

“The role of knowledge development and flow of knowledge on the performance of foreign subsidiary companies”

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Abstract

Purpose – This study examines the relationship between external embeddedness (EE), subsidiary knowledge development (SKD), knowledge flow (KF) and their collective impact on foreign subsidiary performance (FSP). It investigates whether SKD mediates the relationship between EE and KF, particularly in the context of knowledge-intensive business services (KIBS) in Malaysia. By integrating network theory and the resource-based view (RBV), the research explores how multinational enterprises (MNEs) leverage external networks to foster knowledge acquisition and competitive advantage.

Design/methodology/approach – A quantitative, mixed-method approach integrates survey-based analysis (2017–2018) and longitudinal panel regression analysis (2017–2024). The study employs purposive sampling to ensure representation across diverse foreign subsidiaries operating in Malaysia. Data collection consists of primary data from 293 survey responses from foreign subsidiary managers and secondary data from OneSource, Orbis (Bureau van Dijk), WIPO patents and annual reports for financial performance validation. Analytical techniques include structural equation modeling in AMOS 26 and panel regression in Stata, using fixed effects, random effects, and Hausman tests to assess direct and mediating relationships.

Findings – The results indicate that EE positively influences SKD and KF, demonstrating that subsidiaries with stronger local and global ties acquire and transfer knowledge more effectively. KF significantly enhances FSP, confirming its strategic role in fostering innovation and adaptability. The findings also establish that SKD mediates the relationship between EE and KF, suggesting that subsidiaries must internalize and develop acquired knowledge to maximize performance. Additionally, panel regression results validate that these relationships remain stable, even amid technological disruptions and post-pandemic shifts.

Originality/value – This research emphasizes the importance of EE for foreign-owned subsidiaries in terms of knowledge creation, knowledge diffusion and performance. Establishing a strong connection with the local business community can enhance these subsidiaries' technological capabilities, gain access to external knowledge sources and enhance their innovative and service-oriented performance. Policy implications indicate that these advantages may be improved by fostering a more profound integration with local business communities, stimulating innovation and enhancing overall performance.

Keywords External embeddedness, Subsidiary knowledge development, Knowledge flow, Foreign subsidiary performance

Paper type Research paper



1. Introduction

The increasing globalization of MNEs has heightened the importance of subsidiary performance, particularly in emerging economies transitioning toward knowledge-intensive and service-driven industries. Subsidiaries facilitate knowledge acquisition, foster innovation, and ensure market competitiveness (Monteiro *et al.*, 2017). Their ability to leverage external networks, acquire market intelligence, and develop KF mechanisms significantly influences

their long-term sustainability and strategic adaptability. However, the extent to which EE enhances SKD and KF remains an area requiring further empirical investigation.

Subsidiaries embedded in local business environments benefit from access to market intelligence, collaborative innovation opportunities, and unique resources, all of which contribute to product and service innovation (Ferraris *et al.*, 2018). However, the SKD process is not uniform across subsidiaries, as differences in institutional support, digital capabilities, and market linkages create disparities in knowledge exchange. The COVID-19 pandemic further accelerated digital transformation across industries, reshaping how subsidiaries interact with external networks, customers, and headquarters. The emergence of AI-driven knowledge-sharing platforms, blockchain-enabled transparency, and remote collaboration tools has facilitated global knowledge networks (Huang *et al.*, 2025). While many subsidiaries have successfully integrated new digital mechanisms, others struggle with shifting from traditional face-to-face interactions to technology-driven knowledge-sharing systems (Shukran *et al.*, 2023).

Despite increasing scholarly attention on SKD and KF, there remains limited empirical evidence on how these factors influence FSP, particularly in a post-pandemic business environment (Khan *et al.*, 2025). The impact of EE, which facilitates knowledge acquisition and strategic learning, on subsidiary-level innovation and service performance is remarkably underexplored in emerging economies like Malaysia (Shukran *et al.*, 2023). The extent to which subsidiaries can capitalize on EE for SKD and KF is a central focus of this study, as it determines their ability to enhance FSP. Understanding *how external embeddedness influences subsidiary knowledge development and knowledge flow* is essential to identifying how subsidiaries integrate into external networks and leverage these connections for organizational learning and innovation. Furthermore, assessing the extent *to which subsidiary knowledge development and knowledge flow contribute to foreign subsidiary performance* allows for examining whether these knowledge processes translate into strategic advantages and competitive positioning. Finally, investigating *whether subsidiary knowledge development mediates the relationship between external embeddedness and knowledge flow* clarifies whether SKD is a critical intermediary that enables subsidiaries to transform their embeddedness into effective knowledge exchange and improved performance outcomes.

This research integrates network theory and the RBV to analyze the impact of EE, SKD, and KF on FSP. The study examines whether subsidiaries with robust external connections perform better by utilizing information more efficiently (Ciabuschi *et al.*, 2014). This mixed-method approach ensures that both short-term and long-term knowledge development trends are captured, allowing for an assessment of how digitalization and post-pandemic disruptions have reshaped subsidiary knowledge development strategies.

Significant contributions encompass (1) empirical validation of knowledge strategies via integrated survey and panel data analysis (Gölgeci *et al.*, 2019); (2) insights into the transformative impact of digital tools such as AI, collaboration platforms, and blockchain on knowledge exchange (Ciulli and Kolk, 2023); and (3) practical guidance for MNE subsidiaries regarding digital adaptation, systematic knowledge-sharing, and strategic alliances.

The paper delineates its theoretical framework, articulates hypotheses regarding EE, SKD, KF, and FSP, and elaborates on its data-obtaining and statistical techniques. Survey and longitudinal data findings explore these relationships and reveal mediation effects. The discussion and conclusion section interprets the findings of existing literature, emphasizing their theoretical contributions and practical implications, particularly considering digital transformation and post-pandemic market dynamics. By integrating survey-based insights with longitudinal panel regression analysis, this study offers a comprehensive understanding of SKD and their impact on MNE performance in an evolving digital economy.

