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Vertical Partnerships Between OEM And First Tier: Lessons From Automotive Component Companies In Greater Jakarta-Indonesia

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Cover Page Footnote

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Abstract

Research Aims: This research aimed to investigate vertical partnerships between Original Equipment Manufacturers (OEMs) and first-tier automotive component firms based on the relationships between technology transfer, technical exchange, government role and supplier performance in the Greater Jakarta area.

Design/Methodology/Approach: A total of 65 respondent firms participated, comprising 6 OEMs and 59 first-tier firms. The research included site visits and interviews with companies based on questionnaires completed by representative individuals from middle management upward with responsibility for assessing product quality (purposive sampling). The questionnaire results were measured using Partial Least Squares Path Modelling (PLS-PM).

Research Findings: The results highlighted significant relationships between government role and technology transfer (p-value = 0.00), government role and supplier performance improvement (p-value = 0.017), and technical exchange and supplier performance improvement (p-value = 0.077). However, no significant relationship was found between technology transfer and supplier performance improvement (p-value = 0.353).

Theoretical Contribution/Originality: Understanding the vertical relations between OEMs and first-tier automotive component firms in Indonesia.

Managerial Implications in the South East Asian Context: Solid relationships between OEMs and first-tier companies in Greater Jakarta, Indonesia are especially triggered by the increasing tendency for local component use (TKDN/Domestic Component Level).

Research limitation & Implications: The research examined vertical relationships between OEMs and first-tier firms, notably between technology transfer and supplier performance improvement, technical exchange and supplier performance improvement, government role and technology transfer, and government and supplier performance improvement.

Keywords: technology transfer, technical exchange, government role, supplier performance improvement, automotive industries, greater Jakarta-Indonesia

INTRODUCTION

Management supply chains and inter-organisational relations, both vertical and horizontal relationships, have become key research issues. In dynamic industries, vertical organisational relations in different areas of the world have undergone significant development and are an interesting topic to study.

The map of supply chain relationships within the global automotive sector has become more complex as the sector has become more advanced. Original equipment manufacturers (OEMs), as automotive brand holders, face tight competition for survival in a fierce market (Oliver et al., 2008). In the globalisation era, the key to competitive success and winning in the market is based not only on the strength of an OEM or assembler but also on the entire supply chain (Cousin & Spekman, 2003; Leisk & Wormaid, 1992).

Aside from the assemblers and their important roles as the owners of automotive brands, first- and second-tier automotive component companies also play a key role. Thomas and Oliver (1991) reported that Toyota and Honda procured approximately 70–75% of their automotive components from other companies (first-tier companies). At the same time, first-tier companies do not produce every component by themselves; they also outsource their components to second-tier companies. Bresnen (1996) and Lee and Oakes (1996) estimated that component outsourcing accounts for around 50 to 60% of assemblers' total costs. Based on this, the success of an automotive product rests not merely on the activities of the assembler but also on those of the companies that make up the wider supply chain.

In South East Asia, Indonesia is both an important player and a large market within the automotive industry. It now ranks alongside the dominant players of the Philippines, Thailand and Malaysia (Irawati, 2012), notably Thailand, which the Thai Ministry of Industry expects to become the "Detroit of Asia" (Sadangharn, 2017). A key strategic issue facing the sector involves the tough competition within the international automotive market, of which buyer–supplier relationships are an important aspect. Key operational management issues are thus powerful factors; these include lower input costs, the need to meet high product standards, completed end-product quality and supplier performance improvement. The automotive industry is also a notably capital-intensive industry (Zapata & Nieuwenhuis, 2010).

In Indonesia, Greater Jakarta or Jabodetabek (an acronym for Jakarta city, Bogor city, Depok city, Tangerang city and Bekasi city) is central to the automotive industry, which is the principal reason for its selection by the author as the location for this research. Based on the author's fieldwork,

almost all of the major automotive firms, including first-tier firms that produce automotive spare parts, are located in Greater Jakarta or Jabodetabek. The results of this study are expected to highlight the interaction process between the role of government, technology transfer, technical exchange (between buyer and supplier) and supplier performance improvement between the assembler as the OEM and its first-tier firms in the Greater Jakarta area (see Figure 1).

Figure 1. Map of Research Study
Source: Lonely Planet and Wiki Voyage

This study aims to widen the investigative scope of a prior study that focused on relationships across all layers among automotive spare parts players in Indonesia (Syah, 2019a). In doing so, this study seeks to identify the relationships that exist between the four dimensions of technology transfer, technical exchange, government role and supplier performance improvement in the automotive industry. The results of previous research have shown that government role has a positive impact on technology transfer, while technology transfer and technical exchange have also been found to positively impact supplier performance improvement. However, the government role was found to have no impact on supplier performance improvement. The first tier is of crucial importance for OEMs in the context of the automotive industry supply chain. As such, what would be the results of research that focused solely on the relationship between OEMs and first-tier companies? Would they align with or differ from those of previous studies?

Meanwhile, the Indonesian government has tended to elevate the TKDN or Domestic Component Level in domestic industries, including the automotive industry (Sitompul et al., 2022). One clear example is the turbines (micro) industry, which is an important part of the automotive sector. In this case, the Indonesian government attempted to implement Local Content Requirement (LCR) regulation. LCR relates to the proportion of domestic components used relative to imported components. In a bid to elevate this ratio, LCR regulations are stipulated in the National Long-Term Development Plan (RJPP) 2005-2025, where they predominantly apply to the procurement of goods. In brief, one of the government's reasons for establishing an LCR is to reduce foreign exchange expenditure through import substitution (Hartono & Santoso, 2013). It is often only OEMs and first-tier companies that are capable of designing and producing turbines (micro) – second- or third-tier companies rarely produce them – because they are categorised as a "high-level component".

