch sessions, new lawyer training, article writing and internal documentation.
Knowledge sharing processes	Informal processes	References to day-to-day consultation, teamwork, Line groups and spontaneous peer support.
Extrinsic motivational factors	Organizational culture	References to mandatory meetings, open workspaces and expectations of sharing.
Extrinsic motivational factors	Team interaction	References to team-based litigation, due diligence and cross-practice consultation.
Extrinsic motivational factors	Management involvement	References to leadership modelling, attendance at sharing sessions and training support.
Extrinsic motivational factors	Technology	References to shared drives, messaging groups, email, Google Workspace, databases and AI tools.
Emergent extrinsic factors	Business development through knowledge sharing	References to articles, newsletters, seminars, reputation building and client acquisition.
Emergent extrinsic factors	Institutional sustainability	References to succession, continuity, knowledge transfer and reduced dependence on individuals.
Intrinsic motivational factors	Recognition	References to feeling valued, useful and important when sharing knowledge.
Intrinsic motivational factors	Professional reputation	References to being recognized as an expert internally and externally.
Intrinsic motivational factors	Altruism	References to helping juniors and colleagues improve.
Intrinsic motivational factors	Trust	References to psychological safety and confidence that sharing will not be judged negatively.
Emergent intrinsic factor	Reflexive self-development through continuous learning	References to learning by teaching, feedback, clarification and continuous improvement.

4. Results

4.1 Types of Knowledge Shared in IP Law Firms

The analysis revealed four distinct categories of knowledge shared among IP lawyers and legal counsels: legal knowledge, professional practical knowledge, IP-driven business strategy knowledge, and personal skill knowledge. These categories are summarized in Figure 1.



Figure 1: Types of Knowledge Shared in IP Law Firms

4.1.1 Legal knowledge

All participants emphasized that legal knowledge forms the foundation of IP practice. This includes substantive knowledge of IP legislation—the Patent Act, Trademark Act, Copyright Act, and related ministerial regulations and departmental announcements. As one partner with over 30 years' experience explained:

> *"IP legal knowledge can be further divided according to practice areas—copyright lawyers, patent lawyers, trademark lawyers—each may have expertise that doesn't overlap. A trademark specialist may not understand the technical complexities of patent prosecution, and vice versa." (IPFIRM 5).*

Legal knowledge also encompasses court judgments and decisions. Although Thailand follows civil law tradition where precedents are not formally binding, participants noted that judicial interpretations provide crucial guidance. One senior associate observed:

> *"When we encounter new issues, we search for relevant Supreme Court judgments. Even if the facts differ, the reasoning helps us understand how courts might approach similar questions." (IPFIRM 2).*

Participants consistently emphasized the dynamic nature of IP law. Firms regularly send lawyers for training on emerging issues such as AI-related copyright questions, international treaty developments, and legislative amendments. This continuous evolution necessitates ongoing knowledge updating and sharing.

4.1.2 Professional Practical Knowledge

This category encompasses procedural and operational knowledge essential for daily practice. It includes understanding workflows with DIP, document preparation, filing procedures, responding to office actions, and managing client IP portfolios. One senior associate described:

> *"When new lawyers join, we teach them practical skills—how to search the DIP database, how to prepare trademark applications, how to respond to examination reports. These aren't things you learn in law school." (IPFIRM 2.1).*

Practical knowledge evolves with technological and administrative changes. The transition to e-filing systems, updates to search databases, and changes in departmental practices all require knowledge updating and sharing. One partner noted:

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> *"When the DIP introduced the new e-filing system, we had to learn it quickly and share that knowledge across the firm. If one person figured out a workaround for a technical glitch, they'd share it with everyone." (IPFIRM 3).*

This category also includes enforcement and litigation knowledge—procedures for civil and criminal IP enforcement, evidence gathering, and courtroom practice.