2. Theory and hypothesis development

Laumann *et al.* (1978) define a business network as interconnected entities such as parent firms, subsidiaries, and local actors engaged in mutual relationships. Nahapiet and Ghoshal

(1998, p. 245) expand this by viewing networks as sources of real and potential resources, emphasizing that stronger inter-firm ties enhance strategic development and capabilities. Corporate networks are often categorized as single, dyadic, or multi-actor, depending on value distribution, as [Jaakkola and Hakanen \(2013\)](#) highlighted with network theory and its strategic importance.

The RBV posits that subsidiaries with unique, hard-to-replicate resources gain competitive advantages. Thus, EE, SKD, and digital KF contribute to superior FSP. Combining RBV with network theory enriches our understanding of MNE dynamics by incorporating relational and social capital influences on resource access, knowledge sharing, and innovation ([Nazri and Shukran, 2018](#)). Network theory also illuminates trust and mechanisms supporting KF within MNEs. Digital transformation enhances subsidiaries' ability to utilize resources and maintain competitiveness in evolving environments ([Ray et al., 2023](#)). This study blends traditional and digital-era perspectives, showing how network embeddedness and digital capabilities collectively shape FSP.

2.1 Hypothesis development

2.1.1 External embeddedness. EE refers to the extent to which a subsidiary is integrated into local and external knowledge networks, influencing its ability to acquire and transfer knowledge effectively. Subsidiaries engage with inter- and extra-firm relationships, including suppliers, competitors, customers, and research institutions. These serve as marketing intelligence and technical knowledge sources, enhancing subsidiary competitiveness ([Lowe and Wrigley, 2010](#)).

EE can positively impact innovation and performance if the subsidiary contributes to the MNE's knowledge base ([Zhang et al., 2014](#)). Additionally, the performance of KIBS enterprises is boosted by their strong external linkages with local actors, reinforcing the importance of EE in KF and knowledge creation. However, recent research highlights that EE is no longer confined to physical proximity or local market relationships. Digital transformation, AI-driven collaboration, and blockchain-based knowledge-sharing networks have altered the nature of embeddedness in MNE subsidiaries ([Khan et al., 2025](#)). This shift emphasizes that EE must be examined through traditional structural linkages and modern digital platforms facilitating KF across geographically dispersed networks.

Externally integrated subsidiaries also establish stronger relationships with headquarters, fostering bidirectional knowledge exchange, positively correlating with SKD and innovation ([Nell and Ambos, 2013](#); [Shukran and Mustamil, 2023](#)). The RBV highlights embeddedness as a key determinant of competitive advantage, as it enables subsidiaries to integrate external knowledge resources into the broader MNE network ([Tate and Bals, 2018](#); [Shukran and Mustamil, 2023](#)). Yet, minimal research explores how subsidiaries can effectively leverage traditional and digital external networks to create and exploit social capital for sustainable competitive advantage ([Lee et al., 2020](#)). Recent evidence suggests that subsidiaries embedded in AI-enabled digital networks benefit from real-time knowledge exchange, enabling faster innovation cycles and reducing information asymmetry between headquarters and subsidiaries ([Ge et al., 2023](#)).

In addition, we argue that the degree to which a subsidiary is embedded in its external environment directly impacts knowledge transfer mechanisms. A subsidiary with extensive EE, whether through face-to-face networks or AI-driven collaboration platforms, gains greater access to the information, ideas, and innovations circulating within local and global knowledge ecosystems. This increased access fosters knowledge spillovers, enhances absorptive capacity, and strengthens innovation potential ([Sun et al., 2025](#)). With the increasing reliance on digital knowledge-sharing mechanisms, subsidiaries that fail to integrate into digital and external embedded networks risk experiencing a competitive disadvantage. Given the potential influence of EE based on relationships and digital knowledge-sharing linkages with external partners, this study aims to determine whether EE enhances SKD and KF within the MNE network. Thus, the following hypotheses are formulated:

H1. The more embedded the relationships between a subsidiary and its local actors, the greater the subsidiary develops new knowledge.

H2. The greater the subsidiary's embeddedness in its local and external knowledge networks, the greater the knowledge flow.

2.1.2 Subsidiary knowledge development. SKD has long been recognized as a core driver of MNE performance and competitive advantage. In an increasingly digital and knowledge-intensive economy, subsidiaries play a vital role in developing and disseminating knowledge across the MNE network (Borini *et al.*, 2014; Govindarajan and Trimble, 2012). Subsidiaries embedded within strong external and internal knowledge networks are more likely to develop innovative capabilities, acquire valuable resources, and facilitate seamless knowledge transfer. The process of SKD is no longer limited to local interactions; digital transformation and AI-driven knowledge-sharing platforms have expanded the boundaries of knowledge acquisition and dissemination (Shao *et al.*, 2024). The ability to extract insights from diverse knowledge sources, whether internal (parent firm, sister subsidiaries) or external (local firms, universities, industry networks), has become critical for MNE subsidiaries seeking to remain competitive in dynamic environments.

SKD plays a dual role in MNEs; it enhances the subsidiary's internal innovation and problem-solving capabilities and serves as a conduit for KF within the broader MNE ecosystem. The relationship between SKD and KF is particularly pronounced in AI-enabled subsidiaries, where automated knowledge-sharing platforms facilitate seamless communication between geographically dispersed units (Goederham, 2024).

In particular, subsidiaries embedded in digitally advanced ecosystems leverage AI-driven analytics and machine learning algorithms to optimize knowledge capture and dissemination (Che *et al.*, 2025). Moreover, the shift toward cloud-based knowledge repositories, blockchain-driven transparency, and predictive analytics tools has significantly improved knowledge accessibility and transferability within MNEs. These technological advancements help mitigate traditional knowledge silos, allowing subsidiaries to integrate real-time data insights into their strategic decision-making processes.

However, despite the increasing availability of digital knowledge-sharing tools, KF is not uniformly distributed across subsidiaries. Certain subsidiaries act as central hubs of innovation, while others remain peripheral due to weak absorptive capacity, inadequate digital infrastructure, or lack of strategic alignment with headquarters (Andersson *et al.*, 2005; Sun *et al.*, 2025). Therefore, it is necessary to assess whether SKD mediates the relationship between EE, KF, and FSP to determine its role in enhancing MNE knowledge integration strategies. Given these theoretical insights, the following hypotheses are proposed:

H3. The greater the extent of subsidiary knowledge development, the greater the extent of knowledge flow.