The interaction of government role, OEM and first-tier companies, in addition to the vertical partnerships between OEMs and first-tier companies as buyers and suppliers in the automotive industry in Greater Jakarta, is therefore an interesting issue for discussion. On the one hand, the government has LCR policies aimed at reducing foreign exchange and building national industry by prioritising key sectors such as the automotive industry to create a strong industrial structure. Meanwhile, OEMs as principal automotive brands are obliged to comply with LCR regulations to sell their vehicles; likewise for first-tier companies as automotive suppliers due to the increased product quality standards set out for them by OEMs. This approach to product creation will lead to increased labour absorption (Hartono & Santoso, 2013). As such, there is an urgent need to investigate the interaction that this generates.

While this research has many limitations, it impacts the current literature in several areas, including as a comprehensive study of the influence of technology transfer, technical exchange and government role (i.e. of the Indonesian government) in the Indonesian automotive industry, notably on vertical partnerships among OEMs and first-tier firms. However, the study does not focus solely on buyer–supplier relations but also contributes to the literature by examining the role of government.

This introductory section is followed by a literature review. Section Three then explains the gathering of on-site data in the field while Section Four details the methodology used. Finally, Sections Four and Five contain the discussion and ideas for future research.

LITERATURE REVIEW

The relationship of technology transfer and technical exchange to supplier performance improvement

Several areas of the supplier performance improvement literature, as well as other studies citing supplier development, have focused on the relationship between a buying firm and its supplier in terms of how to bolster supplier improvement to meet the buyer's requirement. The areas for improvement will vary, from the technical capability of the supplier to delivery and cost ability. Leenders (1966) was the first to introduce supplier development terminology that described the efforts taken by manufacturers (buyers) to improve the number of viable suppliers and improve supplier performance.

Much of the supplier literature focuses on the automotive industry due to its uniqueness. As noted in the introduction, the parts provided by a supplier can account for 50 to 60% of the total cost of a vehicle. Therefore, if buyer companies wish to be competitive in the market, they must assist their supplier companies to operate competitively and efficiently. Technology transfer and technical exchange are indicators used to examine the process of supplier performance improvement. Lin and Weng (2020) identified that a percentage increase in LCR will lead to strong industrial production and industrial productivity.

According to Kotabe et al. (2003), technology transfer is a synergetic type of relationship in which one partner can access and copy the full technological abilities of the other partner. Theoretically, if the process of technology transfer between buyer and supplier is well implemented, the supplier's capability will improve. The complexity of automotive spare parts requires equally complex technology, as well as broad coordination between buyer and supplier companies. In a study on the Malaysian automotive industry, Kadir et al. (2011) found that assistance from the buyer will increase the capability of suppliers. In this study, the indicators of technology transfer focus on four issues: sharing high-level engineering, willingness to transfer technology to the supplier, partners' willingness to share technology, and technology support to solve technical problems.

In this research, supplier performance improvement will be measured by four variables related to the process of continual improvement that represent four questions in the questionnaire on product design, process design, product quality and the ability to reduce lead time (details of the indicator variables derived from the questionnaire are shown in Table 1). According to Twigg (1998), a typical product design improvement process takes place from the outset of the

interaction between the buyer and the supplier. This is followed by the more complicated phases of process design and product quality (engineering process), which are then followed by a focus on improving the ability to reduce the product development cycle time. If the supplier firm performs well against the four variables, its capabilities will improve and lead to a long-term buyer–supplier relationship (which in this study concerns the relationship between first-tier and second-tier companies).

Meanwhile, technical exchange will also affect the buyer–supplier relationship. Technical exchange is essentially similar to technology transfer, in that both involve an exchange of knowledge between the buyer and supplier. However, the technical exchange occurs on a smaller and narrower scale than technology transfer. In this research, the indicators developed through the survey questions sought to establish narrower, independent pieces of information, such as building a relationship between engineers and the sales team, implementing "two-way communication", regular contact, sharing strategic engineering in an informal meeting, and implementing informal communication to reduce lead time.

In the case of the automotive industry in Indonesia, Syah (2019b) previously assessed the vertical relations between OEMs and first- and second-tier firms in the Jabodetabek area and identified positive relationships between technology transfer and supplier performance improvement and between technical exchange and supplier performance improvement. Syah (2019a) also conducted research focusing solely on first- and second-tier companies in Indonesia. The result showed a positive effect of technology transfer on supplier performance improvement; however, no positive relationship was found between technical exchange and supplier performance improvement. The expectations of second-tier companies towards first-tier companies regarding technical exchange between technicians in the first and second tiers in Indonesia "were not met".

The relationship of government role to technology transfer and supplier performance improvement

The government may play an important role in accelerating the process of technology transfer, including in the automotive area. Each national government will have its own strategy for supporting its automotive industry, especially in terms of technology transfer and supplier performance improvement. LCR, for example, as the author mentioned above, is one such approach. Developing countries have implemented LCR policies to advance the process of industrialisation (Lin & Weng, 2020). In this subsection of the literature review, the author will compare the role played by governments in other countries.

Syah (2019a), when previously focusing on relations between first- and second-tier companies in the automotive industry in the Jabodetabek area, Indonesia, identified a significant relationship between government role and supplier performance improvement. At the aggregate level, Syah (2019b) also discovered that the government role had a positive effect on supplier performance improvement (i.e. relations between the OEM/first tier and the second tier) in the automotive industry in the same area. It was found that the role of government played a pivotal role in supplier performance improvement in the automotive industry.

