Asian Academy of Management Journal, Vol. 16, No. 1, 1–20, January 2011

PATTERNS OF SUPPLIER LEARNING: CASE STUDIES IN THE MALAYSIAN AUTOMOTIVE INDUSTRY

Kadzrina Abdul Kadir[1*], On Kit Tam[2] and Hassan Ali[1]

[1]*College of Business, Universiti Utara Malaysia, 06010 UUM Sintok, Kedah, Malaysia*
[2]*College of Business, RMIT University, Melbourne, Victoria 3001, Australia*

[*]Corresponding author: kadzrina@gmail.com

ABSTRACT

Supplier development programs support the development of a supplier's capabilities, usually with the assistance of a buyer. In an industrial environment that lacks home-grown technology, it is of interest to explore precisely how suppliers learn and increase their capabilities. There are also questions regarding how the buyer impacts this learning process, specifically with respect to dependent suppliers for which major buyers account for more than 20% of sales. It is claimed that support from buyers for supplier training has been deficient. Thus, there is a need to identify the types of training that suppliers themselves prefer. The objective of this study is therefore to examine the patterns of learning for dependent suppliers in the Malaysian automotive industry by exploring how suppliers learn best and defining the role of buyers in providing assistance. This study presents a model based on empirical findings and discusses the implications of the findings.

Keywords: supplier development, dependent supplier, automotive industry, case studies

INTRODUCTION

The literature on supply chain management suggests that when implementing an integrated supply chain, competitors take a long time to duplicate a similar method, sometimes up to three years or more (Bovel & Martha, 2000). Buyers could reap benefits not only in the short-term but also in the long-term by managing suppliers strategically (Talluri & Narasimhan, 2004). Talluri and Narasimhan (2004) suggest that the strategic management of suppliers involves the selection, development, assessment, and (if needed), rationalisation of suppliers.

For buyers, it is important to select competent suppliers; however, in countries that lack home-grown technology, how do suppliers learn to be competent? For example, developing countries such as Malaysia lack any tradition of technology

in areas such as the automotive industry. Local car makers, such as the national vehicle company Proton, have only recently been established in the 1980s. This contrasts with the global manufacturers of Europe and the United States (U.S.), many of which have been established for nearly 100 years. Meanwhile, Japanese automotive industries have been established since the 1930s, and South Korean industries were established between the 1940s and 1960s.

To encourage the development of technical capabilities in the automotive industry in Malaysia, the industry has been given protected status by the Malaysian government. In particular, technology transfer programs between local and global car manufacturers have been initiated. However, such technology transfer programs have yet to lead to global recognition for any Malaysian brands of car in the most important automotive market in the world, namely, the U.S. As of 2010, no Malaysian car has ever been sold in the U.S. As for suppliers, Wad (2008) notes that Malaysian local suppliers have yet to achieve the competitive level of foreign suppliers; thus, Malaysian car buyers might still need to rely on the foreign suppliers that have manufacturing plants in Malaysia (Wad, 2008).

Supplier development programs have been established between local car makers and local suppliers within the Malaysian automotive industry. The focus of such programs has been to increase the capabilities of local suppliers by providing assistance to buyers. This environment contrasts that depicted by Carr, Kaynak, Hartley, and Ross (2008) in their study on supplier development in the U.S., which notes a lack of buyer-supported training.

This suggests that although local suppliers do receive assistance from their buyers, this type of assistance is still not adequate to improve supplier capabilities. Therefore, analysing environments that provide buyer-support training could help identify factors that suppliers themselves deem important to the development of their capabilities. In addition, analysing the learning experiences of suppliers could help determine which technical providers offer the assistance that suppliers need.

In their study on technology transfer, Ivarsson and Alvstam (2004) note that local suppliers from developing countries face difficulties in technology transfer programs with global car makers and suggest the need for further studies on how suppliers learn in these types of programs. In their paper on local suppliers in Malaysia, Othman, Mohammad, and Bakar (2005) also identify the need to understand how local suppliers learn, a point echoed by Li, Humphreys, Yeung, and Cheng (2007). Li et al. (2007) suggest that more research is needed on the experiences of suppliers during supplier development programs to understand supplier development efforts.

Thus, one area of interest involves looking at how suppliers learn in an environment where there is a lack of home-grown technology and where technology transfer effort is therefore required. The aim of this study is to examine patterns of supplier learning, particularly with regards to both how suppliers learn and the role of buyers in providing assistance to their suppliers, especially dependent suppliers. Dependent suppliers are defined as suppliers for whom a major buyer accounts for 20% or more of sales. This research focuses on the point of view of the dependent supplier and the impact of buyer involvement with these suppliers.

The following sections present a literature review on supplier development and supplier selection. The paper then presents the study's research questions. The methodology behind the research is then discussed, followed by a brief summary of findings. The paper concludes with an explanation of the model on which this research was based.