H3a. Subsidiary knowledge development mediates the relationships between external embeddedness and knowledge flow.

H4. The greater the extent of subsidiary knowledge development, the greater the extent of foreign subsidiary performance.

H4a. Subsidiary knowledge development mediates the relationship between external embeddedness and foreign subsidiary performance.

H4b. Subsidiary knowledge development mediates the relationships between external embeddedness, knowledge flow, and foreign subsidiary performance.

2.1.3 Subsidiary roles and knowledge flow. Subsidiaries play a crucial role in MNE knowledge management, acting as knowledge recipients and generators in global innovation networks. The KF within MNEs has traditionally been examined through hierarchical models, where knowledge moves from headquarters to subsidiaries (Gupta and Govindarajan, 1991). However, recent research indicates that subsidiaries are increasingly autonomous knowledge hubs, engaging in reverse knowledge flow, where local innovations are transferred back to headquarters (Demeter *et al.*, 2023; Nazri and Shukran, 2018).

KF within MNEs occurs in multiple forms: technical knowledge (Phene and Almeida, 2008), marketing knowledge (Holm and Sharma, 2006), and strategic knowledge from local markets (Andersson *et al.*, 2007). While prior studies focused on internal organizational networks, contemporary research suggests that EE and AI-driven knowledge-sharing platforms have significantly altered subsidiary knowledge dynamics (Hasan and Ojala, 2024). As subsidiaries engage with local business ecosystems, digital platforms, and cross-border industry networks, they gain strategic advantages by integrating external and internal KF.

Unlike earlier models emphasizing geographical proximity for knowledge transfer, the expansion of digitalization and AI-driven collaboration has transformed KF mechanisms. AI-powered knowledge-sharing platforms and blockchain-based transparency tools enable seamless, real-time knowledge integration across subsidiaries (Che *et al.*, 2025). Reverse knowledge transfer from subsidiaries to headquarters has become a primary driver of MNE innovation and global market competitiveness (Sun *et al.*, 2025; Nazri and Shukran, 2018).

Despite the increasing importance of subsidiary knowledge flow, many subsidiaries struggle with organizational silos, cultural barriers, and inadequate digital infrastructure. Subsidiaries embedded in digitally advanced ecosystems are more effective in knowledge integration, whereas those with limited access to digital transformation tools lag in KF efficiency. Addressing these asymmetries in KF is essential for enhancing subsidiary strategic decision-making and innovation performance. Given these insights, the following hypotheses are proposed:

H5. Knowledge flow positively impacts foreign subsidiary performance.

H5a. Knowledge flow mediates the relationships between external embeddedness and foreign subsidiary performance.

3. Research methodology

This study explores the impact of EE on SKD and KF and its contribution to FSP. A mixed method approach is employed, utilizing SPSS and AMOS 26 for SEM and Stata for panel data regression analysis, including FE, RE, and the Hausman test. This study uses a quantitative research approach to examine the impact of EE, SKD, and KF on FSP.

To ensure methodological rigor, we employ purposive sampling, selecting subsidiaries based on specific industry and operational criteria. This method is justified as it ensures relevance, capturing subsidiaries with established knowledge-sharing mechanisms, which may not be adequately represented through purposive sampling (Hirose and Creswell, 2023). CMB was assessed using Harman's Single-Factor and common latent factor (CLF) tests, confirming minimal bias (Podsakoff *et al.*, 2024). Response bias was reduced by separating key constructs, ensuring anonymity, and randomizing survey items, while sampling bias was controlled by selecting subsidiaries across various industries and entry modes. This methodological framework ensures reliability and validity, providing robust insights into SKD and long-term performance outcomes.

3.1 Data sources: main survey and secondary data (2017–2024)

This study integrates cross-sectional primary survey data (2017–2018) with secondary data (2017–2024) to provide a robust, longitudinal perspective on FSP. The primary survey data

from OneSource (Dun and Bradstreet) ensures reliable insights from multinational subsidiaries in KIBS across Malaysia. The survey captures key variables, including SKD and EE, forming the baseline for long-term performance analysis.

To validate and extend these insights, secondary data is obtained from OneSource (Dun and Bradstreet), Orbis (Bureau van Dijk), company annual reports, patent databases (WIPO), and industry intelligence sources. These datasets provide objective measures of financial performance, R&D investments, KF, and strategic collaborations, ensuring that the findings reflect real-world subsidiary adaptations over time. By integrating primary and secondary sources, this study offers a comprehensive, evidence-driven analysis of subsidiary performance, particularly in response to market shifts and global disruptions, including COVID-19. This dual-source approach enhances data credibility, contextual relevance, and the overall robustness of the research.

3.2 Data collection

This study focuses on KIBS enterprises, including computer systems, design services, R&D, high-technology users, and professional, scientific, and technical services, all operating as multinationals with multiple subsidiaries across various Malaysian states. The survey design adheres to the customized design technique of [Dillman \(2000\)](#), ensuring accurate data collection. Before data collection, a pilot study was conducted with senior managers from various MNE subsidiaries to validate the relevance and comprehensibility of key constructs. Twenty respondents participated, providing critical responses on construct clarity. To qualify for inclusion in the study, subsidiaries had to have been operating in Malaysia for at least five years, ensuring an established global and local knowledge acquisition system.

Furthermore, the study specifically targeted knowledge-based, service-oriented subsidiaries to better analyze the role of industry-specific factors in organizational learning and knowledge development. Given the multidimensional nature of the research framework, a survey-based approach was deemed appropriate. The sampling frame was generated using the OneSource Database, from which data from 2017 to 2018 were utilized. Of 600 initially identified companies, 511 had valid contact information for survey distribution. The respondents were mid-level executives and subsidiary managers, and 291 responses were ultimately received. The core research themes of EE and SKD are long-term strategic rather than transient trends, ensuring the study's applicability. Prior studies indicate that knowledge transfer and embeddedness strategies in multinational subsidiaries exhibit long-term consistency rather than being highly reactive to short-term fluctuations ([Van Tulder et al., 2021](#)).