In Japan, the government was actively involved in the generation of technical exchange within automotive manufacturing when it sought to develop an electric vehicle. The government's role comprised assistance with research and development (R&D) and building a niche market (Ahman, 2006).

In the early 1980s, the Chinese government invited foreign firms to engage in technology transfer through a process of joint ventures with state-owned enterprises (SOEs). General Motors (GM) was among the firms invited to send a delegation to discuss the proposal with the government (Chu, 2011). Thus, to drive supplier performance improvement, Chinese local governments established SOEs to assemble cars. One success story has been the Chery Automobile Company headquartered in Wuhu, Anhui province (Chu, 2011).

In Korea, starting in the 1960–70s, the government pushed hard to initiate the localisation of auto parts and quickly shifted to indigenous development (Kim, 1997). Korean government policy favoured the development of indigenous firms as opposed to joint ventures because the leading firms in Korea relied on technology purchase and learning (Chu, 2011).

In this study, the government role is defined as the role of the government in Indonesia in terms of its relationship with the automotive industry, especially in relation to technology transfer and supplier performance improvement. The government role indicators in this research consist of sufficient training, promotion, tax incentives, local content policies and the overall performance support policy in Indonesia.

This study will pose the same research questions as the prior discussion by Syah (2019a, 2019b). The first question seeks to examine the relationship between government role and technology transfer (as Hypothesis 1). The second question aims to identify the relationship between government role and supplier performance improvement (Hypothesis 2). The third question examines the relationship between technology transfer and supplier performance improvement (Hypothesis 3), and the fourth question seeks to identify the relationship between

technical exchange and supplier performance improvement (Hypothesis 4). The research design is presented in detail in Figure 2.
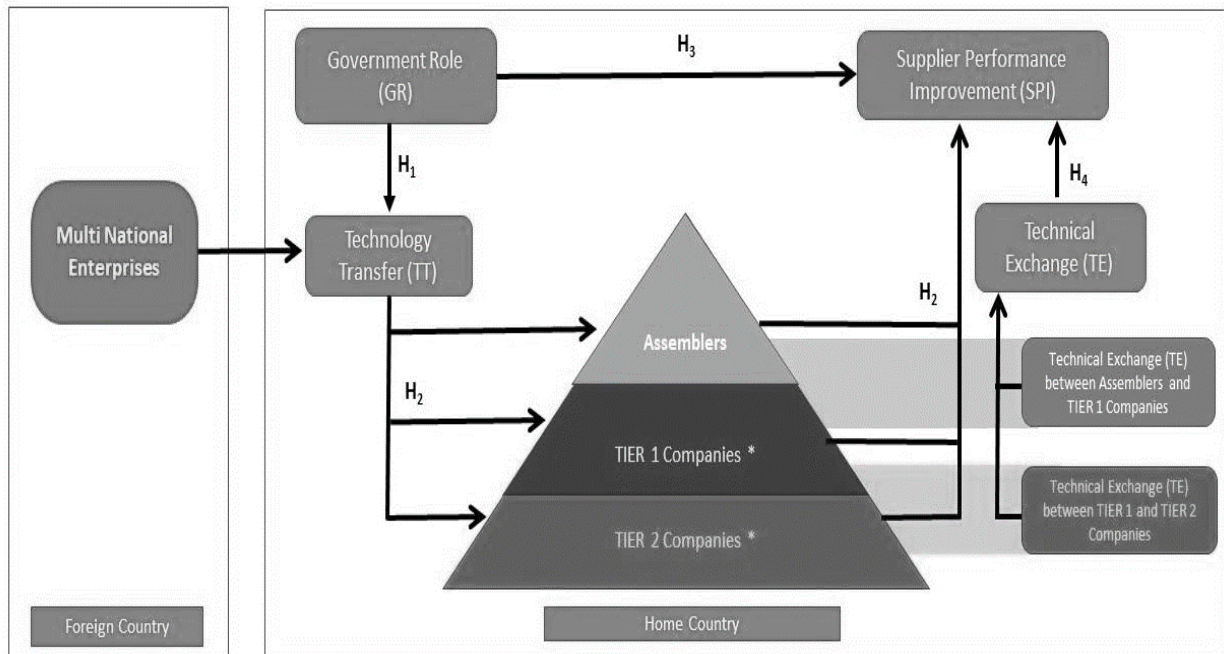

Figure 2. Research Design

RESEARCH METHOD

This chapter will discuss the research methods used, particularly concerning the sample and criterion variable, latent variables and indicators, the statistical method using Partial Least Squares Path Modelling (PLS-PM), and the formula and equations.

Sample and criterion variable

To investigate the relationship between technology transfer, technical exchange, government role and supplier performance improvement, the authors developed a questionnaire survey for distribution to first- and second-tier automotive component firms in Jakarta and the surrounding areas of Bogor, Depok, Tangerang and Bekasi. The questionnaire was shared with firms listed in the following automotive associations in Indonesia: GAIKINDO (Association of Indonesia Automotive Industries), PIKKO (Medium-Sized Automotive Component Companies of Indonesia) and KIKO (Indonesian Automotive Component Industry Cooperative). Probability sampling was used, whereby the authors randomly selected potential respondents based on the data list obtained. If they were willing to receive and complete the questionnaire, the authors arranged to visit them directly or send the questionnaire by email or fax. A total of 65 firms responded, comprising 6 OEM or assembler firms and 59 first-tier firms.

In this type of industrial survey, it is considered discreet to sample all firms since the primary objective of this study was to identify the relationships between technology transfer, technical exchange, government role and supplier performance improvement. Consequently, it was necessary to establish that the respondents (interviewees) who represented the OEMs and first-tier firms were "the right person" to interview to prevent bias. The authors therefore established the following additional criteria for the selection of respondents (interviewees) in this study:

1. The respondents completing the questionnaire should be owners, heads of production or directors with the authority to measure the technical aspects of products in their company.
2. The respondents must have run their businesses for a minimum of two years.
3. The respondents must have supplier companies.