LITERATURE REVIEW

When buyers outsource to suppliers, buyers link the capabilities and performance of suppliers to the performance of their own firms, thus ensuring that a buyer-supplier relationship is established (Carr et al., 2008). Wagner and Hoegl (2006) have found that buyers divide suppliers into two major categories, those with know-how (i.e., with specialised knowledge) and those with capacity (i.e., for whom knowledge is less important), suggesting that supplier value to the buyer is dependent on the capabilities of the supplier and what it brings to the buyer-supplier relationship. Wagner (2006) proposes that the buyer could be a source of "valuable knowledge" for the "deficient supplier" (p. 688). Supplier development could then act as a kind of "inter-organisational collective learning" (Wagner, 2006, p. 692). Knowledge sources, in addition to a firm's own internal learning, include both customers and suppliers (Dyer & Singh, 1998; Huang, Kristal, & Schroeder, 2008). Internal learning includes training and incorporating staff inputs, which in turn leads to knowledge creation (Huang et al., 2008). External learning occurs through knowledge creation in the course of a close buyer-supplier relationship and during routine collaborations (Huang et al., 2008). Modi and Mabert (2006) found that organisational knowledge transfer (or tacit learning) occurs through supplier training and visits. Moreover, training and visits are examples of activities conducted during a supplier development program (Modi & Mabert, 2006).

Supplier Development

Krause (1999) defined supplier development as "any effort by a buying firm to improve a supplier's performance and/or capabilities to meet the buying firm's short- and/or long-term supply needs" (p. 206). There is a body of work that investigates supplier development and buyer performance. Specifically, current literature has analysed the impact of supplier development on buyer performance (Krause & Ellram, 1997; Krause, Handfield, & Tyler, 2007; Krause, Scannell, & Calantone, 2000; Sanchez-Rodriguez, Hemsworth, & Martinez-Lorente, 2005; Wagner, 2006). This area of research looks into how developing a supplier brings improvements to the performance of the buyer firm. Krause et al. (2000) and Krause et al. (2007) have shown that by concentrating on so-called "direct involvement" activities, such as training and buyer visits, supplier performance improves, thus leading to stronger buyer performance.

Carr et al. (2008) noted that from the perspective of the supplier, training development has been lacking, as studies have mostly focused on the buyer's point of view. The authors concluded that this has led to a limited amount of literature concerning suppliers and supplier development. Taking another view of supplier development, Li et al. (2007) suggested the need for case studies for in-depth study of the patterns of supplier development strategies.

Supplier development research has concentrated on developed countries, such as the US, Europe, and Japan (Krause et al., 2000; Krause et al., 2007; Sanchez-Rodriguez et al., 2005; Wagner, 2006; Sako, 2004). In terms of the automotive industry, these countries have highly-developed home-grown technology. In developing countries, however, the lack of home-grown technology in the automotive industry has necessitated technology transfer programs between global firms and domestic firms.

Technology Transfer

In their study on the automotive industry in India, Ivarsson and Alvstam (2004) noted that local technology transfer could occur from new investments by multi-national corporations (MNCs) in emerging countries. MNCs tended to focus on their first-tier suppliers (that is, those that supply directly to buyers), as these suppliers could provide advanced technological capabilities and economies of scale that the MNCs required. Due to just-in-time delivery systems, local suppliers have been able to support the MNCs, as local businesses in emerging countries have become "global export bases for components" (Ivarsson & Alvstam, 2004, p. 30). Kotabe, Martin, and Domoto (2003) differentiate between technology transfer and knowledge transfer; they define knowledge transfer as

relatively simple technical exchanges, while technology transfer is associated with higher-level capabilities.

Ivarsson and Alvstam (2004) suggest that local suppliers from developing countries face difficulties as well as opportunities in technology transfer programs. The authors identify a need for studies examining how suppliers learn in these types of programs. The authors note that local suppliers mostly focus on lower-level production technology.

In a study on Malaysian companies, Othman et al. (2005) comment that successes in technology transfer have occurred at the lower end of the technology scale. The authors suggest that there is a need to examine how Malaysian companies build up their capabilities by understanding what and how these companies learn from technology transfer programs.

Lamming (1993) points out that, during the 1950s, Japan's protected automotive industry was able to develop supplier capabilities through assistance from car assemblers and the government. This action was driven by the Ministry of International Trade and Industry (MITI), with the objective of eliminating weaker firms and strengthening successful firms (Lamming, 1993, pp. 23–25). Thus, for developing countries, government support in areas such as the automotive industry could be important in promoting technology transfer among suppliers.

Implementing supplier development suggests that buyers should support their suppliers by giving them assistance. Krause (1999) noted that supplier development should be seen by the buyer as an investment; these activities are a "transaction-specific investment in the supplier by the buying firm". However, not all buyers currently offer this type of support.

Buyer-Supported Training

Programs for supplier development that receive assistance from buyers can be regarded as buyer-supported training. However, researchers (Carr et al., 2008; Handfield, Krause, Scannell, & Monczka, 2000) have found that the level of buyer-supported training was low, with the latter study making some suggestions as to how to overcome barriers to supplier training. In their study on suppliers in China, Millington, Eberhardt, and Wilkinson (2006) suggest that global buyers should only support development programs for suppliers with long-term contracts. The training of suppliers through short-term contracts might not be cost effective, as such suppliers may change rapidly.