The questionnaire consists of seven-point Likert scale components, adapted from established literature, with response options ranging from (1) "strongly disagree" to (7) "strongly agree." Several precautionary measures were taken to mitigate CMB. First, Harman's Single-Factor test was performed. The CLF test was also applied, confirming that CMB does not significantly affect the study's findings.

4. Results

We analyze the given and hypothesized models employing a covariance-based validation procedure. A two-stage SEM approach begins with a confirmatory factor analysis (CFA) to assess the measurement model's validity and reliability ([Hair et al., 2021](#)). After confirming measurement accuracy, the structural model is evaluated to test the hypothesized relationships. Key assessments include overall model fit, loading estimates, and path coefficients, distinguishing between exogenous and endogenous factors. These results are further validated with panel data regression in Stata, ensuring a comprehensive analysis of subsidiary performance.

4.1 Measurement items, item factor loading, and scale reliability

Before performing the path analysis, we investigate how to measure the unobservable variables (also known as constructs). The model's structural characteristics are then compared

to the parameters of each relationship path. The measuring model meets the 0.70 norms for FSP, EE, SKD, KF, Cronbach's alpha (CA), and composite reliability (CR) (see Table 1). Significant internal consistency appears to be necessary for dependability (Hair et al., 2021). The average extracted variance (AVE) has been discovered to be more than 0.50 and internally consistent (FSP: 0.83; EE: 0.770; SKD: 0.91; KF: 0.857) (see Table 1) (Hair et al., 2021). In the discriminant validity test, the square root of AVE ranged from 0.770 to 0.91, which is always greater than the off-diagonal items in their respective row and columns. The cross-loading range is between 0.732 and 0.962 (see Table 2, cross-loading table). Hence, the discriminant validity of a factor is defined by its AVE square roots' exceeding a specific threshold. (see Figure 1).

4.2 Measurement of the model validation

The CFA results demonstrate a good fit compared to the commonly recognized cut-off values. SRMR (standardized root mean square residual) is less than 8, RMSEA (root mean square error of approximation) is also less than 8, and PClose (*p*-value of close fit) is larger than 0.05 (Byrne, 2016). The standardized factor loadings are statistically significant (*p* 0.05) and within

Table: 1. Measurement items, factor loading, and scale reliability

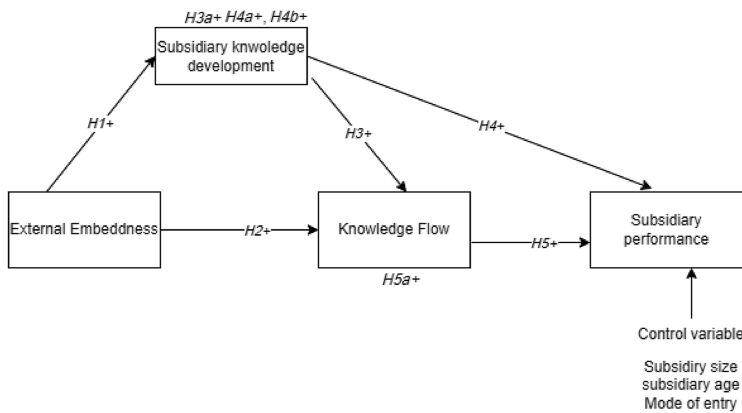
Items	Loading	Cronbach alpha (α)
<i>External Embeddedness (EE) adapted from Andersson et al. (2002)</i>		0.947
1. Strategy know-how (knowledge about customers, competitors, and suppliers)	0.955	
2. Service production strategy know-how	0.932	
3. Marketing know-how (customer relationship management, customer-led product changes, pricing, and market positioning)	0.960	
4. Distribution know-how	0.866	
5. Management systems and practices know-how	0.794	
6. Process design know-how	0.732	
<i>Subsidiary Knowledge Development (SKD) adapted from (Yang et al., 2008)</i>		0.904
1. Strategy know-how (knowledge about customers, competitors, and suppliers)	0.950	
2. Service production strategy know-how	0.960	
3. Process design know-how	0.962	
4. Marketing know-how (customer relationship management, customer-led product changes, pricing, and market positioning)	0.958	
5. Management systems and practices know-how	0.955	
<i>Knowledge flow (KF) adapted from (Gupta and Govindarajan, 2000)</i>		0.976
1. Strategy know-how (knowledge about customers, competitors, and suppliers)	0.954	
2. Service production strategy know-how	0.945	
3. Process design know-how	0.923	
4. Marketing know-how (customer relationship management, customer-led product changes, pricing, and market positioning)	0.930	
5. Distribution know-how	0.887	
6. Packaging design/technology know-how	0.916	
7. Management systems and practices know-how	0.954	
<i>Foreign Subsidiary performance (FSP) adapted from (Birkinshaw et al., 2005)</i>		0.948
1. Our profitability is much better than our competitors,	0.918	
2. Our sales growth has been much higher than our competitors,	0.944	
3. Our market share has been higher than our competitors,	0.922	
4. Our productivity has been much higher than our competitors	0.901	
5. Our customer satisfaction has been much better than our competitors	0.911	
6. Our technological improvement has been much higher than that of our competitors	Dropped	
7. Our new product/service development is much higher than our competitors	0.894	
8. Our quality of product/service is much better than our competitors	0.908	
Source(s): Authors' own creation		

Table 2. Reliability and discriminant assessment of measurement model

	CR	AVE	MSV	MaxR (H)	FSP	KF	EE	SKD
FSP	0.973	0.835	0.276	0.974	0.914			
KF	0.973	0.857	0.276	0.975	0.526***	0.926		
EE	0.952	0.770	0.206	0.972	0.454***	0.329***	0.877	
SKD	0.982	0.916	0.180	0.982	0.342***	0.424***	0.316***	0.957

Note(s): FSP: Foreign subsidiary performance; EE: external embeddedness; KF: knowledge flow; SKD: subsidiary knowledge development; CA: Cronbach alpha; CR: composite reliability; AVE: average variance extracted; MSV: maximum shared squared variance; ASV: average shared variance

Source(s): Authors' own creation

**Figure 1.** Depicts the conceptual framework and hypotheses of the research. (Source: Authors' own creation)

an acceptable range, as depicted in [Figure 2](#) (greater than or equal to 0.50). Chi-Square = 338.422, $df = 245$, relative chi-square/ $df = 1.381$ (threshold is between 1 and 3 is excellent), $p = 0.000$, NFI = 0.965, IFI = 0.990, GFI = 913, AGFI = 894, CFI = 0.990 (>0.95), RMSEA = 0.036 (0.06), SRMR = 0.040 (0.08), and PCLOSE = 0.990 (see [Table 3](#)).