Latent variables and indicators

This study contains four latent variables (construct) with five indicators for government role, four indicators for technology transfer, six technical exchange indicators and four supplier performance improvement indicators.

Table 1. Indicator Variables

Latent Variables	Indicators	Symbol	Scale
Government Role	Providing sufficient training	GR1	Likert 1–5
	Assistance to promote automotive products	GR2	Likert 1–5
	Providing tax incentives	GR3	Likert 1–5
	Supportive local content (TKDN) policy	GR4	Likert 1–5
	Recent policy supports automotive industry performance	GR5	Likert 1–5
Technology Transfer	Sharing high-level engineering capability with suppliers	TT1	Likert 1–5
	Willing to transfer technology to suppliers	TT2	Likert 1–5
	Our partner is willing to share technologies with us	TT3	Likert 1–5
	On many occasions, technological support from our partner firm helps us to solve technical problems	TT4	Likert 1–5

Table 1. Indicator Variables (Continued)

Latent Variables	Indicators	Symbol	Scale
Technical Exchange	Our engineers and sales teams have a close relationship with our supplier's personnel	TE1	Likert 1–5
	We have "two-way communication" rather than unilateral communication in the development process	TE2	Likert 1–5
	Regular contact between our partner and engineers is valuable (important)	TE3	Likert 1–5
	Our partner often conveys strategic engineering information through informal discussion	TE4	Likert 1–5
	Communication with our partner often starts to appear earlier in the development process	TE5	Likert 1–5
	Informal communications often diminish lead time in the development process	TE6	Likert 1–5
Supplier Performance Improvement	In the last 2–3 years, OEM and first-tier firms have been able to continually improve product design through their partnership	SPI1	Likert 1–5
	In the last 2–3 years, OEM and first-tier firms have been able to continually improve process design through their partnership	SPI2	Likert 1–5
	In the last 2–3 years, OEM and first-tier firms have been able to continually improve product quality through their partnership	SPI3	Likert 1–5
	In the last 2–3 years, OEM and first-tier firms have continued to reduce lead times through their partnership	SPI4	Likert 1–5

Source: Questions adopted from previous research (Kotabe et al., 2003) and based on preliminary interviews with automotive firms in the Greater Jakarta area (authors).

Statistical method

All multi-item questions were measured based on a five-point Likert scale. The data were measured with PLS-PM using SmartPLS 3.2.7 software. Chin in Vinzi et al. (2010) explained that PLS is a group of regression-based methods for the analysis of high dimensional data in a low-structure environment. The data obtained in this study were processed using PLS-PM for several reasons. First, it was appropriate to use PLS-PM as this study contains several latent variables. Second, PLS-PM has no minimum sample size requirement, whereas Structural Equation Modelling (SEM), for instance, requires a minimum sample size of 100–150

(Schumacker & Lomax, 2010). With more than 50 respondent firms (OEM and first-tier firms) but fewer than 100, PLS-PM was favourable for use in this study. Kotabe et al. (2003) used the SEM method in their assessment of OEM and first-tier firms in the USA and Japan.
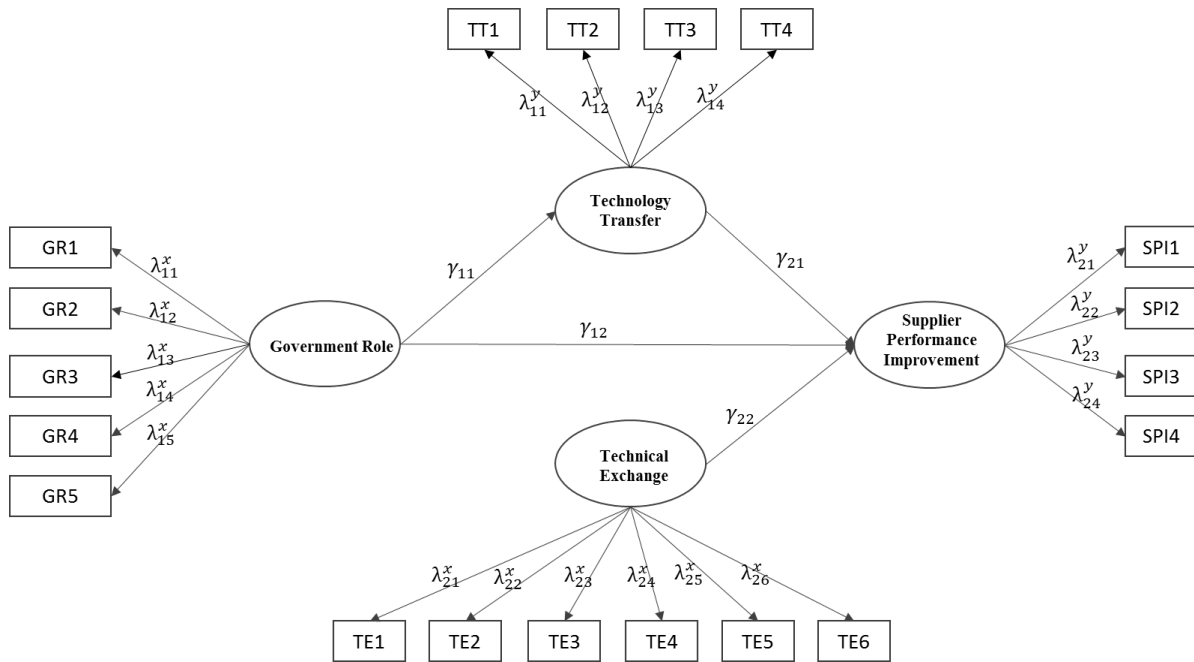

Figure 3. Structural Model and Measurement Model

Formula and equation

The structural model and measurement model formula adopted references from Hair et al. (2014).