Krause et al. (2007) point out that supplier development is found in Japanese organisations but is lacking in studies focusing on U.S. buyers. They suggest that

perhaps U.S. buyers are reluctant to make a high investment in training or that U.S. buyers may have other ways of improving supplier performance.

The literature suggests that buyers have various ways of supporting their suppliers, with some buyers giving more support than others. Some buyers focus on short-term benefits, while others look at supplier development as a long-term investment. Thus, suppliers have access to different types of supplier development programs depending on their buyers. This implies that the types of training that would most benefit suppliers could be best assessed through studies focusing on the supplier perspective. By identifying the relevant types of training, buyer-supported training programs could increase. This would be because buyers could select the type of training suitable for specific groups of suppliers. The right type of training could then lead to an increase in performance for the supplier, which would in turn encourage an increase in buyer-supported training.

Supplier Dependence

Supplier dependence exists when suppliers are dependent on their major buyers for sales of 20% or more (Carr et al., 2008; Laamanen, 2005). Carr et al. (2008) showed that supplier dependence is a significant factor in boosting levels of supplier training and supplier involvement, with both activities leading to an increase in the supplier's operational performance.

In a study based on suppliers during a period of downturn, Laamanen (2005) found that dependent suppliers are more involved in collaborative research and development (R&D) with their buyers as compared to less dependent suppliers. However, the author suggests that dependent suppliers should organise their own R&D to reduce the potential negative effects of a downturn. Takeishi (2001) notes that the more dependent suppliers are on their buyers, the more effort they will make to satisfy the buyers. Takeishi (2001) also notes the importance of inter-firm and intra-firm variables for competitive advantage (Henderson & Mitchell, 1997); in other words, both internal and external management contributes to a firm's competence (Teece & Pisano, 1994).

In a similar manner, Sako (2004) suggests that a firm's boundary is not based on definitions stipulated by law or exchange but rather by its production capabilities. Sako (2004) argues that the difference between the buyer as a "source of information" or as a "teacher of know-how" is whether the status of the buyer is seen as an "outsider" or an "insider". Sako (2004) provides an example in which a supplier firm was reluctant to make investment decisions suggested by Honda, as such decisions would require the agreement of its shareholders. This scenario suggests circumstances in which the dependent supplier might need to make operational decisions that are influenced by the buyer.

Overall, the literature suggests that dependent suppliers are more involved and compliant with their buyers, though this approach might not be suitable in times of industry downturn; this is because such compliance might not ultimately be beneficial to the suppliers. For example, a dependent supplier might be influenced by a buyer with respect to decision-making and that influence could run counter to the supplier's own sense of management control in making operational decisions.

In summary, the literature suggests a need to examine how dependent suppliers learn, i.e., how they identify a pattern of learning based on supplier development training needs and the possible reasons for the lack of buyer-supported training. Thus, in this study, the main research question is the following: what are the patterns of supplier development for dependent suppliers? We also specifically look at how much support for this training comes from buyers. Our definition of supplier development is based on that suggested by Krause (1999, p. 206): "any effort by a buying firm to improve a supplier's performance and/or capabilities to meet the buying firm's short- and/or long-term supply needs".

METHODOLOGY

A multiple case study approach was used based on Yin (2003). Ro, Liker, and Fixson (2007), who used a case study approach in their own study on the automotive industry, note that Benbasat, Goldstein, and Mead (1987) and Meredith (1998) have described several advantages of this methodology. It enables the examination of a phenomenon in its natural setting and the building of theory based on observations of actual practice; it also answers the question of "why" rather than merely "what" and "how" (Ro et al., 2007; Benbasat et al., 1987; Meredith, 1998).

For our case studies, data were gathered mainly through interviews with senior managers and executives of seven supplier organisations. The number of case studies is recommended to be between six and ten (Yin, 2003). These organisations were suppliers to LA1 and LA2, which are two local car manufacturers in Malaysia. The organisations, moreover, were selected based on three dimensions: size, industry base, and ownership. To maintain anonymity, the local car manufacturers and seven suppliers were assigned initials unrelated to their actual identities.

Eight key respondents were selected and were interviewed due to their knowledge of both operations and top management decision-making (see Table 1). All interviews were held on site. Interviews ended when no new information seemed to be forthcoming, as this showed that the data had reached a

saturation point (Glaser & Strauss, 1967). These interviews were supplemented by material from questionnaires. Interviews and questionnaires focused on supplier development program activities implemented by buyers as well as the extent of the influence of buyers on suppliers.

Data were analysed based on Miles and Huberman's (1994) framework for analysing across and within a case study. In a three-phase analysis, as suggested by the authors, interviews were transcribed, data were coded (data reduction) and arranged into tables and matrices (data display), and conclusions were drawn and verified (conclusion drawing/verification). In addition to supplier interviews, three interviews were also conducted with two government agencies and one supplier association to supplement the data.