4.3 Common method bias

CMB occurs when the variance in responses is attributed to the measurement techniques rather than the valid constructs, which may jeopardize the validity of research findings ([Podsakoff et al., 2003](#)). To mitigate this, both procedural and statistical approaches were applied.

Procedurally, a structured questionnaire was designed with input from industry experts and academics to enhance clarity. Key constructs, particularly FSP, were separated to prevent response bias. A confidentiality assurance letter was also provided, emphasizing anonymous data handling to reduce social desirability bias. Statistically, Harman's Single-Factor test was conducted, showing that the first factor accounted for only 32.36% of the total variance, remaining below the 50% threshold ([Podsakoff et al., 2003](#)). Furthermore, a CLF test has been performed to compare regression weights between models with and without CLF, revealing a minimal difference (0.200), confirming a negligible CMB impact ([Gaski, 2017](#)). The measurement model's fit indices were also strong (RMSEA = 0.032, CFI = 0.993, TLI = 0.991, GFI = 0.926, $Chisq/df = 1.298$). These combined procedural safeguards and statistical tests confirm that CMB does not significantly influence this study's findings, ensuring research validity (see [Table 4](#)).

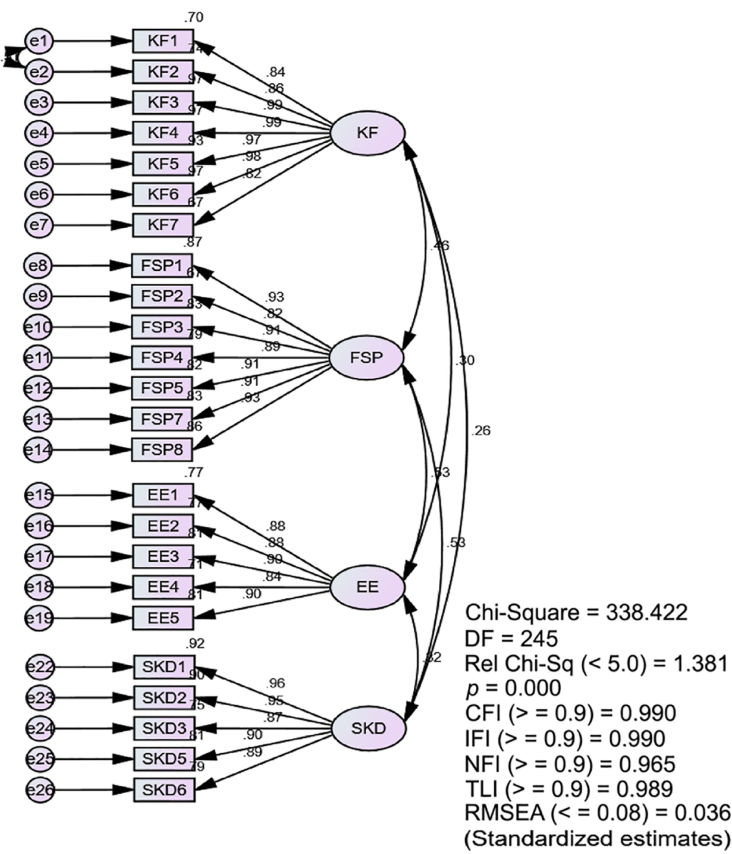


Figure 2. Measurement model assessment. (Source: Authors' own creation)

Table 3. Overall model fit

Construct	CMIN/DF	GFI	CFI	NFI	SRMR	RMSEAS	PCLOSE
Indicator value	1.547	0.913	0.990	0.965	0.032	0.036	0.995
Note(s): Cutoff Criteria for Fit Indexes in Covariance Structure Analysis: CMIN/DF=> 5 (terrible); >3 (acceptable); >1 (excellent); CFI=<0.90 (terrible); <0.95 (acceptable); >0.95 (excellent); SRMR=>0.10 (terrible); >0.08 (acceptable); <0.08 (excellent); RMSEA =>0.08 (terrible); >0.06 (acceptable); <0.06 (excellent); PClose=<0.01(terrible); <0.05 (acceptable); >0.05 (excellent)							
Source(s): Authors' own creation							

4.4 Control variables

We incorporate firm size, age, and entry mode as control variables. Firm size and age are measured by multiplying the number of employees by the logarithm of subsidiary years in Malaysia. Entry mode distinguishes acquired subsidiaries (1) from Greenfield operations (0), recognizing prior research on its impact on knowledge development and transfer (Gupta and Govindarajan, 2000). We also control for new product age, acknowledging that older innovations may influence FSP more. The rationale for including these controls is grounded in prior research that suggests larger, more established subsidiaries may have better resources and knowledge networks, potentially impacting their ability to develop and share knowledge.