4.1.3 IP-Driven Business Strategy Knowledge

Several partners emphasized knowledge about commercializing intellectual property and integrating IP with business strategy. This represents a more sophisticated level of knowledge extending beyond traditional legal advice. As one partner explained:

> *"Clients don't just want registration; they want to know how to monetize their IP. We need to understand licensing, franchising, technology transfer—and match these to specific IP types and business contexts." (IPFIRM 4).*

This knowledge encompasses understanding client industries, market dynamics, and emerging technologies. Participants mentioned needing familiarity with AI, NFTs, blockchain, and other innovations to advise on new IP issues. Another partner observed:

> *"When a client asks about protecting AI-generated works, we need to understand both the technology and the legal gaps. This requires continuous learning and sharing insights across the firm." (IPFIRM 2).*

This finding suggests that knowledge sharing in IP law firms extends beyond legal interpretation and procedural know-how. It includes commercially oriented knowledge that enables lawyers to advise clients on how IP can be protected, monetized and strategically used as a business asset. Therefore, IP-driven business strategy knowledge represents a distinct knowledge category that differentiates IP legal practice from general legal services.

4.1.4 Personal skill knowledge

This category includes knowledge developed through experience that is difficult to codify or teach directly. Participants identified several dimensions:

Problem-solving skills—the ability to analyze complex factual situations and devise creative legal solutions. One partner noted:

> *"Some lawyers can look at a problem and immediately see solutions others miss. That's accumulated wisdom—knowing what arguments work, what evidence matters, how to frame issues favorably." (IPFIRM 5).*

Communication and client management skills—understanding how to interact effectively with diverse clients, including cultural nuances when dealing with international clients. A senior associate explained:

> *"Dealing with Japanese clients requires different approaches than American clients. Understanding these differences—when to be direct, when to be indirect—comes from experience. It's hard to write a manual for this." (IPFIRM 4.1).*

Relationship management with government officials—particularly with Department of Intellectual Property examiners and officials. Participants noted that effective interaction requires interpersonal skills developed through experience.

Language skills—especially English proficiency essential for international IP practice, as most IP clients are multinational corporations requiring English-language communications.

One partner encapsulated personal skill knowledge:

> *"It's the ability to achieve client goals by 'thinking outside the box' while staying within legal boundaries. Solid advice—where you're confident the answer wouldn't differ if the client consulted elsewhere—comes from accumulated experience. That's invaluable firm intellectual capital." (IPFIRM 1).*

4.2 Knowledge Sharing Processes

Participants described both formal and informal knowledge sharing processes in their firms. Formal processes included regular lawyer meetings, lunch sessions, departmental meetings, training for new lawyers, article

writing, and internal documentation. These mechanisms allowed lawyers to share legal updates, practice issues, case experiences, and procedural knowledge in a structured manner. As one participant explained:

> *"Every Thursday we have lunch sessions. Each department presents issues encountered, problems solved, or legal updates. We discuss different perspectives—it's structured sharing." (IPFIRM 2).*

Informal processes were equally important. Knowledge was often shared through day-to-day consultation, teamwork on complex cases, cross-departmental discussions, Line groups, email, and spontaneous peer support. These informal interactions were particularly useful for sharing tacit and experience-based knowledge that could not be fully captured in manuals or databases. One senior associate noted:

> *"If I'm working on a copyright question involving software, I might call our patent colleague who understands technology better. These informal consultations happen constantly." (IPFIRM 3.1).*

This suggests that knowledge sharing in Thai IP law firms occurs through a combination of structured mechanisms and informal professional interaction. While formal processes help institutionalize knowledge sharing, informal processes remain essential for transferring tacit, practical, and case-specific knowledge.

4.3 Extrinsic Motivational Factors

Analysis identified six key extrinsic factors influencing knowledge sharing among IP lawyers and legal counsels. Four factors were consistent with those previously identified in the literature: organizational culture, team interaction, management involvement, and technology. In addition, two emergent factors were identified from this study: business development and institutional sustainability.

4.3.1 Previously identified extrinsic factors

Organizational culture emerged as a foundational factor, though its manifestation varied considerably across firms. Some firms have institutionalized knowledge sharing through explicit policies. As one participant explained:

> *"Our company has an Internal Policy—meetings are mandatory, a firm rule we strictly follow. It's part of our culture." (IPFIRM 3.1).*

Another firm designed physical workspace to encourage interaction:

> *"We arrange desks so people sit together, not in separate rooms. This creates constant conversation—about cases, about developments. If people are isolated, that atmosphere doesn't develop." (IPFIRM 5).*

However, some participants described weaker cultures where sharing depends on individual initiative rather than organizational expectation. Generational gaps were mentioned as potential barriers, suggesting culture involves not just policy but interpersonal dynamics.