To ensure validity and reliability, several steps were taken, as suggested by Miles and Huberman (1994, p. 279). These steps include the addition of an 'audit trail' (Schwandt & Halpern, 1988) by which processes and methods taken were recorded to ensure confirmability. Internal validity was maintained by ensuring context-rich and meaningful (or "thick") description (Denzin, 1989; Geertz, 1973) as well as by triangulating across methods and data sources. Reliability was ensured by means of coding checks and data quality checks. As previously mentioned, the seven cases differed in three dimensions: size (small-to-medium enterprise [SME] or large enterprise); industry base (plastic or metal), and ownership (always Malaysian-owned or formerly foreign-owned). External validity was based on theoretically diverse sampling along these three dimensions.

FINDINGS

Case Profile

Table 1 presents the profile of the seven cases. These firms were Tier 1 suppliers to two local car makers called LA1 and LA2. Tier 1 suppliers directly supply parts to the car makers or buyers. The supplier firms consisted of four large organisations and three SMEs. All of the suppliers had been established for a number of years ranging from 15 to 30 years. Thus, four of the seven suppliers were already established when the earliest local car maker, LA1, began selling its first model in 1987. All of the suppliers were Malaysian-owned, with two suppliers formerly owned by either German or Taiwanese owners before being taken over by Malaysians.

Table 1
Case study profiles

	Case	Size	Years est.+	Industry base	No. of key respondents (Total: 8)	Job title	Experience in automotive industry (No. of years)
1.	VA	Large	20	Plastic	1	Operations Manager	18
2.	SU	Large	18	Plastic	1	Operations Manager	10
3.	LI	Large	30	Plastic	1	Manager: Automotive	7
4.	PR	SME*	23	Plastic	1	Business Development Manager	17
5.	GN	SME*	16	Metal	1	General Manager	24
6.	CS	SME*	15	Metal	1	Senior Development	17
7.	KA	SME*	20	Metal	2	Plant Manager	14
						Head of Department: Engineering	10

Note: Est.+: Established; SME*: Small and medium-sized enterprise

Dependent suppliers, as defined earlier, have at least one major buyer that accounts for more than 20% of their sales. Of the SMEs, all three had a buyer that accounted for more than 70% of their sales, and only one SME had a major foreign buyer. The remaining firms had major buyers that accounted for more than 20% of their sales. For company GN, each of its major buyers LA1 and LA2 accounted for less than 20% of sales. However, if combined, LA1 and LA2 would account for more than 20%. As GN was an example of a successful dependent supplier firm, it was included in this research.

The suppliers provided either plastic- or metal-based materials; both large firms and SMEs fell into these categories. Based on interview data, these suppliers had access to supplier development programs (SDP) from their buyers when they supplied parts to the buyer. All of the suppliers had access to supplier development programs from both LA1 and LA2.

Types of Training

Through supplier development programs, dependent suppliers have access to various types of training activities; for the purposes of this study, we categorised them into four types of technical exchanges. The study focuses on those activities that lead to technology transfer from the buyer (or other external parties) to the suppliers. Kotabe et al. (2003) stated that technical exchanges only become technology transfers when these technical exchanges are part of a long-term, systematic program that has an evident buyer-supplier relationship. We particularly wanted to examine direct supplier development (Krause et al., 2000) through activities that included training and plant visits.

The four technical exchanges were as follows:

1. Buyer-assisted training through a supplier development program.
2. Technical assistance partnerships.
3. Government-supported training (e.g., technical expert programs).
4. A supplier's own training initiatives (e.g., to acquire technologies).

Building the buyer-supplier relationship was the main focus of supplier development programs. Dependent suppliers were given assistance and training, and visits from buyers to plants were scheduled during each car model project. Technical assistance partnerships were programs in which dependent suppliers and others involved in supplier development programs had contractual agreements with a buyer's technical partners. For example, LA1 had a Japanese technical partner named LA1 Japanese Technical Partner (LA1JTP). Through the technical assistance (TA) program, LA1's suppliers could receive assistance and training from LA1JTP's suppliers. Government-supported training consisted of more general programs, such as those in total quality management (TQM). Some of these programs also received the assistance of Japanese agencies and associations. Lastly, suppliers developed some programs on their own initiative to increase the capabilities of their own firms. For this type of program, funding was generally internal, as opposed to the other three programs, which were funded either by external parties in full or by a mix of internal and external funding avenues. Based on the definition of technology transfer given above, the buyer-supplier development program and the TA program fit the definition of technology transfer (Kotabe et al., 2003).

Level of Technology Acquired

Grouping the data on training into several categories, a table was constructed to show the levels of technology acquired; the results are presented in Table 2.

Table 2
Level of technology acquired

Level	Time period 1985–2007	Technology provider (Technology type)
Level 1	Early	LA1*(Supplier development program) [Production-related technology]
Level 2	Later	LA1 Japanese Technical Partner: Specialist technology Collaborator/Technical Assistance partner [Process-related technology]
Level 3	Current+	Buyers Academic Consultants Technology Collaborator LA1 Suppliers Specialist Experts – ie. Technical Expert programs Plant visits and market research [Product development technology, Design, Systems]

Note: LA1*: A Malaysian Automaker; Current+: As at time of interviews

During Level 1, there were fewer technology providers for the local suppliers; the LA1 supplier development program was the first program to be established. The LA2 program was only established in 1990. LA1 program staff played a major role for some suppliers in laying out the basic groundwork for them. One of the respondents from a PR organisation described the process as follows: "[From LA1, we] acquired production systems, standard operating procedures (SOPs), a visual management system, [and a] 4S system."

