ISSN 2683-345X
journal homepage: http://ijiemjournal.uns.ac.rs/
International Journal of Industrial Engineering and Management
Volume 15 / No 1 / March 2024 / 34 - 44

Original research article

The Influence of Link Duration on Supplier-Buyer Collaboration in the Automotive Industry: Lessons from Greater Jakarta, Indonesia

D. O. Syah[a], T. Umemura[b], C. Ricky[c,*]

[a] Universitas Indonesia, Faculty of Administrative Science, Department of Business Administration, Depok, Indonesia;
[b] Nagoya University, Graduate School of International Development (GSID), Nagoya, Japan;
[c] Ritsumeikan University, Graduate School of Technology Management, Ibaraki, Osaka, Japan

ABSTRACT

This exploratory study investigates the association between technology transfer, technical exchange, and supplier performance within Greater Jakarta, Indonesia, focusing on the moderating role of link duration in the buyer-supplier relationship in the automotive industry. The data collection involved site visits and the administration of Likert-scale questionnaires to middle to upper-level management personnel responsible for relevant processes. The sampled population comprised 99 companies, including six assembler companies, 59 tier-1 companies, and 34 tier-2 companies. Smart PLS 3.2.7 software was employed to conduct partial least squares multi-group analysis (PLS-MGA) to process and analyze the data. The analysis was divided into two groups: the first exploration consisted of buyer-supplier relationships of less than five years and more than five years. Next, the second exploration consisted of buyer-supplier relationships of less than and more than ten years. The findings revealed that technology transfer has significant importance in relationships lasting over five but less than ten years, while technical exchange becomes significant in relationships exceeding five years. The research contributes valuable insights into the dynamics of supplier-buyer collaboration in the automotive industry, particularly in the Indonesian context.

ARTICLE INFO

Article history:
Received May 14, 2023
Revised November 15, 2023
Accepted January 10, 2024
Published online January 23, 2024

Keywords:
Link duration;
Technology transfer;
Technical exchange;
Supplier performance improvement;
Automotive industry

*Corresponding author:
Christian Ricky
christian.ricky@gmail.com

1. Introduction

Knowledge transfer is recognized as a competitive advantage that relies not only on internal idiosyncrasies, but also on resources derived from external networks [1]. External network resources can be harnessed to generate value through buyer-supplier collaboration [2], [3]. As Porter [4] posits, the intricacies of knowledge transfer within buyer-supplier relationships are multifaceted. Nevertheless, fostering collaboration and frequent communication between firms can enhance the positive outcomes of supply chain integration between buyers and suppliers. Moreover, Schuh et al. [5] suggest that procurement can serve as a "secret weapon" for overcoming challenging circumstances by positioning suppliers at the core of the business. Consequently, examining the duration of relationships (link duration) within an organization becomes crucial. For instance, Kotabe et al. [6] assert that efficiency can be achieved through the duration of a relationship, leading to strategies that promote knowledge transfer. They explain knowledge transfer

Published by the University of Novi Sad, Faculty of Technical Sciences, Novi Sad, Serbia.

http://doi.org/10.24867/IJIEM-2024-1-346

in terms of technology transfer within collaborative endeavors, enabling one partner to replicate the technological capabilities of another. In addition, Zainal Abidin et al. [7] consider technical exchange (or technical information) and technical assistance as crucial in order to rapidly assimilate technology and advance knowledge.

Technical exchange and assistance facilitate the sharing of small-scale engineering knowledge between the information-providing firm and the recipient. Furthermore, the receiving organization's absorptive capacity and the length of the relationship between firms influence such exchange. Absorptive capacity refers to the recognition, assimilation and application of new information [8]. Consequently, the connection between information transfer (technical exchange and technology transfer) and the duration of firm relationships (link duration) is pertinent.

Syah's [9], [10] investigations into the automotive industry aimed to clarify the relationship between information transfer and link duration, thereby illuminating the importance of link duration, technology transfer, and technical exchange. Syah [9], [10] defines link duration as the interaction between the buyer and supplier, typically measured on an annual basis. Although link duration has been explored in previous studies [6], [11], none has examined it as a moderating variable. This study aims to evaluate the moderating role of link duration, as it provides insights into the strength of buyer-supplier relationships in automotive industries with regard to supplier performance enhancement factors. Furthermore, it is also reasonable to expect that the relationship will strengthen as the duration of the buyer-supplier link increases.