Table 4. Standardized regression weights: (With CLF and without CLF)

Total items	Items name	Estimate (without CLF)	Estimate (with CLF)	Δ (Delta = D4-I4)
1	EE1	0.955	0.914	0.041
2	EE2	0.932	0.928	0.004
3	EE3	0.96	0.89	0.07
4	EE4	0.866	0.849	0.017
5	EE5	0.794	0.793	0.001
6	EE6	0.732	0.731	0.001
7	SKD1	0.95	0.893	0.057
8	SKD2	0.96	0.645	0.315
9	SKD3	0.962	0.665	0.297
10	SKD4	0.958	0.926	0.032
11	SKD5	0.955	0.9	0.055
12	KF1	0.954	0.898	0.056
13	KF2	0.945	0.909	0.036
14	KF3	0.923	0.732	0.191
14	KF4	0.93	0.901	0.029
16	KF5	0.887	0.877	0.01
17	KF6	0.916	0.857	0.059
18	KF7	0.954	0.867	0.087
19	FSP1	0.918	0.827	0.091
20	FSP2	0.944	0.87	0.074
21	FSP3	0.922	0.861	0.061
22	FSP4	0.901	0.867	0.034
23	FSP5	0.911	0.859	0.052
24	FSP6	0.894	0.843	0.051
25	FSP6	0.908	0.833	0.075

Note(s): The estimated row without CLF D4 and with CLF row is I4

Source(s): Authors' own creation

More importantly, incorporating these controls improves the model's explanatory power, as indicated by an increase in the R-squared value from 30% to 39%, confirming their relevance in explaining FSP.

4.5 Path coefficients and structural model

The findings strongly support the hypothesized relationships and align with prior research on the role of EE in SKD and FSP. We tested our hypotheses via bootstrapping with 5,000 samples to determine confidence intervals (CI) (Chen *et al.*, 2016). Results from the survey data confirm [Hypothesis 1](#), showing a positive relationship between EE and SKD ($\beta = 0.435$, $p = 0.000$, $SE = 0.79$, $CR = 5.519$). This reinforces previous studies highlighting the importance of subsidiary integration into local networks for knowledge acquisition and innovation (Andersson *et al.*, 2002). Similarly, [hypothesis 2](#) establishes a strong link between KF and EE ($\beta = 0.284$, $p = 0.001$, $SE = 0.73$, $CR = 3.902$), consistent with Gupta and Govindarajan (2000), who argue that embedded subsidiaries enhance intra-MNE knowledge transfer. [Hypothesis 3](#) also validates that SKD facilitates KF ($\beta = 0.332$, $p = 0.001$, $SE = 0.53$, $CR = 6.254$), supporting Minbaeva *et al.* (2002), who emphasize local knowledge creation in strengthening knowledge-sharing across the MNE. Findings from [hypothesis 4](#) confirm that SKD positively impacts FSP ($\beta = 0.124$, $p = 0.010$, $SE = 0.48$, $CR = 2.568$), aligning with Najafi-Tavani *et al.* (2015), who argue that subsidiaries leveraging internal knowledge gain a competitive advantage. Additionally, [Hypothesis 5](#) reveals a significant positive correlation between KF and FSP ($\beta = 0.424$, $p = 0.000$, $SE = 0.53$, $CR = 8.026$), reinforcing Tsai (2001)

and Shukran and Mustamil (2023), who highlight effective knowledge sharing as a key driver of subsidiary success (see Figure 3).(see Table 5)

4.6 Results with a mediation model from the 2017–2018 survey

Using the bootstrap approach, we validate these indirect effects, as bootstrapping enhances accuracy by eliminating distributional assumptions (Tibshirani and Efron, 1993). The results indicate that hypothesis 3a is supported, with SKD significantly mediating the relationship between EE and KF ($\beta = 0.145$, lower bound = 0.098, upper bound = 0.210, $p = 0.000$). Similarly, hypothesis 4a is validated, showing that SKD mediates the EE-FSP relationship ($\beta = 0.054$, lower bound = 0.015, upper bound = 0.112, $p = 0.000$), aligning with prior research that emphasizes SKD as a key mechanism for enhancing FSP (Preacher and Hayes, 2008). Additionally, the survey results confirm that KF mediates the EE-FSP relationship (hypothesis 4b: $\beta = 0.061$, lower bound = 0.042, upper bound = 0.093, $p = 0.000$), highlighting that KF is strengthened when subsidiaries actively engage in SKD. Furthermore,

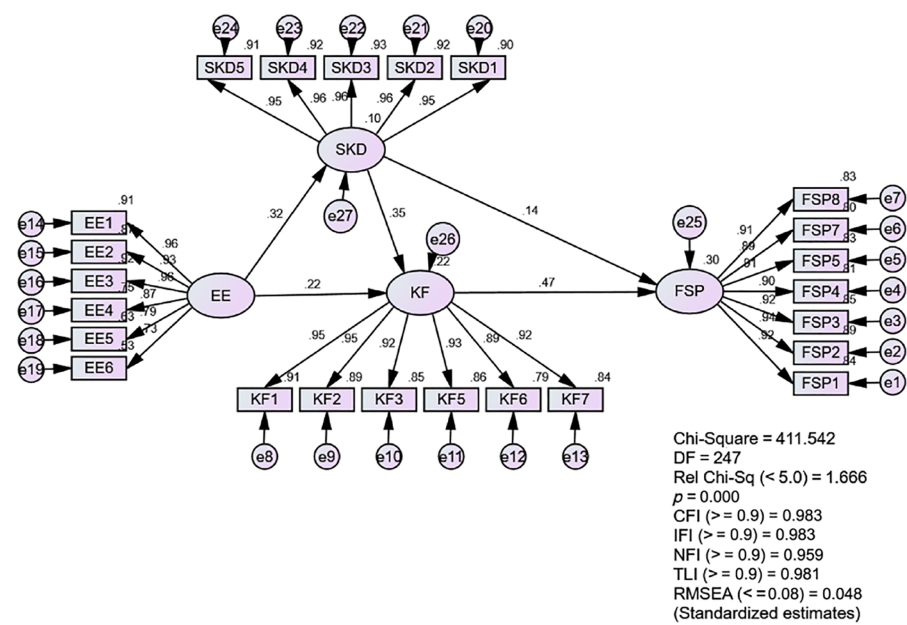


Figure 3. Structural model assessment. (Source: Authors’ own creation)

Table 5. The summary of the structural equation modeling

Hypotheses and path	Beta	Standard error	Critical ration	P-value	Remarks
H1: EE→ SKD	0.435	0.079	5.519	***	Supported
H2: EE→ KF	0.284	0.073	3.902	***	Supported
H3: SKD→ KF	0.332	0.053	6.254	***	Supported
H4: SKD→ FSP	0.124	0.048	2.568	0.010	Supported
H5: KF→ FSP	0.424	0.053	8.026	***	Supported

Note(s): *** is statistically significant at a 0.001 level
Source(s): Authors’ own creation

[hypothesis 5a](#) demonstrates that the benefits of EE are maximized only when subsidiaries develop internal knowledge, as indicated by a significant mediation effect of EE via SKD on FSP ($\beta = 0.120$, lower bound = 0.060, upper bound = 0.199, $p = 0.001$) (see [Table 6](#)).