Team interaction was universally recognized as crucial. Both formal meetings and informal collaboration facilitate knowledge exchange. One participant noted:

> *"Each team conducts monthly internal training on their specialty—beyond IP, topics like NFTs or FDA regulations. This deepens everyone's knowledge." (IPFIRM 4).*

The collaborative nature of complex IP work naturally generates interaction. As another explained:

> *"Because our cases are large, we work in teams—4-5 people on litigation, 5-10 on due diligence. Knowledge sharing happens organically through this teamwork." (IPFIRM 5).*

Management involvement was consistently identified as critical. Leaders who prioritize and model knowledge sharing create organizational momentum. One partner described:

> *"As a manager, I actively support knowledge sharing within our team and with associates. I conduct training on interesting topics and encourage sharing across departments." (IPFIRM 3).*

Another observed:

> *"Management is crucial because they set rules and policies. Our managing partner attends every knowledge sharing session—demonstrating commitment." (IPFIRM 3.1).*

A senior partner emphasized modeling behavior:

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> *"I try to set an example. After court, I asked juniors why I argued certain points. Back at the office, I have them present and discuss—showing that learning continues after cases end." (IPFIRM 5).*

Technology was unanimously recognized as an important enabler of knowledge sharing, but participants' accounts also revealed that its current role in Thai IP law firms remains largely supportive rather than fully transformative. The technologies currently used include shared servers or shared drives for storing case files, email for distributing legal updates, Line groups for quick informal communication, Google Workspace for collaborative document management, DIP databases and e-filing systems for procedural work, and specialized databases such as Darts-IP for case law and IP-related research. One firm also reported developing an internal AI chatbot trained on internal data to provide basic answers on IP procedures, fees and legal requirements.

However, participants consistently noted that existing systems still have practical limitations. Shared drives and servers are useful for storage, but knowledge retrieval often depends on folder structures, file names, personal memory or asking colleagues where information is located. As one participant explained:

> *"We have a shared server where everyone can access case files and information. But searching is difficult—you have to click through folders, guess file names. Finding specific knowledge takes time." (IPFIRM 2.1).*

Another participant expressed desire for better search:

> *"If we had technology that could intelligently search our shared knowledge—using keywords, finding relevant precedents quickly—it would transform how we work." (IPFIRM 3.1).*

Salary increase, bonus receipt, promotion, knowledge champions, time allocation, and annual appraisement showed mixed and limited responses. Some participants indicated that financial rewards or performance-related incentives operated in their firms, while others stated that these were not directly linked to knowledge sharing. Similarly, knowledge champions and time allocation were mentioned only by some participants. As these factors were not strongly repeated across the interviews, they were not retained as core factors in the final framework.

4.3.2 Emergent Extrinsic Factors in Thai IP law firm context

Business development through knowledge sharing emerged as a significant extrinsic factor. Participants recognized that external knowledge sharing—through articles, speaking engagements, website content—serves marketing and business development functions. One partner explained:

> *"As a partner, I write articles as part of business development—promoting our department, demonstrating expertise in interesting areas. It attracts clients." (IPFIRM 3).*

Another noted:

> *"Clients are willing to pay when they see we deeply understand their business. That understanding comes from team knowledge, which comes from sharing. So sharing indirectly drives revenue." (IPFIRM 4).*

A senior associate observed:

> *"Our website articles and newsletters show clients we're current. When foreign clients search for Thai IP expertise, our published content builds credibility." (IPFIRM 2).*

This factor represents knowledge sharing's instrumental value for organizational growth and individual career advancement through enhanced professional visibility.

Institutional sustainability represents another emergent extrinsic factor. Participants viewed knowledge sharing as essential for firm sustainability and risk management. One partner articulated:

> *"To be a true organization, not dependent on individuals A, B, or C, we need successors who can replace each other. That's why knowledge must be passed generation to generation." (IPFIRM 1).*

Another partner emphasized:

> *"A law firm's most valuable resource is people. When people leave, knowledge leaves unless we've shared it. Sharing ensures continuity." (IPFIRM 5).*

A senior associate expressed personal satisfaction from this dimension:

> *"When I share knowledge and see juniors grow, I feel I'm building the IP profession's next generation. That's motivating—creating successors." (IPFIRM 4.1).*

This factor reflects knowledge sharing's role in organizational resilience and professional legacy, particularly in small and medium-sized IP law firms where tacit knowledge is often closely tied to senior professionals.