By the time Level 2 occurred, suppliers had access to more technical providers. In addition to LA1 staff, suppliers had access to the technical partners of LA1. This meant that suppliers had access to Japanese technical expert staff, as explained by one of the respondents from KA: "Japanese technical experts solve suppliers' problems". It was also during this period that suppliers started their technical assistance program and acquired TA partners. During this period, Japanese technical expert staff or TA partners seem to have had a strong influence on the suppliers. Perhaps this is why when LA1 changed their technical partner from a Japanese organisation to a European organisation, which created a significant impact on suppliers as discussed by PR: "When LA1 changed to [their] European technical partner, [there was] less focus on supplier development".

During the current period (as at the time of the interviews), the level of technology could be given the rating of Level 3. The number of technical providers for local suppliers had increased. Sources of technology were now

numerous and may come from buyers (i.e., LA1 supplier development programs, LA2 supplier development programs, or other buyer programs), consultants, or other (foreign) suppliers. Suppliers also initiated their own strategies of acquiring new sources of technology. In addition, they started to be involved in government-supported technical expert programs. A few suppliers had started venturing into the non-automotive sector to diversify.

Types of Technology

The types of technology that local suppliers had acquired based on this research could be divided into three groups, as shown in Table 2.

Group 1: Production-related technology and systems, e.g., SOPs (Standard Operating Procedures), 4S, and establishment of the business
Group 2: Process-related technology moving into parts development, e.g., quality control, and the manufacturing of technology
Group 3: Quality management, systems-based organisation, designing own drawings, advanced parts development, and diversifying into non-automotive, e.g., certified TS 16949, CATIA R&D, and die design

Model

Pyramid Model: Capability development and funding

In summary, we found that a model could be built based on capability development and on the types of funding of that suppliers could attract to develop training programs with local buyers, as shown in Figure 1.

Our research findings suggest that as the dependent suppliers developed capabilities, they progressed from general technology to niche technology and finally to building their own technology. This is reflected in the model. At the lowest level, government support training is provided. This includes general training given for quality-type training (such as TQM) and basic entrepreneurship training for new business owners. These types of training were provided through government agencies. For example, for SMEs, the relevant agency is the Small and Medium Industries Development Corporation (SMIDEC). Funding for this level of training is mostly external; funding is supported by the government agencies or government funding, with minimal funding from firms.

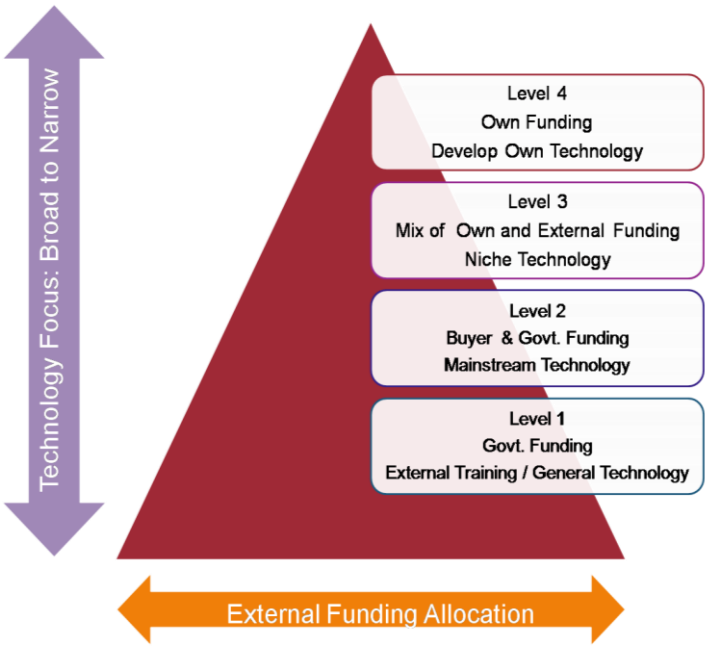

Figure 1. Pyramid model capability development and funding.

The next level is training programs delivered through supplier development programs between suppliers and buyers. This type of training is less general and more focused on technologies that are relevant to the buyer. Suppliers in this case were taught by the buyer's staff through site visits and on-site training. Training is based on project phases, i.e., based on car models. Funding was usually acquired from both buyers and suppliers. Buyers usually provided trained staff and technical expertise, while suppliers invested in needed equipment, materials, and staff.

The third level of training involves the development of dependent suppliers through technical assistance programs with technical assistance partners (TA partners). Here, the type of technology could be regarded as a narrower or "niche" type of technology. The TA partners had more specialised knowledge on the specific areas of parts development that dependent suppliers would need as they developed their capabilities. Funding at this level is specified by the contract agreements between dependent suppliers and their TA partners.

The highest level of training occurred when dependent suppliers were able to be more independent with parts development and technology. They had either ceased training with their TA partners or maintained them as consultants. For other dependent suppliers, cooperative relationships with their TA partners were

maintained. Funding at this level was almost exclusively from the dependent suppliers. Thus, some dependent suppliers that had financial issues were not able to invest in these types of training, preferring instead to put limited funds into firm-based operations and focusing on the daily cash flow or issues of current or short-term focus.