4.7 The rationale for using panel data regression and its relevance to the 2017–2018 survey research

This study employs panel data regression analysis to examine how EE, SKD, and KF influence FSP over 2017–2024. While the 2017–2018 survey provides a strong empirical foundation, the long-term nature of SKD and FSP necessitates a multi-year approach to assess their sustained impact. Panel regression is suitable for tracking subsidiary performance trends over time while accounting for cross-sectional differences across subsidiaries ([Nguyen, 2023](#)).

Unlike cross-sectional analysis, which captures a single point in time, panel regression differentiates short-term fluctuations from long-term trends, ensuring more robust causal inferences ([Arkhangelsky and Imbens, 2024](#)). Since subsidiaries operate in dynamic business environments, their knowledge-sharing strategies and external networks evolve, making a longitudinal approach essential for evaluating sustained effects. Furthermore, panel regression controls for external shocks, such as the COVID-19 pandemic, allow us to distinguish performance changes driven by internal subsidiary strategies from those caused by external disruptions.

FE and RE regression analyses were conducted to determine the best-fit model. The Hausman test confirmed that the FE model was more appropriate, as it controls for time-invariant subsidiary-specific factors such as industry type, location, and corporate structure, thereby reducing unobserved heterogeneity bias ([Najafi-Tavani et al., 2015](#)). Using panel regression enhances the credibility of the 2017–2018 survey findings, validating whether the strategic knowledge development and embeddedness mechanisms identified in the survey remained effective over time. The panel regression analysis reveals the long-term effects of EE, SKD, and KF on FSP. The FE model results are presented in [Table 7](#).

Table 6. The mediating effect of SKD, KF, and FSP

Relationship	Beta value	Lower bound	Upper bound	P-value	Remarks
H3a : EE-SKD-KF	0.145	0.098	0.210	0.000	Mediation
H4a : EE-SKD-FSP	0.054	0.015	0.112	0.000	Mediation
H4b : EE-SKD-KF-FSP	0.061	0.042	0.093	0.000	Mediation
H5a : EE-KF- FSP	0.120	0.060	0.199	0.001	Mediation

Note(s): *** $p < 0.001$

Source(s): Authors' own creation

Table 7. Fixed effects panel regression result

Variable	Coefficient (β)	Std. Error	t-value	p-value	Interpretation
External Embeddedness	0.32	0.07	4.57	0.001	Positively impacts subsidiary performance
Subsidiary Knowledge Dev.	0.39	0.06	5.81	0.000	Strongest predictor of performance
Knowledge Flow	0.26	0.05	3.94	0.002	Knowledge-sharing enhances performance
COVID-19 Dummy	−0.11	0.08	−1.38	0.174	No direct impact

Source(s): Authors' own creation

Panel regression analysis and survey data provide several key findings. First, EE significantly influences FSP ($\beta = 0.32, p < 0.01$). Subsidiaries embedded in local networks, strategic alliances, and host-market collaborations experience greater knowledge acquisition, operational efficiency, and competitiveness. This finding aligns with [Andersson et al. \(2005\)](#), who argue that strong subsidiary ties to external networks foster knowledge absorption and innovation.

Second, SKD emerges as the most influential predictor of FSP ($\beta = 0.39, p < 0.001$). Subsidiaries that prioritize R&D investments, digital transformation, and AI-driven knowledge-sharing mechanisms outperform those that do not. These findings support [Ferraris et al. \(2020a\)](#), who highlight that subsidiaries leveraging digital transformation achieve higher adaptability and resilience, even in uncertain environments.

Additionally, KF is a significant driver of FSP ($\beta = 0.26, p < 0.01$). Subsidiaries engaging in frequent intra-MNE knowledge exchanges, such as technology transfers, best practice sharing, and collaborative innovation, achieve higher operational efficiency. This is consistent with [Ciabuschi et al. \(2014\)](#), who emphasize that internal knowledge-sharing mechanisms enhance subsidiary competitive advantages and strategic alignment within MNEs. Interestingly, the COVID-19 dummy variable is not statistically significant ($p = 0.174$), suggesting that the pandemic did not directly impact FSP.

4.8 Validating the 2017–2018 survey findings

This study reinforces the survey findings by employing panel regression, demonstrating their continued relevance in a rapidly changing global business environment. The original survey identified EE, SKD, and KF as critical performance drivers. The panel data analysis confirms that these variables have remained significant over 2017–2024, providing strong empirical validation of their long-term impact on FSP.

Moreover, the findings highlight that EE alone cannot drive performance gains. Subsidiaries must actively develop and internalize knowledge to maximize the benefits of external engagement. This underscores the strategic importance of combining external collaboration with internal capability-building to drive sustained performance and innovation ([Huang et al., 2025](#); [Shukran et al., 2023](#)). The panel regression analysis results validate the survey findings, confirming that EE, SKD, and KF remain critical for long-term FSP.

5. Discussion and conclusions

5.1 Discussion

This study offers strong empirical support for the positive relationships between EE, SKD, KF, and FSP. Survey data initially established these links, and panel regression analysis confirms their long-term relevance.

Subsidiaries embedded in local networks show higher knowledge acquisition and development capabilities, reinforcing the findings of [Ciabuschi et al. \(2014\)](#). Both survey and regression data affirm that EE positively influences SKD and overall performance. Similarly, consistent with [Minbaeva et al. \(2002\)](#) and [Lee et al. \(2020\)](#), KF is confirmed as a critical factor in boosting innovation and operational efficiency.