The study concentrates on the automotive industry based on to findings from previous research on buyer-supplier link duration and performance improvement [6], [10]. Additionally, Indonesia was selected as the research context because its automotive industry has exhibited overall positive growth [12] and constitutes a primary sector in Industry 4.0 [13]. Furthermore, Greater Jakarta (Jabodetabek) was chosen as the study location, as it encompasses most of the Indonesian automotive industry [10], [14].

An exploratory study was conducted to investigate the relationship between technology transfer, technical exchange, and supplier performance improvement, with an emphasis on the moderating role of link duration. In line with Kotabe et al. [6], link durations of five and ten years were selected for the exploratory research, and two research questions were formulated to explore the association:

(1) What is the role of link duration as a moderating factor in the buyer-supplier relationship between technology transfer and supplier performance improvement in the Greater Jakarta automotive industry?

(2) What is the role of link duration as a moderating factor in the buyer-supplier relationship between technical exchange and supplier performance improvement in the Greater Jakarta automotive industry?

The remainder of this paper is organized as follows. Section 2 provides a literature review and a concise overview of the variables under investigation. Section 3 outlines the research methodology employed, the conceptual model, and the proposed hypotheses, while Section 4 discusses the results, followed by an interpretation of the findings. Section 5 concludes the overall study.

2. Literature Review

2.1 Technology Transfer and Technical Exchange

Technology transfer and technical exchange represent two crucial forms of knowledge transfer within the automotive industry [9]. As delineated by Kotabe et al. [6], such transfer entails a collaborative relationship which allows one partner to scrutinize and replicate the comprehensive technological competencies of the other. When the technology transfer process from buyer to supplier proceeds seamlessly, capabilities in technical and engineering fields are enhanced, particularly when manufacturing numerous intricate components necessitates complex technology and robust coordination between buyer and supplier.

Knowledge transfer in the automotive industry is challenging due to several factors. For example, technology is embedded in products, processes and people, and it is also disseminated through various institutional channels [15]. Consequently, if technology transfer represents a broader form of knowledge transfer, technical exchange—small-scale exchanges of technical information—proves more straightforward in comparison. In this context, technical exchange is defined as technical communication to address engineering issues [6].

Numerous researchers have focused on knowledge transfer between buyers and suppliers. For instance, a study of the Malaysian automotive industry identified such transfer based on the explicit and tacit knowledge of industry capabilities [16]. Lawson et al. [17] reported that managerial communication and technical exchange enhance supply chain performance, while in a study conducted in Greater Jakarta, Indonesia, Syah et al. [18] found that technical exchange significantly improved supplier performance in relationships between Original Equipment Manufacturer (OEM) and tier-1 companies. Additionally, Takeishi [19] outlined focal areas in automotive product design among buyer-suppliers, including problem-solving practices, communication patterns, and knowledge levels. In summary, previous research has argued that technology and knowledge transfers facilitate faster product development, superior end products, and improved supplier performance within buyer-supplier relationships.

In this study, technology transfer refers to four elements: 1) Sharing high-level engineering capability with suppliers; 2) Willingness to transfer technology to suppliers; 3) Buyers/suppliers willingness to share technologies; and 4) technological support from partners (buyer/supplier firms) has on many occasions been shown to help solve technical problems. In turn, technical exchange comprises six elements: 1) engineers' and sales teams' close relationships with supplier and buyer personnel; 2) in the development process, communication is "two-way" rather than unilateral; 3) regular contact between partners and engineers; 4) buyers and suppliers often convey strategic engineering information through informal discussion; 5) communication between the buyer and the supplier often starts to appear early in the development process; and 6) informal communication often reduces lead times in the development process.

2.2 Link Duration between Buyer and Supplier

Sikombe and Phiri [20] conducted a literature review to identify the key factors of knowledge transfer that impact suppliers' innovation capacities. One of their findings revealed that link duration influenced tacit knowledge and innovation transfer within buyer-supplier relationships. Successful implementation of knowledge transfer requires a comprehensive approach, one of the critical components of this being the duration of the implementation [21]. In addition, other studies have corroborated the notion that the partnership duration between buyer and supplier in the automotive industry during product design and development is beneficial for both parties [22]. Research has discovered that suppliers invest significantly in partnerships with buyers (OEM), particularly in terms of human resources and time. Suppliers attend buyer meetings, while buyers dedicate time and effort to train new suppliers, enhance quality performance, and address supplier concerns.