As Figure 1 shows, the types of technology could also be seen to shift from a broad category of technology (i.e., general) at the first level towards a 'niche' approach at the third level, and finally ending with the supplier developing its own custom technology at the highest level. For example, SU was able to focus on design technology and, as a result, found a new customer in a non-automotive sector.

DISCUSSION

This research paper began by identifying the types of training dependent suppliers might need; we thus initiated this study by looking for a pattern in training programs run by and for dependent suppliers. Another concern was the lack of buyer-supported training. Based on the pyramid model of capability development and funding, some possible explanations are suggested. The pyramid model tells us that the type of training necessarily depends on where suppliers are in terms of capability development (that is, whether they are at the general technology level or at the specialised technology level at which dependent suppliers develop their own technology).

The other aim of this study is to explore possible reasons for the lack of buyer-supported training. According to our study results, this could be due to the outsourcing of technology providers. Based on the pyramid model, buyers were the technology providers at the mainstream level. At other levels, other technology providers played a role, including government agencies, TA partners or consultants, and R&D initiatives that suppliers had developed for themselves. This suggests that buyers may only be able to supply limited mainstream technical knowledge to their suppliers. For niche applications of technology, suppliers would have to look elsewhere for technology providers. In a sense, buyers that cannot provide technical knowledge to their suppliers and bring in external parties to do so are, in essence, outsourcing the provision of technology services.

Outsourcing Technology Providers

Lack of buyer knowledge

The outsourcing of technology services is not unexpected, as the types of technology needed could be different for buyers and suppliers. Buyers are the assemblers, while suppliers are the parts developers. In a statement, KA, a former staff member at LA1, noted how the staff at LA1 could not really understand how suppliers developed parts, as the role of the buyer was more like that of a "facilitator" in assembling cars.

Other researchers have also noted a lack of knowledge on the part of some buyers towards their suppliers. Takeishi (2001) cited a study by Liker, Kamath, Wasti, and Nagamachi (1995) in which Japanese buyers were considered most knowledgeable by their suppliers, followed by U.S. buyers. In Liker and Choi's (2004) example, Japanese buyers decided to gather data on suppliers for two to three years. By comparison, a U.S. supplier noted that U.S. car makers wanted to see "what" the suppliers did but did not show these suppliers "how" to do it (Liker & Choi, 2004, p. 112). Therefore, some buyers might or might not have the expertise to provide the required technology or knowledge transfer to their suppliers. If buyers have limited expertise due to a lack of home-grown technology (for example, local car makers), these buyers must outsource training services to other buyers to provide this technical expertise to their suppliers.

Funding sources and support

Outsourcing to other technology providers could provide one possible reason for the lack of buyer-supported training. Another possible reason is that buyers need support and funding for supplier development. In the example provided by Liker and Choi (2004), of the two to three years of data gathering from a supplier firm, it was evident that such efforts need special funding to compensate for time and effort as well as for the belief of top management that such effort is a worthy use of corporate resources.

Thus, when buyer firms have access to government funding and support, more buyer-supported training is possible. Government could then provide funding or a guarantee of funding at a future date. In addition, regarding TA programs and the involvement of foreign technical partners and their suppliers, a government mechanism could provide support in the event that local buyers are not viable. For example, if local buyers are suffering from financial difficulties, the government could allocate special funding to assist them. In addition, Malaysia's Prime Minister Dr. Mahathir has also implemented a "Look East" policy, encouraging a focus on and emulation of Japanese corporations. This type of

policy has also given assurance to Japanese companies and their suppliers (that is, the first TA partners for dependent suppliers) that local Malaysian car makers were serious about their dealings, technology development, and knowledge transfer.

"*Capacity*" *versus* "*Know-How*" *suppliers*

From the perspective of the buyers, there are costs and benefits to funding supplier development. As noted by Millington et al. (2006), some buyers are only willing to fund for the long term. This certainly is logical, as buyers would need to ensure that the high cost of supplier development is recoverable through future profits made by capable suppliers. Yet there are also other issues that need to be assessed. There are limits to the ability of a buyer to provide supplier development. One issue relates to the lack of buyer knowledge. Buyers would be unlikely to provide funding for technical areas outside of their own field of expertise, thus necessitating the involvement of external parties, which might not be possible in certain circumstances due to issues of company privacy. Another issue could arise when a particular supplier is a subsidiary of a global company. The buyer would then be restricted to involving these particular suppliers in its development programs, as that supplier has already been involved in its own program at its company headquarters. Therefore, the ability of suppliers to provide "know-how" development opportunities for other suppliers might be different from their ability to provide "capacity" (Wagner & Hoegl, 2006). Thus, another possible reason for a lack of buyer-supported training could be due to the two different categories of suppliers. For the purpose of this research, dependent suppliers have been placed in the "capacity" category.