Evaluation model

The measurement model was evaluated using convergent validity, discriminant validity and internal consistency reliability. The structural model was assessed using R-squared values and goodness of fit (GoF).

Hypothesis test

The purpose of the t-test is to examine the path coefficient value. Moreover, the t-test examines the relationships between the latent variables in the inner model. Hypothesis 0 is rejected if the coefficient path has a t-value > 1.96 at the 5% significance level (p-value 0.05), or a p-value < 0.1 at the 10% significance level. In this study, the t-test was implemented at the 10% level of significance.

RESULTS AND DISCUSSION

Respondent profile

A total of 65 firms took part in this study (N＝65), comprising 6 OEMs and 59 first-tier companies. Details of the respondent profile are shown in Table 2.

Table 2. Profile of OEM and First-Tier Company Respondents

		Frequency	Percentage (%)
Company Type	Assembler	6	9.23
	First tier	59	90.76
Location (City)	Jakarta	8	12.3
	Bogor	3	4.6
	Depok	1	1.5
	Tangerang	1	1.5
	Bekasi	50	76.9
	Karawang	2	3.1
Sales	Less than 300 million IDR	1	1.5
	300 million–2.5 trillion IDR	7	10.8
	2.5 trillion–50 trillion IDR	18	27.7
	More than 50 trillion IDR	28	43.1
	Neglect to answer	11	16.9
Link Duration (length of relationship)	*less than 2 years	1	1.5
	2–3 years	10	15.4
	3–5 years	13	20.0
	5–10 years	18	27.7
	10–15 years	16	24.6
	More than 15 years	7	10.8

A majority of the respondent firms (43.1%) had sales of above 50 trillion IDR (Indonesia Rupiahs). The second-largest proportion of firms had sales in the range of 2.5–50 trillion IDR. These sales data ranges were based on those used by the Ministry of Cooperatives and Small-

Medium Enterprises (Indonesia). Around 16.9% of the respondents refused to provide their sales data.

A large majority of the respondents were located in Bekasi city, at 76.9%, followed by the special region of Jakarta city at 12.3%. The fewest respondents were from Depok and Tangerang. Based on the authors' field observation, Bekasi is home to a large number of respondents due to the presence of various industrial areas. The authors identified at least seven industrial areas in Bekasi city, including Megapolis Manunggal Industrial Development (MM2100), PT. Delta Mas, PT Hyundai Inti Development Park Dae Woo, PT Bekasi Fadjar Hungkang, PT Cikarang Industrial Estate (Jababeka), PT Lippo Cikarang, and PT East Jakarta Industrial Park (EJIP).

Meanwhile, the supplier–buyer relationship durations are proportionately distributed. The most common link duration is 5–10 years (27.7 %), followed by 10–15 years (24.6 %) and 3–5 years (20.0 %), as shown in Table 2.

Results

Two models were evaluated in PLS-PM, namely the outer model and the inner model. The outer model evaluation aimed to scrutinise the relationships between the indicators and the latent variables. The inner model evaluation, meanwhile, aimed to assess the relationships among the latent variables (Hair et al., 2014).

The indicator validity scores were calculated by the loading factors, cross-loading and Average Variance Extracted (AVE). An indicator was considered valid if it had a loading factor > 0.7; cross-loading was considered valid if an indicator used to measure a latent variable had a higher score compared to other constructs, and the AVE score was > 0.5 (Abdillah & Yogiyanto, 2015; Hair et al., 2014).

Convergent validity test

Based on the results from the data processing on Table 3, all loading factors were > 0.7, except for TE 6 (0.62, mean < 0.7). However, indicator TE 6 was not removed as the AVE of its latent variable was AVE > 0.5, which was within the acceptable range.

Table 3. Validity Test of Assembler and First-Tier Companies

No	Item Indicators	Loading Factor	Description
1.	Government Role (GR 1)	0.865	Valid
2.	Government Role (GR 2)	0.851	Valid
3.	Government Role (GR 3)	0.765	Valid
4.	Government Role (GR 4)	0.765	Valid
5.	Government Role (GR 5)	0.724	Valid
6.	Technology Transfer (TT 1)	0.753	Valid
7.	Technology Transfer (TT 2)	0.707	Valid
8.	Technology Transfer (TT 3)	0.842	Valid
9.	Technology Transfer (TT 4)	0.746	Valid
10.	Technical Exchange (TE 1)	0.750	Valid
11.	Technical Exchange (TE 2)	0.774	Valid
12.	Technical Exchange (TE 3)	0.778	Valid
13.	Technical Exchange (TE 4)	0.753	Valid
14.	Technical Exchange (TE 5)	0.719	Valid
15.	Technical Exchange (TE 6)	0.625	Valid
16.	Supplier Performance Improvement (SPI 1)	0.803	Valid
17.	Supplier Performance Improvement (SPI 2)	0.854	Valid
18	Supplier Performance Improvement (SPI 3)	0.828	Valid
19.	Supplier Performance Improvement (SPI 4)	0.830	Valid

Average variance extracted

The AVE results showed that all latent variables had an AVE score > 0.5. This indicated that all of the indicators were valid, as shown in Table 4.