However, Squire et al. [23] posited that knowledge exchange was more prevalent in earlier business interactions than in later ones. In a similar vein, Arvitrida et al. [11] emphasized that partnership duration does not substantially impact demand fulfilment and supply chain resilience. These findings suggest that the advantage of fostering long-term partnerships does not necessarily bolster supply chain competitiveness in the long run. Conversely, Wagner [24] expounded that the buyer-supplier relationship life cycle and link duration might enhance supplier development activity performance. Furthermore, research on Toyota's supplier association (*kyohokai*) demonstrated that nurturing relationships and processes to facilitate effective knowledge management takes time [25]. In summary, previous studies underline that time, as represented by link duration, is a factor that can either strengthen or weaken partnerships between suppliers and buyers. Consequently, the examination of moderating links is an important issue and warrants the analysis made in this study.

2.3 Supplier Performance Improvement

Supplier performance improvement plays a crucial role in supporting buyers, particularly OEMs or assemblers, within the context of the value chain. For example, Kotabe et al. [6] identified two primary insights from technology transfer: technical exchange and supplier performance improvement. First, suppliers benefited from a systematic knowledge exchange process when interacting with buyers. Second, a higher level of technology transfer occurred in an optimal environment characterized by a long-established link duration between supplier and buyer.

In this study, supplier performance improvement is related to four elements, namely improving product design, process design, product quality, and reducing lead time. Wu et al. [26] emphasize the importance of supplier base alignment in enhancing supplier operational performance, specifically in product design, process design, product quality, and on-time delivery. Additionally, Wagner [24] highlights the significance of lead time reduction in improving demand chain performance, addressing the limitations posed by long lead times in enhancing performance. Furthermore, Handfield et al. [27] discuss how strong relational partnerships between buyers and suppliers can improve suppliers' understanding of buyers' needs and their performance, aligning with the elements of product and process design, product quality, and lead time reduction.

3. Methods

Following Kotabe et al. [6], and with the objective of exploring differences in link duration, two groups were formed and divided by link duration. In the first exploratory analysis, group 1 had a link duration of less than five years and group 2 had one of over five years. The reason why the two groups were formed on the basis of less than five and more than five years was because previous research [6] on Japanese manufacturers showed that a link duration between supplier and buyer companies was positive if it exceeded 3-4 years. In the second exploratory test, two groups were also formed, one with a link duration of less than 10 years, and the other with a duration of more than 10 years. The reason for implementing a link duration of 10 years was because the same research conducted by Kotabe et al. (2003), this time on US manufacturers, showed that a link duration was positive if it exceeded 10 years. Therefore, this study aimed to research the link duration between buyer and supplier automotive companies in Greater Jakarta, Indonesia.

We employed partial least squares multi-group analysis (PLS-MGA) to investigate the differences between the groups. MGA is a statistical technique used in PLS to test the influence of moderating variables. The method involves a parametric significance test for differences between two specific groups. Once the results are processed, the outcomes are compared to determine which group has the best performance.

3.1 Conceptual Model

In line with Syah's [9] findings, a positive impact of both technology transfer and technical exchange on supplier performance in Indonesia (OEM-Tier-1-Tier-2). Moreover, within the context of supply chain integration between OEMs and suppliers, the OEM system enhances the performance of suppliers [14]. This paper proposes technical exchange and technology transfer based on previous research, with link duration serving as a moderating factor to improve supplier performance. This relationship is illustrated in Figure 1, showing the conceptual framework.

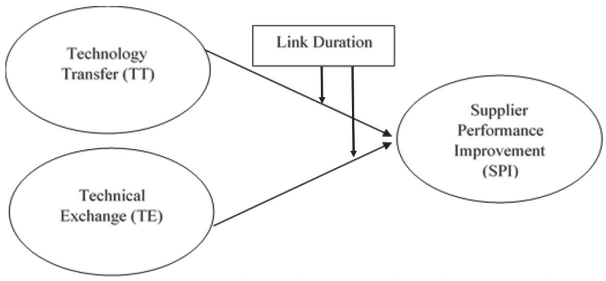

Figure 1. Conceptual Framework

3.2 Hyphothesis Development

Following [6], and with the objective of exploring differences in link duration, the authors propose two sets of hypotheses. Each set of hypotheses was tested within each group to examine the significance of technology transfer and technical exchange in relation to supplier performance improvement. The following subsections discuss the hypothesis development. Figure 2 shows the set of hypotheses for each group.