4.4 Intrinsic Motivational Factors

Analysis identified five key intrinsic factors influencing knowledge sharing among IP lawyers and legal counsels. Four factors were consistent with those previously identified in the literature: recognition, professional reputation, altruism, and trust. In addition, one emergent intrinsic factor was identified from this study: reflexive self-development.

4.4.1 Previously identified intrinsic factors

Recognition emerged as a powerful intrinsic motivator. Recognition encompasses feeling valued, important, and integral to the organization. One participant described:

> *"When I share knowledge, I feel good—I feel part of the company, important to it. I have power in this area." (IPFIRM 3.1).*

Another noted:

> *"Sharing knowledge across departments exposes our expertise. We gain recognition in our practice areas." (IPFIRM 3).*

A senior associate expressed:

> *"I feel useful when I share. Like I'm contributing something valuable." (IPFIRM 2.1).*

Professional reputation also motivated knowledge sharing. Participants noted that sharing knowledge through internal discussions, publications, and presentations helped them become recognized as experts within the firm and in the broader legal community. One participant explained:

> *"When the company needs IP expertise, they think of me. Writing articles and speaking at seminars builds that reputation." (IPFIRM 3.1).*

Another observed:

> *"Being known as the go-to person for certain issues—that's motivating. It builds your profile, which helps career advancement." (IPFIRM 4).*

Reputation operates both within the firm and in the broader legal community, enhancing credibility and opportunities.

Altruism was strongly present throughout the interviews. Participants frequently described knowledge sharing as a way to help colleagues, support junior lawyers, and contribute to team success. One partner expressed:

> *"I want juniors to surpass me, to build on what I share. That's genuine satisfaction—seeing others grow." (IPFIRM 1).*

A senior associate stated simply:

> *"My motivation is helping colleagues become better. When they succeed, I'm happy." (IPFIRM 1.1).*

Another partner noted practical benefits alongside altruism:

> *"The more competent juniors become, the easier my work gets. Helping them helps me too." (IPFIRM 5).*

Altruism reflects genuine care for colleagues' development and team success.

Trust was also identified as a foundational condition for knowledge sharing. Participants emphasized that lawyers are more willing to share knowledge when they feel psychologically safe and confident that their contributions will not be judged negatively. One partner explained:

> *"Senior-junior gaps can be barriers. We need to break down hierarchy, build trust so juniors communicate without fear—with genuine desire to learn. That makes sharing easier." (IPFIRM 1).*

Another participant described:

> *"Sharing happens when people trust they won't be judged. When colleagues receive shared knowledge positively—'this is really helpful'—trust builds." (IPFIRM 4).*

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Trust creates the interpersonal safety necessary for open knowledge exchange, particularly for tacit knowledge where vulnerability exists.

4.4.2 Emergent intrinsic factor in Thai IP law firm context

Reflexive self-development through continuous learning represents a significant emergent factor. Participants described how teaching and sharing actually enhance their own learning. One partner articulated:

> *"I feel good sharing my knowledge. Without sharing, there's no self-development. When others take what I share and build on it, their insights come back to me—I learn too." (IPFIRM 1).*

Another partner used a memorable metaphor:

> *"The brain needs to release old knowledge to receive new knowledge. Sharing forces that release, creating space for learning." (IPFIRM 2).*

A senior associate explained:

> *"When lawyers research and learn without sharing, they may forget. But when they share, others offer different perspectives—which makes us want to learn more and develop ourselves." (IPFIRM 4).*

This factor reveals that sharing is not merely altruistic giving but a reciprocal learning process. The act of articulating knowledge for others requires the sharer to organize, clarify, and deepen their own understanding. Feedback and questions from recipients further stimulate learning. Thus, knowledge sharing creates a virtuous cycle where sharers themselves benefit through enhanced expertise and continuous development.

4.5 Summary of Key Motivational Factors

The findings identified two main groups of motivational factors affecting knowledge sharing among IP lawyers and legal counsels: extrinsic factors and intrinsic factors. The key extrinsic factors are organizational culture, team interaction, management involvement, technology, business development, and institutional sustainability. These factors reflect organizational conditions and external support that encourage knowledge sharing within IP law firms.