Table 4. Average Variance Extracted (AVE)

Latent Variables	Average Variance Extracted (AVE)
Government Role (GR)	0.634
Technology Transfer (TT)	0.583
Technical Exchange (TE)	0.687
Supplier Performance Improvement (SPI)	0.540

Reliability test

The reliability test relates to the extent to which a test is appropriate and consistent in measuring that which it is designed to measure. The reliability test was carried out using Cronbach's alpha and composite reliability. A set of indicators is deemed reliable if it has a Cronbach's alpha value of more than 0.7 and a composite reliability value of more than 0.7. Table 5 shows that all the indicators used in this study were reliable; this means they were consistent and stable in measuring the latent variable.

Table 5. Reliability Test

Latent Variable	Cronbach's Alpha	Composite Reliability	Conclusion
Government Role	0.855	0.896	Reliable
Technology Transfer	0.766	0.848	Reliable
Technical Exchange	0.830	0.875	Reliable
Supplier Performance Improvement	0.849	0.898	Reliable

Discriminant validity

Discriminant validity aims to determine whether an indicator that measures one latent variable is not highly correlated with indicators that are intended to measure other latent variables. The discriminant validity results in Table 6 show that the cross-loading for each latent variable is higher than for the other latent variables. It is therefore possible to conclude that the latent variables and indicators used in this research satisfy the requirement of discriminant validity. Table 6 shows that indicators GR 1 to GR 5 are fit to measure the latent variable of government role; indicators SPI 1 to SPI 4 are fit to measure supplier performance improvement; TE 1 to TE 6 are fit to measure technical exchange, and TT 1 to TT 4 are fit to measure the latent

variable of technology transfer. Thus, all measurements that are not supposed to be related are indeed unrelated.

Table 6. Cross-Loading

Indicators	Government Role	Supplier Performance Improvement	Technology Transfer	Technical Exchange
GR1	**0.900**	0.434	0.358	0.255
GR2	**0.852**	0.344	0.313	0.223
GR3	**0.810**	0.385	0.247	0.246
GR4	**0.766**	0.390	0.379	0.295
GR5	**0.725**	0.150	0.243	0.173
SPI1	0.392	**0.761**	0.373	0.298
SPI2	0.403	**0.891**	0.329	0.418
SPI3	0.332	**0.811**	0.476	0.452
SPI4	0.317	**0.809**	0.462	0.392
TE1	0.410	0.371	0.561	**0.750**
TE2	0.226	0.430	0.601	**0.774**
TE3	0.275	0.390	0.567	**0.778**
TE4	0.443	0.494	0.486	**0.753**
TE5	0.144	0.375	0.562	**0.719**
TE6	0.035	0.266	0.479	**0.625**
TT1	0.267	0.247	**0.753**	0.529
TT2	0.351	0.289	**0.707**	0.473
TT3	0.406	0.506	**0.842**	0.618
TT4	0.313	0.435	**0.746**	0.614

Internal consistency reliability test

A reliability test examines the extent to which a test is compatible and consistent in measuring what it is expected to measure. The reliability test in this study used Cronbach's alpha and composite reliability. A set of indicators is reliable if it has a Cronbach's alpha value of more than 0.7 and a composite reliability value of more than 0.7. Table 7 shows that all sets of indicators are reliable, which means that the indicators were consistent and stable in measuring the respective latent variables.

Table 7. Internal Consistency Reliability Test

Latent Variable	Cronbach's Alpha	Composite Reliability	Conclusion
Government Role	0.863	0.900	Reliable
Technology Transfer	0.760	0.845	Reliable
Technical Exchange	0.813	0.864	Reliable
Supplier Performance Improvement	0.850	0.899	Reliable

Path coefficient test

A path coefficient test is a tool used to measure the influence between latent variables. The criteria 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.

Table 8. Path Coefficient Test

Path				Path Coefficient	t-value	p-value
GR	→	TT	H1	0.447	4.626	0.000***
GR	→	SPI	H2	0.267	2.396	0.017*
TT	→	SPI	H3	0.126	0.620	0.535
TE	→	SPI	H4	0.327	1.772	0.077*

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

Based on the data shown in Table 8, the study found that Government role (GR) has a positive impact on technology transfer (TT). This is shown by the p-value of 0.00 in Table 8. Thus, for the first hypothesis (H1) of this study, there is a significant relationship between government role and technology transfer.

There is a positive relationship between GR and supplier performance improvement (SPI). The p-value of $0.017 > 0.05$ indicates that the path coefficient is smaller than 0.05. In relation to the second hypothesis (H2), government role has a significant impact on supplier performance improvement.

There is no positive relationship between technology transfer (TT) and supplier performance improvement (SPI). As shown in Table 8, the p-value is 0.535, which indicates that the p-value is greater than 0.1 (10% level). Thus, for the third hypothesis (H3), there is an insignificant relationship between technology transfer and supplier performance improvement.

A positive relationship exists between technical exchange (TE) and supplier performance improvement (SPI). From Table 8, the p-value is 0.077. As such, for the fourth hypothesis (H4) of this study, there is a significant relationship between technical exchange and supplier performance improvement.