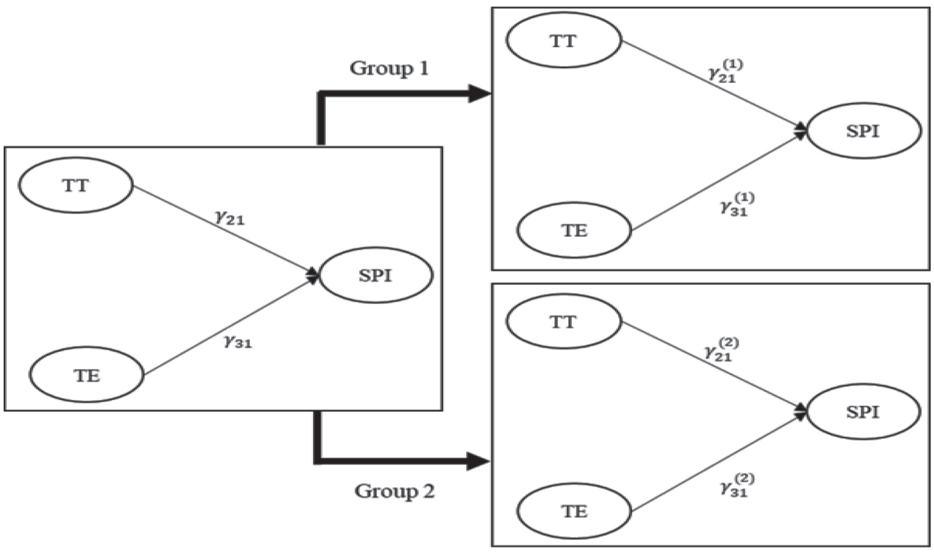

Figure 2. Multi Group Analysis (Source: Authors)

The first group (Group 1) addresses the relationship between link duration of less than five years and more than five years:

1. H_0: $\gamma_{21}^{(1)} = \gamma_{21}^{(2)}$ - There is no difference in buyer-supplier link duration in the relationship between technology transfer and supplier performance improvement. A "no difference" result implies that the relationship is not significant.
2. H_1: $\gamma_{21}^{(1)} \neq \gamma_{21}^{(2)}$ - There is a difference in buyer-supplier link duration in the relationship between technology transfer and supplier performance improvement. A "difference" result implies that the relationship is significant.
3. H_0: $\gamma_{31}^{(1)} = \gamma_{31}^{(2)}$ - There is no difference in buyer-supplier link duration in the relationship between technical exchange and supplier performance improvement. A "no difference" result implies that the relationship is not significant.
4. H_1: $\gamma_{31}^{(1)} \neq \gamma_{31}^{(2)}$ - There is a difference in buyer-supplier link duration in the relationship between technical exchange and supplier performance improvement. A "difference" result implies that the relationship is significant.

The second group (Group 2) addresses the relationship between link duration of less than 10 years and more than 10 years:

1. H_0: $\gamma_{22}^{(1)} = \gamma_{22}^{(2)}$ - There is no difference in buyer-supplier link duration in the relationship between technology transfer and supplier performance improvement. A "no difference" result implies that the relationship is not significant.
2. H_1: $\gamma_{22}^{(1)} \neq \gamma_{22}^{(2)}$ - There is a difference in buyer-supplier link duration in the relationship between technology transfer and supplier performance improvement. A "difference" result implies that the relationship is significant.
3. H_0: $\gamma_{32}^{(1)} = \gamma_{32}^{(2)}$ - There is no difference in buyer-supplier link duration in the relationship between technical exchange and supplier performance improvement. A "no difference" result implies that the relationship is not significant.
4. H_1: $\gamma_{32}^{(1)} \neq \gamma_{32}^{(2)}$ - There is a difference in buyer-supplier link duration in the relationship between technical exchange and supplier performance improvement. A "difference" result implies that the relationship is significant.

Respondents

The questionnaire was distributed to the companies list obtained from PIKKO (Small and Medium-Sized Automotive Component Companies) and KIKO (Indonesian Automotive Component Industry Cooperative), which represent automotive associations in Indonesia [9]. Over 150 companies were randomly approached for responses; however, only 99 agreed to participate in the study. These respondents included six assembler companies, 59 tier-1 enterprises, and 34 tier-2 companies. The response rate exceeded the minimum threshold, leading to the conclusion that the outcomes were representative of the automotive industry in Greater Jakarta. Table 1 represents the demographic of respondents.