LIMITATIONS AND IMPLICATIONS

This research has limitations in that the findings cannot be applied to the population of manufacturing organisation in general. In addition, the study has been restricted to focus on one industry, namely, the automotive industry. Our findings would therefore likely be applicable to other manufacturing-based industries but less applicable to service-based industries. The research also employed a developing country perspective, which would be useful to understanding similar countries looking to develop the local supplier industry but less relevant to advanced countries with a more highly skilled supplier industry. This study also focused on supplier development programs with a government mechanism; thus, a training program with only buyer-supported funding would probably reveal quite different findings.

This paper provides insights for practitioners involved as either buyers or suppliers as well as for government officials involved in the automotive industry or other similar sectors. A supplier development program focuses on the development of the local supplier in cooperation with either local or foreign buyers and/or government policies. According to this study, even with the support of a government mechanism, the success of a supplier development program (e.g., technology transfer from buyer to supplier) may also need to involve other parties, such as foreign technical partners. However, rapid changes in the industry suggest that ultimately, the *onus* is on suppliers themselves to improve their capabilities.

CONCLUSION

To summarise, this paper has examined patterns of learning for local dependent suppliers. The research study focused on the development of dependent suppliers in the automotive industry and looked at how buyers assist suppliers in their learning. The literature has noted a lack of buyer-supported training. However, the literature has not identified the types of training needed by suppliers from the perspective of suppliers, particularly dependent suppliers. Rather, the literature has been dominated by studies from the point of view of the buyer and what the buyer regards as suitable training to meet supplier needs. However, as some studies note, some buyers know much more than others about their suppliers. Therefore, we need studies examining the experience of supplier development training from the point of view of the suppliers themselves. With these types of studies, patterns should emerge such that the training needs of suppliers can be identified, analysed, and improved.

There is no doubt that buyers themselves have significant knowledge of the training that a supplier might need. However, in the automotive industry, nearly 75% of the process of making a car is outsourced (Womack, Jones, & Roos, 2007). As technology development in the automotive industry increases, the buyer (in this case, the car manufacturer) no longer has a hold on all of the technology that is involved in the automotive industry. Car makers are more and more dependent on suppliers providing automotive parts manufactured with technology that the suppliers either develop themselves or acquire through joint ventures.

Thus, it is important that suppliers looking to develop their capabilities have access to the type of training that they require, which may or may not be supplied by their buyers. For suppliers that have access to buyer-supported training, their training needs might often change as they develop their own capabilities. Therefore, the training that suppliers received when they were at a lower

capability level may no longer be sufficient when they reach a higher level of capability. Part of this might be due to the knowledge level of the buyers themselves. As Takeishi (2001) pointed out, some buyers have limited knowledge compared to others. Thus, some suppliers might need to seek out other sources of technical knowledge. In this study, we have shown examples whereby the buyers (LA1 and LA2) have also outsourced to external parties to provide technical support.

This study contributes to the existing body of knowledge by identifying dependent supplier training patterns and needs from the supplier point of view, in contrast to most studies, which focus on the buyer's point of view. This study also presents a model to describe the varying levels of training needs for dependent suppliers. The model highlights the need for suppliers to develop their capabilities at different levels. At certain levels, the buyer is an adequate source of technical knowledge; however, at higher levels, suppliers must acquire technical knowledge from other sources. We also note that in supplier development programs, buyers at times choose to outsource the provision of technical knowledge to external parties.

ACKNOWLEDGEMENT

The authors would like to thank Professor Fauziah Md. Taib and an anonymous reviewer for valuable comments and feedback. Parts of this paper have been presented at the 23rd Australia and New Zealand Academy of Management (ANZAM) conference in Melbourne, Australia, 2–4 December 2009.

REFERENCES

Benbasat, I., Goldstein, D. K., & Mead, M. (1987). The case research strategy in studies of information systems. *MIS Quarterly, 11*(3), 368–386.

Bovel, D., & Martha, J. (2000). From supply chain to value net. *Journal of Business Strategy, 21*(4), 24–28.

Carr, A. S., Kaynak, H., Hartley, J. L., & Ross, A. (2008). Supplier dependence: Impact on supplier's participation and performance. *International Journal of Operations and Production Management, 28*(9), 899–916.

Denzin, N. K. (1989). *Interpretive interactionism*. Newbury Park, CA: SAGE Publications.

Dyer, J. H., Cho, D. S., & Chu, W. (1998). Strategic supplier segmentation: The next 'best practice' in supply chain management. *California Management Review, 40*(2), 57–77.

Geertz, C. (1973). Thick description: Toward an interpretive theory of culture. In C. Geertz (Ed.), *The interpretation of cultures* (pp. 3–30). New York, NY: Basic Books.

Glaser, B., & Strauss, A. (1967). *The discovery of grounded theory: Strategies of qualitative research*. London, England: Wiedenfeld & Nicholson.

Handfield, R. B., Krause, D. R., Scannell, T. V., & Monczka, R. M. (2000). Avoid the pitfalls in supplier development. *Sloan Management Review*, Winter, 37–49.

Henderson, R. M., & Mitchell, W. (1997). The interactions of organizational and competitive influences on strategy and performance. *Strategic Management Journal, Summer Special Issue 18*, 5–14.