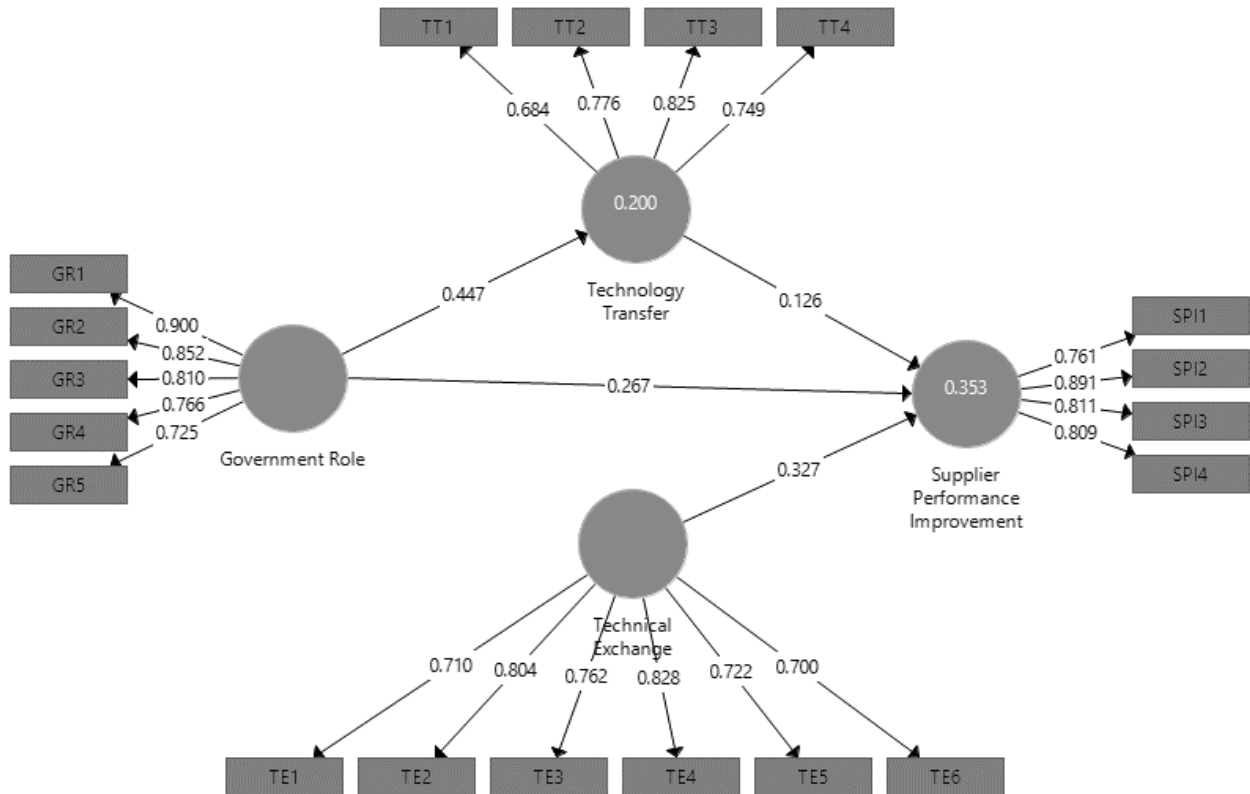The overall research results are illustrated below:

Figure 4. Result

With Goodness of Fit (GoF) Model at 37.24 %, this means that overall the result of this study can explain 37.24 % of the relationships among government roles, technology transfer, technical exchange and supplier performance improvement. A GoF model value of more than 0.36 is categorised as denoting a "good model" (Wetzels & Odekerken, 2009).

Discussion

In terms of the relationships between OEMs as automotive brand holders and first-tier firms, the conclusions drawn from examining the linkages between government role and technology transfer are displayed in Figure 3, which shows that government role exerts a positive influence on technology transfer. This finding supports a previous study by Syah (2019a) that assessed the vertical buyer–supplier relationships between first-tier and second-tier companies. The finding also supports another prior study (Syah, 2019b) that assessed the automotive industry

in Indonesia. Based on the authors' observations in the field, although its intervention may not have matched the success of those pursued by the Korean and Taiwanese governments, the Indonesian government nevertheless succeeded in encouraging cooperation between OEMs and first-tier firms in Indonesia. This was particularly notable among foreign and domestic automotive firms, which proceeded to cooperate smoothly and effectively to facilitate the technology leverage process. As an example, the Indonesian government used a tariff policy to aid automotive manufacturing, while local content requirements (TKDN) ensured that assemblers (OEMs) successfully developed local manufacturing (first-tier) firms to enhance their capacity and support their industrial work. Sitompul et al. (2022) reported that the government implemented a variety of measures to entice investment, while LCRs were frequently mixed with incentives to encourage OEM and first-tier firms to cooperate.

Meanwhile, the study found a positive relationship between government role and supplier performance improvement, which contrasted with findings by Syah (2019a, 2019b). There are several possible explanations for this. Firstly, almost all first-tier firms in Indonesia have strong relationships with their OEM; for example, it is common for OEM companies to base their technical staff inside their first-tier counterparts (staff swapping) to help control and build coordination to ensure their products meet the OEM standard and qualifications. Moreover, activities such as welding, painting and automotive assembly (four-wheel and two-wheel) in Indonesia are currently operated domestically (regulation 80/M-IND/PER/9/2014). As such, first-tier firms' supplier performance improvement meets the standard of OEMs. Secondly, a key successful role of government in developing countries, as highlighted by Jan and Hsiao (2004), has been to institute timely policy to stimulate cooperation between assemblers and their domestic automotive counterparts (i.e. first-tier firms) to facilitate OEMs' technology process in the domestic market context. In Indonesia, LCR policy is one such example; here, the authors consider that the Indonesian government has been successful in achieving this objective. OEM and first-tier companies in the Indonesian automotive industry have thus become mutually dependent. First-tier firms have acquired a "bargaining position" from the perspective of OEMs based on the ability to produce sophisticated automotive components. However, Saluy et al. (2021) found that while the implementation of LCR policy tends to increase production, it can reduce productivity. The reverse tendency can also apply.