The key intrinsic factors are recognition, professional reputation, altruism, trust, and reflexive self-development. These factors reflect personal and relational motivations that encourage IP lawyers and legal counsels to share knowledge with colleagues. Trust supports open communication, while reflexive self-development shows that knowledge sharing also helps the sharer learn and improve through the process of explaining and exchanging knowledge.

Some other factors, such as salary increase, bonus receipt, promotion, knowledge champions, time allocation, and annual appraisement, were mentioned by a smaller number of participants. However, these factors were not strongly repeated across the interviews. Therefore, they were not included in the final framework. Figure 2 presents the key motivational factors most relevant to knowledge sharing in the context of Thai IP law firms.

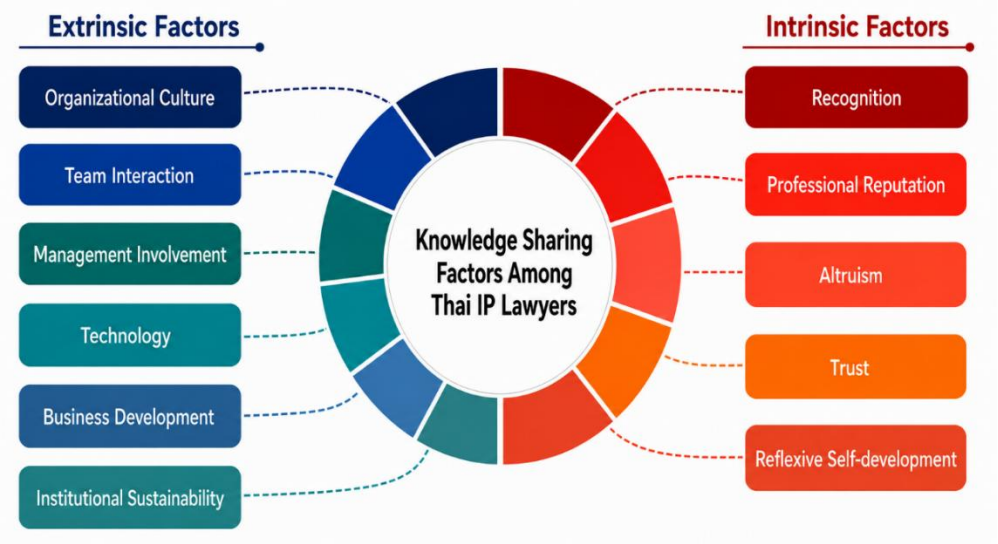


Figure 2: Knowledge Sharing Factors Among Thai IP Lawyers

5. Discussion

5.1 Knowledge Types in IP Legal Practice

This study identifies four categories of knowledge shared among IP lawyers and legal counsels in Thai IP law firms: legal knowledge, professional practical knowledge, IP-driven business strategy knowledge, and personal skill knowledge. These findings extend previous classifications of legal knowledge, which commonly distinguish between declarative, procedural and analytical knowledge (Apistola & Gottschalk, 2012; Edwards & Mahling, 1997). The findings show that IP legal practice requires an integration of formal legal knowledge, procedural know-how, commercial understanding and experience-based professional judgement.

The emergence of IP-driven business strategy knowledge as a separate category signifies the commercialization necessity in modern IP practice. This category shows that IP lawyers do not merely advise clients on registration, prosecution or enforcement, but also help clients understand how intellectual property can be protected, commercialized and used as a business asset. Such knowledge includes licensing, technology transfer, IP portfolio strategy, emerging technologies and client-specific commercial considerations. This finding suggests that IP law firms operate not only as legal service providers, but also as strategic advisors in innovation-driven business contexts.

The significance of personal skill knowledge underscores the enduring relevance of tacit knowledge in legal practice, notwithstanding technological advancements. Although explicit legal knowledge can be documented in databases and manuals, the experiential wisdom necessary for effective client counselling, strategic judgement, and nuanced communication is inherently personal. This supports Nonaka, Toyama and Konno (2000), who argued that tacit knowledge is embedded in action, experience and values. Therefore, mentoring, apprenticeship and collaborative work remain essential mechanisms for transferring professional knowledge in IP law firms.