To mitigate bias and misrepresentation, it is crucial that respondents (interviewees) are appropriate representatives for the interviews. Hence, the following requirements were established for the research participants:

1. Those completing the questionnaire should be owners, heads of production or directors possessing the authority to assess the technical aspects of products within their company.
2. Respondents should have been involved in production for a minimum of two years.
3. Automotive respondents must include supplier companies as part of their operations.

3.3 Latent variables and indicators

Table 2 shows the latent variables (constructs), with four indicators of Technology Transfer (TT), six of Technical Exchange (TE), and four of Supplier Performance Improvement (SPI).

3.4 PLS-MGA Test

All the data were analyzed using PLS-MGA and SmartPLS 3.2.7. The PLS-MGA process builds on PLS-SEM bootstrapping results if the probability value $\gamma_2^{(1)} \geq$ probability value $\gamma_2^{(2)}$, meaning that $\gamma_2^{(1)}$ is more significant than $\gamma_2^{(2)}$.

$$\text{Probability } \gamma_{(2)} = \frac{frequency\ \gamma_2^{(1)} \geq \gamma_2^{(2)}}{Total\ frequency\ of\ bootstrap\ samples} \quad (3.1)$$

Table 1. Respondent Demographics (Source: Authors' Field Research)

Respondent Profiles		Frequency	Percentage
Company Type	Assembler	6	6.06 %
	Tier-1	59	59.59 %
	Tier-2	34	34.34 %
Location (City)	Jakarta	10	10.10 %
	Bogor	9	9.09 %
	Depok	1	1.01 %
	Tangerang	1	1.01 %
	Bekasi	75	75.75 %
	Karawang	3	3.03 %
Sales	Less than 300 million IDR	2	2.02 %
	300 million - 2.5 trillion IDR	18	18.18 %
	2.5 - 50 trillion IDR	35	35.35 %
	More than 50 trillion IDR	31	31.31 %
	Neglect to Answer	13	13.13 %
Link Duration (length of relationship)	2-3 years	16	16.16 %
	3-5 years	20	20.20 %
	5-10 years	33	33.33 %
	10-15 years	19	19.19 %
	More than 15 years	11	11.11 %

Table 2. Indicator Variables [6]

Latent Variable	Indicators	Symbol	Scale
Transfer Technology	Sharing of high-level engineering capability to suppliers	TT1	Likert 1-5
	Willing to transfer technology to suppliers	TT2	Likert 1-5
	Partners' willingness to share technologies	TT3	Likert 1-5
	Technological support from partner firms on many occasions has assisted us to solve technical problems	TT4	Likert 1-5
Technical Exchange	Our engineers and sales teams have a close relationship with our suppliers' personnel	TE1	Likert 1-5
	Communication is "two-way" rather than unilateral in the development process	TE2	Likert 1-5
	Regular contact between our partners and engineers is valuable (important)	TE3	Likert 1-5
	Our partners often convey strategic engineering information through informal discussion	TE4	Likert 1-5
	Communication with our partners often starts to appear early in the development process	TE5	Likert 1-5
	Informal communications often reduce lead time in the development process	TE6	Likert 1-5
Supplier Performance improvement	In the last 2-3 years, buyers and suppliers have continued to improve product design through their partnership	SPI1	Likert 1-5
	In the last 2-3 years, buyers and suppliers have continued to improve the process design through the partnership	SPI2	Likert 1-5
	In the last 2-3 years, buyers and suppliers have continued to improve product quality through their partnership	SPI3	Likert 1-5
	In the last 2-3 years, buyers and suppliers have continued to reduce lead time through the partnership	SPI4	Likert 1-5

The PLS-MGA procedure was as follows:

(1) Analysis was divided into two groups: group 1 (less than and more than five years) and group 2 (less than and more than 10 years).
(2) Each model was estimated for both groups. The estimation procedure followed that implemented in partial least squares procedures.
(3) The hypotheses of the effects of the moderating variables were tested. A different path coefficient test was implemented with Henseler approaches [28] because the total sample between each group was unequal.

4. Results

The validity, reliability and path coefficient tests are discussed in this section. Following [29], the reliability and validity of the model were tested. In addition, to make result reading easier and compare findings between the groups, the validity, AVE and path efficiency tests are presented together in the section below.

4.1 Validity Test

Hair et al. [29] explained the importance of establishing the reliability and validity of a measurement instrument, stating that survey researchers should recognize the importance of knowing whether or not their items measure what they are intended to measure (validity) and the degree to which items would give consistent or repeatable results (reliability). For this reason, reliability and validity are crucial when discussing survey research methods and questionnaire design. Table 3 shows the indicator scales meet accepted reliability and validity measurement standards and, thus, they provide an empirically tested measurement instrument for the researchers.