In contrast, the study also revealed that the technology transfer process within the automotive industry in Greater Jakarta had no significant impact on supplier performance improvement. Prior studies on technology transfer have reported that local suppliers in developing countries find technology transfer programmes with global automotive makers (i.e. OEMs) difficult, as noted by Ivarsson and Alvstam (2004) in the case of Volvo trucks in India. However, the authors of this study did not consider this to be the case in the context of the automotive industry in the Greater Jakarta area as assemblers and first-tier companies here typically have relatively close relationships.

The result nevertheless showed an insignificant relation. The authors' field research revealed a possible answer in the form of "independent supplier first-tier companies" that have their own capabilities and own R&D. This means they are not dependent on any one OEM company. This type of first-tier supplier would not usually supply only one OEM; instead, they have special competencies, unique to them, that OEMs do not share. Following recent technological advancements, assemblers no longer hold all of the technology required in the modern-day automotive industry. This reason was also advanced in a study on the Malaysian automotive industry (Kadir et al., 2011). Another possibility is that the respondents in both cases did not consider that the successful supplier performance improvement was based solely on technology transfer but rather involved other factors.

Finally, this study identified a positive relationship between technical exchange and supplier performance improvement. This aligns with one prior study by Syah (2019b) but not with Syah (2019a), which assessed vertical partnerships between first- and second-tier firms. A relatively strong link was found between technical exchange and supplier–buyer (first tier and OEM) relations in the Greater Jakarta area. This related not only to strong technical relations concerning the day-to-day exchange of technical information in the factory context but also to the long-term contractual relationships that most first-tier firms enjoy with OEM. It is no secret that first-tier firms' ability and performance enable them to enter into long-standing contracts with OEMs, helping to reduce uncertainty for OEM firms.

MANAGERIAL IMPLICATIONS IN THE SOUTH EAST ASIAN CONTEXT

This research offers some managerial implications. First, knowledge transfer in a technical exchange between OEMs and the first tier shows a positive relationship, indicating a positive trend of information exchange between technical personnel in the different entities. When the technical communication between them regarding improvement is aligned with the OEM, the quality of the

product will meet the OEM's standards and qualifications. In a study on manufacturer–supplier collaboration in the Korean automotive industry, Oh and Rhee (2008) showed that communication was the key to successful OEM–first-tier collaboration. After gaining the trust of and successfully supplying one OEM company, a first-tier company may then seek to expand its capabilities to produce automotive parts to supply other OEMs, not merely domestic but also foreign OEMs. Lettice et al. (2010) confirmed that both buyers and suppliers perceived that they benefited from longer-term partnerships when they interviewed 12 global supplier organisations in the automotive sector. In this context, a first-tier company has the opportunity to become a player in the global automotive value chain. They therefore shift from supplying one to several OEMs, which is a strong benefit for first-tier firms.

In this study, technology transfer was found to have no positive implications for supplier performance improvement. As the authors mentioned above, in some cases, the capabilities of various first-tier firms have gained them a solid position with OEMs. These may include well-qualified human resources and their own R&D funds. One larger first-tier firm also held the patent for its products. In a first-tier company such as this, the transfer of technology from the OEM is not an important variable. Thus, an OEM will sometimes view its first-tier company as "a counterpart" and not as "a subordinate". Indeed, many first-tier firms supply their products to not one but several OEMs.

THEORETICAL IMPLICATIONS

One of the authors' objectives in conducting this research was to assess the vertical relationships between OEMs and first-tier firms in Indonesia. Kotabe et al. (2003) previously tried to benchmark this phenomenon in the context of vertical OEM–first-tier relationships in the USA and Japan. This present study, however, focused only on the Indonesian context. However, this study endeavoured to apply other variables, such as the role of government, which previous research had not considered, including Kotabe et al. (2003). The results of this study align with those of previous studies, including Zirpoli and Caputo (2002), who found, in the context of the Italian auto industry, that long-term buyer–supplier relationships (especially OEM–first tier) were nurtured through mutual trust and dependence. Regarding the automotive industry in Indonesia, especially in the Greater Jakarta area, both prior research (Syah 2019a, 2019b) and this study have shown that government role has a positive impact on the transfer of technology. This means that Indonesia is "on the right track" in terms of the relationship between government role and technology transfer. This study therefore enriches the literature on vertical relationships in the automotive industry.

However, this study also has some limitations. Firstly, the respondents were limited. As such, future studies may seek to recruit more company respondents (both OEM and first tier) to enhance the quality of the research. The authors recommend that future research should include more respondents and expand the recruitment to include automotive companies from both within and outside the Greater Jakarta area (even though most OEMs and first-tier companies are located in Greater Jakarta). Secondly, this research included the link duration variable (i.e. the length of the buyer–supplier relationship). Previous studies including Kotabe et al. (2013) also used link duration as a variable to assess vertical buyer–supplier relationships in the automotive industry. Thus, to obtain a more comprehensive picture of the field, future research may also consider link duration as a variable.

CONCLUSION

This study has identified vertical partnerships in the automotive sector in Greater Jakarta, Indonesia. The results show significant relationships between government role and technology transfer, government role and supplier performance improvement, and technical exchange and supplier performance improvement between OEM and first-tier companies. However, no link was found between technology transfer and supplier performance improvement. Since OEMs and first-tier companies play a strategic role in the automotive industry, the result should become a topic for further detailed research. This is because previous studies into other vertical partnerships, for instance, between first- and second-tier firms (Syah, 2019a), have identified positive relationships. In this study, based on the authors' field research, the notion of "independent supplier first-tier companies" was advanced in relation to first-tier firms with their own capabilities and R&D. However, this concept requires further investigation and confirmation in future studies, where ideally the information would not be provided solely, as was the case in this study, through discussions with two–three first-tier companies before/after they completed the questionnaire during the field research.

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