5.2 Extrinsic Motivational Dynamics

The findings show that extrinsic motivation for knowledge sharing in Thai IP law firms is shaped mainly by organizational and contextual conditions rather than direct financial rewards. The key extrinsic factors were organizational culture, team interaction, management involvement, technology, business development, and institutional sustainability. Although salary increase, bonus receipt, promotion, knowledge champions, time allocation, and annual appraisement were mentioned by some participants, they were not strongly repeated and were not retained as core factors. While some participants confirmed that financial rewards and performance-related incentives operate in their firms, others stated that these incentives are not directly linked to knowledge sharing. This variation may reflect differences in firm size, ownership structure, including Thai-owned firms and international affiliates, and management philosophy. It may also suggest that knowledge sharing has not yet been systematically integrated into formal performance management in many Thai IP law firms, consistent with Forstenlechner's (2005) observation that knowledge management in law firms remains underdeveloped.

Management involvement emerged as a particularly important factor. Leaders influence whether knowledge sharing becomes normal professional practice or remains dependent on individual initiative. This supports Disterer's (2003) view that consistent and credible management behavior helps foster a knowledge-sharing culture. In this study, management support was reflected through formal policies, active participation, modelling of sharing behavior, training junior lawyers, and encouraging cross-team discussion.

Technology was also recognized as essential, but participants' dissatisfaction with current systems indicates an implementation gap. Shared drives, internal servers, email, Line groups, Google Workspace, DIP databases, e-filing systems, specialized IP databases such as Darts-IP, and one internal AI chatbot supported communication, document storage, legal updates, and procedural work. However, these tools remained largely supportive rather than transformative, especially where knowledge retrieval depended on folder structures, file names, personal memory, or informal consultation. This suggests that technology in Thai IP law firms is embedded in daily practice, but knowledge management remains partly people-dependent. Technology must therefore evolve beyond document repositories toward more active knowledge support, while tacit and strategic knowledge still requires mentoring, interpretation, and collaborative discussion. This aligns with calls for KM systems to move from lawyer-to-information toward lawyer-to-application stages (Gottschalk & Terje Karlsen, 2009).

The emergent factor of business development through knowledge sharing reveals an important instrumental motivation in the Thai IP law firm context. Participants recognized that knowledge sharing does not only support

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internal learning, but can also create external value for the firm. For example, writing articles, preparing newsletters, speaking at seminars, and sharing legal updates can demonstrate expertise, strengthen professional visibility, and attract potential clients. This is particularly relevant in IP practice, where clients often seek lawyers who can show specialized knowledge of legal developments, emerging technologies, and commercial IP strategy. Thus, knowledge sharing functions not only as an internal knowledge management activity, but also as a mechanism for reputation building and client development.

The other emergent extrinsic factor, institutional sustainability, reflects participants' concern that legal knowledge should not remain concentrated in individual lawyers. Several participants viewed knowledge sharing as a way to develop successors, reduce dependency on specific individuals, and preserve the firm's accumulated expertise across generations. This factor is especially important in small and medium-sized IP law firms, where tacit and experience-based knowledge may be closely tied to senior professionals. Knowledge sharing therefore supports organizational continuity by helping junior lawyers acquire practical judgement, procedural know-how, and client-related experience. In this sense, institutional sustainability links knowledge sharing with the long-term resilience of the firm.

5.3 Intrinsic Motivational Dynamics

The intrinsic factors identified in this study align with and extend prior research. Holinde (2015) found that the desire to help colleagues motivates sharing, and the universal endorsement of altruism in this study confirms that finding. The strong presence of altruism suggests that knowledge sharing was also supported by concern for colleagues' development and team success. Recognition and reputation also operated as powerful intrinsic reinforcers. This is consistent with prior studies showing that intrinsic rewards can strongly influence knowledge sharing in law firms and professional settings (Holinde, 2015; Evans, Wensley & Frissen, 2015; Van den Brink, 2003). In this study, internal recognition reflected the feeling of being valued within the firm, while professional reputation reflected being acknowledged as an expert within and outside the organization.

Trust emerged as a foundational enabler rather than a direct motivator. Without psychological safety, sharing—particularly tacit knowledge involving uncertainty and vulnerability—cannot flourish.