The indicator is valid if the loading factor is greater than 0.4, while cross-loading is valid if each indicator measuring the latent variable has a higher score than the other constructs [29]. Based on the results, the validity test for TT, TE, and SPI indicators reveals no issues, so all the indicators are valid.

4.2 Average Variance Extracted (AVE)

Together with reliability and internal consistency, average variance extracted (AVE) is the first of three tests known as convergent validity [30]. It aims to assess the variance explained by the items compared to the variance due to measurement error. AVE can be interpreted as a more conservative reliability assessment. For adequate reliability, a given construct should attain a value of at least 0.5; Otherwise, its reliability will be problematic and the construct questionable [30]. Table 4 shows the AVE results from each latent variable.

The AVE for TT is an issue in Group 2 (> 10

Table 3. Validity Test

No	Item Indicator	Group 1				Group 2			
		<5 years		>5 years		<10 years		>10 years	
		Loading Factor	Result	Loading Factor	Result	Loading Factor	Result	Loading Factor	Result
1	TT 1	0.796	Valid	0.699	Valid	0.796	Valid	0.357	Valid
2	TT 2	0.771	Valid	0.661	Valid	0.735	Valid	0.577	Valid
3	TT 3	0.882	Valid	0.842	Valid	0.849	Valid	0.896	Valid
4	TT 4	0.738	Valid	0.748	Valid	0.750	Valid	0.789	Valid
5	TE 1	0.686	Valid	0.799	Valid	0.748	Valid	0.734	Valid
6	TE 2	0.707	Valid	0.798	Valid	0.768	Valid	0.826	Valid
7	TE 3	0.755	Valid	0.813	Valid	0.780	Valid	0.763	Valid
8	TE 4	0.845	Valid	0.683	Valid	0.671	Valid	0.862	Valid
9	TE 5	0.778	Valid	0.683	Valid	0.746	Valid	0.694	Valid
10	TE 6	0.773	Valid	0.485	Valid	0.748	Valid	0.705	Valid
11	SPI 1	0.792	Valid	0.806	Valid	0.813	Valid	0.780	Valid
12	SPI 2	0.910	Valid	0.814	Valid	0.838	Valid	0.849	Valid
13	SPI 3	0.846	Valid	0.833	Valid	0.825	Valid	0.852	Valid
14	SPI 4	0.754	Valid	0.852	Valid	0.829	Valid	0.806	Valid

years). Despite the fact that the AVE value is lower than 0.5, the authors consider it adequate.

4.3 Reliability Test

The assessment of reliability concerns the degree to which a measurement instrument effectively and consistently gauges its intended construct [29]. Higher values are equivalent to higher levels of reliability. In particular, composite reliability values of 0.60-0.70 are acceptable in exploratory research, while in more advanced levels of research, values of between 0.70 and 0.90 can be regarded as satisfactory [30]. In this study, we evaluated reliability through the use of both Cronbach's alpha and composite reliability. An indicator is considered reliable when it exhibits a Cronbach's alpha exceeding 0.7 and a composite reliability value also surpassing 0.7. As indicated in Table 5 the results affirm the reliability of all the indicators employed in the research. The results demonstrate the consistency and stability in measuring the latent variables studied.

The reliability test for TT, TE, and SPI revealed no issues. All the latent variable (LV) results are reliable based on Cronbach's alpha (α) and composite reliability (CR).

4.4 Path Coefficient Test

A path coefficient test is a tool to measure the influence between latent variable [28]. The criterion decision is measured by reject Ho if t-value > t-table or reject if P-value < alpha (0.1). If the p-value is less than 0.1, the path coefficient is significant. Based on the criteria, Table 6 and Table 7 shows the respective values of the difference path coefficients (ZΔ) for each group:

Figures 3 and 4 present the outcomes of the path coefficient test: Figure 3 illustrates the findings for Group 1, while Figure 4 displays those for Group 2.