In the Malaysian context, EE is particularly strategic for KIBS, helping subsidiaries overcome institutional and expertise barriers. Panel data highlight how network-based knowledge-sharing and partnerships contribute to resilience and competitiveness, aligning with [Achcaoucaou et al. \(2017\)](#) and [Gölgeci et al. \(2019\)](#).

While COVID-19 had no direct statistical impact, subsidiaries with strong EE and structured knowledge strategies showed greater resilience, supporting [Ferraris et al. \(2020b\)](#). Integrating survey and panel data confirms that EE, KF, and SKD are enduring drivers of MNE subsidiary performance in evolving global environments.

5.2 Conclusion

The findings reinforce that EE facilitates KF and FSP, positioning subsidiaries for sustained competitive advantage. The study further highlights that KF is pivotal in improving FSP, with subsidiaries engaged in active knowledge-sharing networks achieving greater innovation and adaptability.

As Malaysia transitions from a post-agricultural to a service-driven economy, subsidiary success will increasingly depend on their ability to leverage external relationships. However, institutional challenges and limited local expertise in the KIBS sector remain key barriers to growth. The study emphasizes the need for enhanced institutional support and a stronger knowledge infrastructure to unlock the full potential of KIBS. Addressing these structural challenges will allow Malaysia to strengthen its position as a global innovation hub, ensuring its service sector continues to drive economic growth and diversification.

5.3 Theoretical contribution

This study contributes to the understanding of FSP by integrating insights from network theory and the RBV, emphasizing the role of EE, SKD, and KF in shaping innovation and performance outcomes (Govindarajan and Ramamurti, 2011; Achcaoucaou *et al.*, 2014). It reinforces that subsidiary success is not solely dependent on internal resources but is significantly influenced by external relationships and institutional contexts. MNE subsidiaries operate within dynamic network environments where market conditions, partnerships, and knowledge-sharing mechanisms directly affect their competitive edge.

The study's theoretical novelty lies in its integrated framework that combines network theory and RBV and empirically maps the mediation pathways through which EE, SKD, and KF influence FSP. Specifically, identifying and testing four critical mediation effects (EE-SKD-KF; EE-SKD-KF-FSP; EE-SKD-FSP; EE-KF-FSP) offers a refined understanding of how internal and external knowledge mechanisms interact to drive sustained subsidiary performance. This expands existing theory by linking knowledge embeddedness and digital knowledge transmission to performance over time. The study also offers practical guidance for MNE managers, emphasizing that competence creation and knowledge absorption are amplified through external embeddedness.

5.4 Practical implications

This study offers valuable insights into how EE, SKD, and KF collectively influence FSP, particularly in the context of KIBS and digital transformation. By integrating network theory and the RBV, this research provides a framework that enhances both academic understanding and practical application for MNEs.

5.4.1 Relevance to research and practice. From a managerial perspective, the study highlights the strategic importance of EE in fostering innovation, adaptability, and long-term subsidiary success. MNEs can optimize knowledge exchange and enhance FSP by implementing structured mechanisms for knowledge-sharing and collaboration across geographically dispersed units. Key strategies include:

- (1) Developing Digital Knowledge Platforms - AI-powered systems, cloud-based knowledge repositories, and blockchain-enabled transparency tools can facilitate real-time knowledge sharing, enabling subsidiaries to access and utilize firm-wide expertise efficiently (Huang *et al.*, 2025).
- (2) Strengthening Communities of Practice -Establishing knowledge-sharing networks within MNEs encourages subsidiaries to exchange best practices, insights, and innovations, reinforcing cross-border learning (Ferraris *et al.*, 2020a, b).
- (3) Encouraging Cross-Divisional Learning Initiatives—Structured programs such as virtual innovation hubs, inter-subsidiary collaboration projects, and cross-functional training can accelerate knowledge transfer and integration (Conroy *et al.*, 2023).

5.4.2 Effects on society. The implications of this research are not limited to the corporate sector; they also affect public policy and societal well-being. MNEs can contribute to the broader societal objective of economic development, particularly in emerging markets such as Malaysia, by fostering a knowledge exchange and collaboration culture. The dissemination of advanced practices and innovations that benefit local industries and economies can be facilitated by effective KF within MNEs, enhancing the quality of life and promoting sustainable economic growth (Chandran, 2022). Furthermore, the study's emphasis on the role of KIBS underscores the potential for MNEs to shape public perceptions of innovation and knowledge-based economies, thereby promoting a more progressive and informed society (Tsai, 2024; Shukran and Mustamil, 2023).

5.5 Limitations and future research

Despite providing valuable insights into EE, SKD, and KF, this study has several limitations that should be acknowledged. *Firstly*, the study relies on survey and panel data, which may not fully reflect recent technological disruptions, such as AI-driven collaboration, blockchain-enabled transparency, and digital knowledge-sharing platforms (Huang *et al.*, 2023). Future research should incorporate real-time data collection to capture ongoing transformations in subsidiary knowledge networks better. *Secondly*, the study focuses on Malaysia's KIBS sector, which limits the generalizability of the findings to other industries and geographical contexts. Manufacturing, energy, and traditional service sector subsidiaries may experience different knowledge flow dynamics and performance drivers. Future studies should expand to diverse industries and emerging economies to ensure broader applicability. *Thirdly*, although surveys in AMOS 26 and panel regression in Stata provide intense analytical rigor, CMB remains a potential concern due to the self-reported nature of survey responses. While Harman's Single-Factor and CLF tests confirmed minimal CMB (Podsakoff *et al.*, 2024), integrating multi-source data, qualitative methods, and real-time performance tracking could enhance validity. *Finally*, while panel regression helps track longitudinal trends, it does not establish definitive causal relationships. To strengthen causal inferences, future studies should employ difference-in-differences (DiD) analysis, instrumental variable (IV) approaches, and quasi-experimental methods (Abadie *et al.*, 2010). Acknowledging these limitations, this study remains a significant contribution to understanding subsidiary knowledge strategies. Future research should expand industry scope, integrate digital embeddedness, and apply advanced causal analysis to refine insights into subsidiary performance in an evolving global business environment.

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