This finding is consistent with Social Exchange Theory, which suggests that individuals are more willing to engage in exchange behavior when they perceive the relationship as safe, reciprocal and beneficial (Emerson, 1976; Blau, 1986). In the context of knowledge sharing, trust reduces the perceived risk that shared knowledge may be misused, judged negatively or appropriated without recognition, thereby enabling deeper forms of tacit and strategic knowledge exchange ((Kankanhalli, Tan & Wei, 2005, 2005; Chiu, Hsu & Wang, 2006). Evans, Wensley and Frissen (2015) demonstrated that trustworthiness mediates between social-cognitive factors and sharing behavior, a finding that this study supports.

The findings also reflect cultural and relational nuances in Thai IP law firms. Values such as helpfulness, mutual support, and concern for junior development encouraged knowledge sharing, particularly in mentoring and successor development. However, hierarchy, respect for seniority, relational sensitivity, and workplace harmony may affect how junior lawyers ask questions, seek feedback, or express uncertainty. This is consistent with studies showing that hierarchy and interpersonal sensitivity influence communication and feedback seeking in Thai professional contexts (Andrews & Chompusri, 2013; Areemit *et al*., 2021). These cultural dynamics help explain why trust, team interaction, and management involvement were important in creating a safe environment for tacit knowledge sharing.

The emergent factor of reflexive self-development represents this study's most significant theoretical contribution. While previous research has recognized that sharing benefits organizations, the finding that sharing directly benefits sharers through enhanced learning has received limited attention. Participants described knowledge sharing not only as helping others, but also as a process that improves the sharer's own understanding. Explaining knowledge to colleagues requires lawyers to organize their thoughts, clarify assumptions, and respond to questions or alternative perspectives. This process deepens the sharer's expertise and creates a reciprocal learning cycle in which sharing generates further learning. In this sense, knowledge sharing is both a contribution to others and a mechanism of self-development.

5.4 Theoretical Implications

This study contributes to knowledge management theory in four main ways. First, it extends understanding of knowledge types in specialized legal contexts by identifying IP-driven business strategy knowledge as a distinct

category. This suggests that knowledge classifications in law firms should reflect the specific nature of each practice area.

Second, the findings show that motivation for knowledge sharing is not strictly divided into extrinsic and intrinsic categories. Factors such as business development and institutional sustainability serve organizational purposes while also supporting individual reputation, professional identity, and personal satisfaction.

Third, the finding on reflexive self-development challenges the view that knowledge sharing only benefits recipients or organizations. In this study, sharing also enhanced the sharer's own learning by encouraging reflection, clarification, and deeper understanding.

Fourth, the study contextualizes knowledge management theory in Thai IP law firms. The findings suggest that knowledge sharing is shaped by professional relationships, trust, hierarchy, mentoring, and concern for institutional continuity. Therefore, knowledge management models should be adapted to the cultural and organizational context in which they are applied.

5.5 Practical Implications

For law firm management, the findings suggest that effective knowledge sharing requires both organizational support and personal motivation. Firms should strengthen leadership involvement, encourage regular team interaction, build trust, and recognize lawyers' contributions to knowledge sharing.

Technology should be improved not only for document storage, but also for knowledge retrieval and reuse. Searchable repositories, better classification of work products, AI-assisted retrieval, and clear documentation practices can help lawyers access prior knowledge more effectively. However, technology should support, not replace, mentoring, interpretation, and professional discussion.

Firms should also frame knowledge sharing as part of professional development rather than an additional burden. Training, mentoring, internal presentations, and case discussions can be used as learning opportunities for both sharers and recipients. In addition, knowledge sharing may be recognized in evaluation and professional development processes, not necessarily through direct financial rewards, but by showing that mentoring, documentation, and cross-team support are valued contributions.

5.6 Limitations and Future Research

This study has several limitations. The sample, while representing leading IP firms, may not reflect practices in smaller or less prestigious firms. Findings may not generalize to other legal practice areas or to non-Thai cultural contexts. The qualitative design, while providing depth, cannot establish causal relationships or quantify factor importance.

Future research should test identified factors through quantitative methods, examining their relative influence on sharing behavior across larger samples. Comparative studies across different legal practice areas and cultural contexts would reveal whether findings are IP-specific or generalize more broadly. Longitudinal research could examine how motivational dynamics evolve as firms implement knowledge management systems. Investigation of technology's role, particularly AI's potential to transform knowledge sharing, represents another important direction.