Table 4. Average Variance Extracted (AVE)

Latent Variable (LV)	Group 1		Group 2	
	< 5 years	> 5 years	<10 years	>10 years
Technology Transfer (TT)	0.638	0.549	0.614	0.471
Technical Exchange (TE)	0.576	0.517	0.517	0.588
Supplier Performance Improvement (SPI)	0.685	0.683	0.682	0.677

Table 5. Reliability Test

LV	< 5 years		> 5 years		< 10 years		> 10 years	
	α	CR	α	CR	α	CR	α	CR
TT	0.82	0.875	0.802	0.828	0.798	0.864	0.668	0.764
TE	0.858	0.89	0.85	0.862	0.816	0.864	0.86	0.895
SPI	0.848	0.896	0.845	0.896	0.846	0.896	0.841	0.893

Table 6. Path Coefficient Test Group 1

	< 5 years			> 5 years		
Path	ZΔ	t-value	p-value	ZΔ	t-value	p-value
TT →SPI	0.225	0.951	0.342	0.337	2.187	0.029**
TE →SPI	0.332	1.535	0.125	0.271	1.639	1.102

*Note. *p-value < 0.1, ** p-value< 0.05, ***p-value< 0.01*

Table 7. Path Coefficient Test Group 2

	< 10 years			> 10 years		
Path	ZΔ	t-value	p-value	ZΔ	t-value	p-value
TT →SPI	0.319	2.404	0.017**	0.579	1.397	0.103
TE →SPI	0.341	2.607	0.009***	-0.186	0.541	0.589