Huang, X., Kristal, M. M., & Schroeder, R. G. (2008). Linking learning and effective process implementation to mass customization capability. *Journal of Operations Management, 26*(6), 714–729.

Ivarsson, I., & Alvstam, C. G. (2004). International technology transfer to local suppliers by Volvo trucks in India. *Tijdschrift voor Economische en Sociale Geografie, 95*(1), 27–43.

Kotabe, M., Martin, X., & Domoto, H. (2003). Gaining from vertical partnerships: Knowledge transfer, relationship duration, and supplier performance improvement in the U.S. and Japanese automotive industries. *Strategic Management Journal, 24*(4), 293–316.

Krause, D. R. (1999). The antecedents of buying firms' efforts to support suppliers. *Journal of Operations Management, 17*, 205–224.

Krause, D. R., & Ellram, L. M. (1997). Success factors in supplier development. *International Journal of Physical Distribution and Logistics Management, 27*, 39–52.

Krause, D. R., Handfield, R. B., & Tyler, B. B. (2007). The relationships between supplier development, commitment, social capital accumulation, and performance improvement. *Journal of Operations Management, 25*(2), 528–545.

Krause, D. R., Scannell, T. V., & Calantone, R. J. (2000). A structural analysis of the effectiveness of buying firms' strategies to improve supplier performance. *Decision Science, 31*(1), 33–55.

Laamanen, T. (2005). Dependency, resource depth, and supplier performance during industry downturn. *Research Policy, 34*(2), 125–140.

Lamming, R. (1993). *Beyond partnership: Strategies for innovation and lean supply*. London, England: Prentice Hall.

Li, W., Humphreys, P. K., Yeung, A. C. L., & Cheng, T. C. E. (2007). The impact of specific supplier development efforts on buyer competitive advantage: An empirical model. *International Journal of Production Economics, 106*, 230–247.

Liker, J. K., & Choi, T. Y. (2004). Building deep supplier relationships. *Harvard Business Review, 82*(12), 104–113.

Liker, J. K., Kamath, R. R., Wasti, S. N., & Nagamachi, M. (1995). Integrating suppliers into fast-cycle product development. In J. K. Liker, J. E. Ettlie, & J. C. Campbell (Eds.), *Engineered in Japan* (pp. 152–191). New York, NY: Oxford University Press.

Meredith, J. (1998). Building operations management theory through case study and field research. *Journal of Operations Management, 16*, 441–454.

Miles, M. B., & Huberman, A. M. (1994). *Qualitative data analysis: An expanded sourcebook* (2nd ed.). Thousand Oaks, CA: SAGE Publications.

Millington, A., Eberhardt, M., & Wilkinson, B. (2006). Supplier performance and selection in China. *International Journal of Operations & Production Management, 26*(2), 185–201.

Modi, S. B., & Mabert, V. A. (2006). Supplier development: Improving supplier performance through knowledge transfer. *Journal of Operations Management, 25*, 42–64.

Othman, S. N., Mohammad, N., & Bakar, N. A. (2005). Technology transfer for developing suppliers' technological capability. *Journal of Technology Management and Entrepreneurship, 3*(2), 1–18.

Ro, Y. K., Liker, J. K., & Fixson, S. K. (2007). Modularity as a strategy for supply chain coordination: The case of U.S. auto. *IEEE Transactions on Engineering Management, 54*(1), 182–189.

Sako, M. (2004). Supplier development at Honda, Nissan, and Toyota: Comparative case studies of organizational capability enhancement. *Industrial and Corporate Change, 13*(2), 281–308.

Sanchez-Rodriguez, C., Hemsworth, D., & Martinez-Lorente, A. R. (2005). Supplier development initiatives. *Supply Chain Management: An International Journal, 10*(4), 289–231.

Schwandt, T. A., & Halpern, E. S. (1988). *Linking auditing and metaevaluation: Enhancing quality in applied research*. Newbury Park, CA: SAGE Publications.

Takeishi, A. (2001). Bridging inter- and intra-firm boundaries: Management of supplier involvement in automobile product development. *Strategic Management Journal, 22*(5), 403–433.

Talluri, S., & Narasimhan, R. (2004). A methodology for strategic sourcing. *European Journal of Operational Research, 154*, 236–250.

Teece, D. J., & Pisano, G. (1994). The dynamic capabilities of firms: An introduction. *Industrial and Corporate Change, 3*(3), 537–556.

Wad, P. (2008). The development of automotive parts suppliers in Korea and Malaysia: A global value chain perspective. *Asia Pacific Business Review, 14*(1), 47–64.

Wagner, S. M. (2006). Supplier development practices: An exploratory study. *European Journal of Marketing, 40*(5/6), 554–571.

Wagner, S. M., & Hoegl, M. (2006). Involving suppliers in product development: Insights from R&D directors and project managers. *Industrial Marketing Management, 35*(8), 936–943.

Womack, J. P., Jones, D. T., & Roos, D. (2007). *The machine that changed the world: How Lean Production revolutionized the global car wars*. London, England: Simon & Schuster.

Yin, R. K. (2003). *Case study research: design and methods* (3rd ed.). Thousand Oaks, CA: SAGE Publications.