6. Conclusion

This study explored knowledge sharing motivations among IP lawyers and legal counsels in Thai IP law firms. The findings identified four categories of knowledge shared in this context, as shown in Figure 1: legal knowledge, professional practical knowledge, IP-driven business strategy knowledge, and personal skill knowledge. Among these, IP-driven business strategy knowledge represents an important insight, as it shows that IP lawyers are not limited to providing legal advice but also support clients in understanding the commercial value and strategic use of intellectual property.

The study further identified two main groups of motivational factors influencing knowledge sharing behavior. The key extrinsic factors were organizational culture, team interaction, management involvement, technology, business development, and institutional sustainability. The key intrinsic factors were recognition, professional reputation, altruism, trust, and reflexive self-development. These factors were summarized in Figure 2 as the core knowledge sharing factors among Thai IP lawyers.

The findings suggest that knowledge sharing in Thai IP law firms is shaped not only by organizational systems, but also by professional relationships and personal motivations. Technology supports communication, storage

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and access to knowledge, but it remains insufficient without mentoring, interpretation and collaborative discussion. Trust also plays a crucial role by creating psychological safety for sharing tacit and experience-based knowledge. In addition, the finding on reflexive self-development shows that knowledge sharing benefits not only the recipient or the organization, but also the sharer, as the process of explaining and exchanging knowledge helps lawyers clarify, deepen and develop their own expertise.

This study contributes to knowledge management research by extending understanding of knowledge sharing in a specialized legal context in Thailand. It highlights the importance of combining organizational support, relational trust, technology and intrinsic motivation to promote effective knowledge sharing. For practice, the findings suggest that Thai IP law firms should strengthen leadership involvement, improve knowledge-sharing technology, encourage mentoring and team interaction, and recognize knowledge sharing as part of professional development and institutional continuity. As IP legal work becomes increasingly complex, effective knowledge sharing will be essential for maintaining service quality, developing junior professionals and sustaining firm competitiveness.

AI Declaration: The authors declare that basic AI tools were used only for language assistance during manuscript preparation. All content has been reviewed and approved by the authors, who assume full responsibility for the work's originality and scholarly integrity.

Ethics Statement:This study strictly adhered to all ethical principles. The entire research process, including the methodology and interview protocol, was reviewed and approved by The Research Ethics Review Committee for Research Involving Human Subjects: The Second Allied Academic Group in Social Sciences, Humanities and Fine and Applied Arts at Chulalongkorn University. This approval confirmed that the research protocol is in accordance with established international ethical guidelines, including the Declaration of Helsinki, the Belmont Report, CIOMS guidelines, and the International Conference on Harmonisation – Good Clinical Practice (ICH-GCP). Furthermore, all participants were provided with detailed information about the study's objectives and gave written informed consent prior to their interviews. Confidentiality and anonymity were strictly maintained throughout the research process.

Conflict of Interest: The authors state that they have no conflicts of interest related to the publication of this research.

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Appendix 1: Interview Questions

Part 1: Knowledge Sharing for Lawyers and Legal Counsels

1. In your opinion, what are the characteristics of the knowledge held by lawyers and legal counsels in an IP law firm?
2. What are your views on knowledge management for lawyers and legal counsels in an IP law firm?
3. Do you think it is necessary for lawyers and legal counsels in an IP law firm to share knowledge with one another? Why or why not, and in what ways?
4. What methods do you use to share knowledge within the firm? And what types of knowledge do you typically share?
5. In your view, what would an ideal knowledge-sharing process for lawyers and legal counsels in an IP law firm look like?

Part 2: Motivational Factors Affecting Knowledge Sharing

6. How does your organization's culture promote knowledge sharing within the firm?
7. What are some of the reasons that motivate you to want to share your knowledge at the firm?
8. What do you think would help to influence knowledge sharing at the firm?
9. How do you believe you personally benefit when you share your knowledge at the firm?
10. How do you feel when you have shared your knowledge with colleagues at the firm?
11. Does the management play a role in promoting knowledge sharing among lawyers and legal consultants at the firm? If so, how?

Part 3: Additional Suggestions or Comments

12. Do you have any other suggestions or comments on how to promote knowledge sharing among lawyers and legal consultants at the firm?