*Note. *p-value < 0.1, ** p-value< 0.05, ***p-value< 0.01*

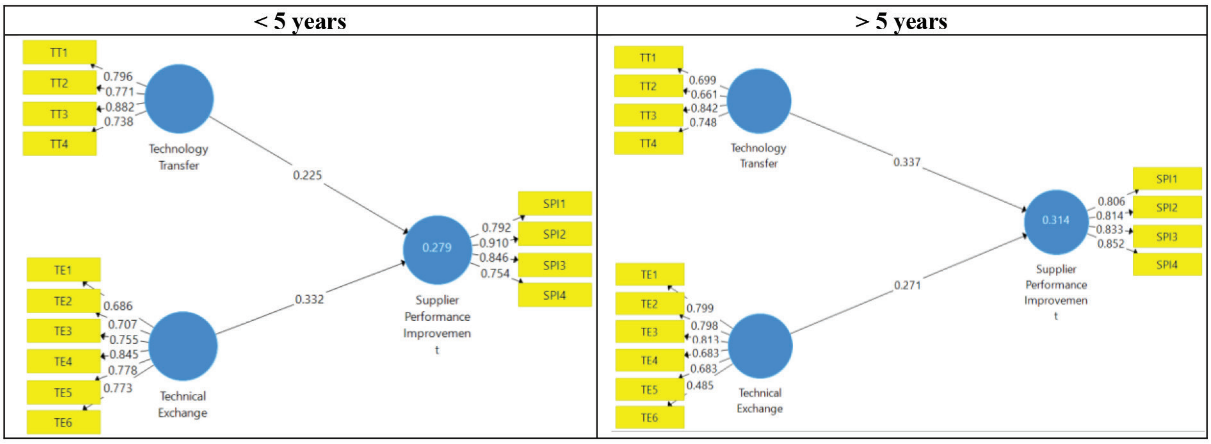

Figure 3. Results for Group 1

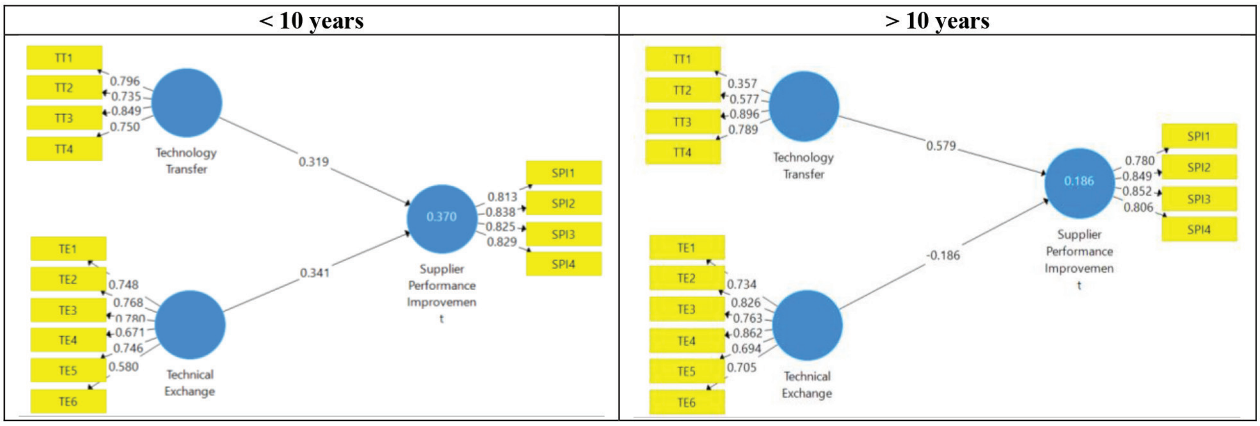

Figure 4. Results for Group 2

The analysis reveals a significant relation between technology transfer (TT) and supplier performance improvement (SPI) in cases where the link duration exceeds 5 years (> 5 years). However, the results indicate an insignificant relation between technology transfer (TT) and supplier performance improvement (SPI) in cases of a duration of less than 5 years (< 5 years). In addition, insignificant relationships were found between technical exchange (TE) and supplier performance improvement, both for link durations of less than 5 years (< 5 years) and those exceeding than 5 years (> 5 years).

Moving on to Group 2 (Figure 4), the analysis highlights a significant relationship between technology transfer (TT) and technical exchange to supplier performance improvement (SPI) when the link duration is less than 10 years (< 10 years). However, the results show an insignificant link duration relationship between technology transfer (TT) and supplier performance improvement (SPI), and at the same time an insignificant link duration relationship between technical exchange (TE) and supplier performance improvement (SPI) for link durations exceeding 10 years (> 10 years).

5 Discussion and Policy Recommendations

5.1 Key Findings and Managerial Implications

Based on the results, there is a different influence of technology transfer (TT) on supplier performance improvement (SPI), in particular in link durations of > 5 years. There is also a different influence of technology transfer (TT) and technical exchange (TE) on supplier performance improvement (SPI) in link durations of < 10 years (less than ten years).

The findings demonstrate that for link durations of group 1, technology transfer (TT) significantly influences supplier performance improvement (SPI). When examining link durations of group 2, both technical exchange (TE) and technology transfer (TT) have significant effects on SPI. This indicates that in the context of the automotive industry in Greater Jakarta, technology transfer strongly impacts supplier performance improvement within a range of five to ten years, while technical exchange plays a significant role in relationships that are less than ten years.

The results have several managerial and policy implications. First, to nurture the capabilities of local suppliers it is crucial that the Indonesian government expedites the process of technology transfer. Enhancing local suppliers' capital investment, marketing, and research and development capabilities could encourage buyers to share technology transfer with suppliers. Second, the government should support local suppliers in the automotive industry by offering tax breaks and training opportunities to help them survive for more than five years, as technology transfer is more likely to be fully implemented in relationships lasting over five years.

5.2 Macro-level Policy Recommendations

Two policies are recommended for the Indonesian government. First, they should strengthen industrial competitiveness structures, such as implementing the Standard Nasional Indonesia (SNI) to boost industrial competitiveness. Second, human resource capabilities within the automotive market should be improved, particularly for those working in SMEs (tier-2 firms), through training programs and competency certification.

With regard to technical exchange, it is recommended that technical exchange processes be promoted at the micro-level (managerial level) and solid buyer-supplier communication encouraged to accelerate the production process. At a macro level, the government should provide non-fiscal incentives for automotive firms with R&D programs involving educational institutions (universities and polytechnics) and facilitate vocational education and training to expedite the process of technological exchange.

6. Conclusion

Based on the relationships explained above, there were significant relationships between technology transfer (TT) and supplier performance improvement (SPI) in durations exceeding 5 years, with a significant relationship also occurring between technology transfer (TT) and technical exchange (TE) to supplier performance improvement (SPI) in link durations of less than 10 years.

Meanwhile, an insignificant relationship was evident between technology transfer (TT) and supplier performance improvement (SPI) in link durations of less than 5 years; between technical exchange (TE) and supplier performance improvement (SPI) in periods both less than and exceeding 5 years; and finally also between technology transfer (TT) and technical exchange (TE), and supplier performance improvement (SPI) in link durations exceeding 10 years.

It is noteworthy that the impact of link duration on supplier performance improvement becomes less significant over longer periods. Our findings align with previous research [11], [23] that suggests that a longer link duration does not always lead to better outcomes. Future research should investigate the factors that weaken the link over extended periods and explore ways to improve relationships within shorter timeframes (below 5 years). Such inquiries will contribute to a more comprehensive understanding of the dynamics within buyer-supplier relationships and guide future research on link duration.

Funding

This research is funded by Directorate of Research and Development, Universitas Indonesia under Hibah PUTI 2024.

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