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Vendor Performance Monitoring in Automotive Manufacturing Under Localization Strategy

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Abstract

Given the competitive nature of the automotive industry, supplier performance must be analyzed and monitored to ensure continuous production while minimizing costs and maximizing quality and service. This research seeks to analyze the practices of vendor performance monitoring by non-Malaysian companies in localization strategies that align with national automotive policies. A case study was performed in ABC Company, a well-established Japanese vehicle manufacturer in Malaysia, through three main research approaches, namely, semistructured interview, site visit, and documentation review. The interview centered on their top management to understand how they monitor supplier performance and determine the current issues they face, while the site visit and documentation review focused on actual practices. A vendor known as WHN Company was chosen for additional analysis in the case study. Result reveals the poor performance of vendors with several root causes such as material shortages, manpower limitations, machine capacity issues, and financial constraints. A cause and effect analysis was performed to deeply understand the root causes. ABC terminates the existing vendors that have been classed in "C" category for 3 months and treated as underperformers. ABC then identifies and develops new qualified vendors to replace them. This case illustrates the importance of vendor monitoring, thorough assessment, and development for optimal performance. It also evaluates the importance of competitiveness and localization of the automotive sector's strategies on supply chain resilience for sustaining adaptive monitoring mechanisms.

Keywords: *Vendor performance; Automotive manufacturing; Supply chain management; Localization strategy; Supplier evaluation*

1. Introduction

The automotive industry revolves around the concept of designing a vehicle and its subsequent sales and marketing. It suffers the same difficulties as every other industry has in the current market, which comes down to consumer market maturity and growing consumer sophistication as well as the stakeholders [1, 2]. The proliferation of world trade agreements under the World Trade Organization poses a specific difficulty for original equipment manufacturers (OEMs), such as regarding their remanufacturing activities [3, 4].

The assembly of a vehicle in itself is made up of a complex arrangement of 10,000 plus parts, which greatly increases the unit's supply chain cost. The cost of completing a unit also comes down to a competitive measure for its market share. Global and local geopolitical tensions, such as wars, and economic issues also greatly affect the integration of supply chain for the automotive industry [5]. The imposition of border taxes as a result of geopolitical tensions has a great impact on the financial standing of automotive businesses [6]. In consideration of the cross-border supply chain integration of the industry, the impact of a single border tax on a single economy can lead to a chain of supplier parts being delayed and cost pressures being multiplied [7].

The automotive industry in Malaysia is still deepening its relationship with local consumers and with government policy while keeping pace with the rest of the world [8]. Though domestic national car manufacturers such as Proton and Perodua still dominate the local market, the market has seen the entry of several other foreign players in the last few years. Brands such as Toyota, Honda, Nissan, Mazda, and even Mercedes-Benz have established assembly plants in Malaysia under completely knocked down production agreements. This business model enables them to fulfil local content requirements and, at the same time, recharge their competitive edge over vehicles that are brought in as imports, which are often priced higher.

This local content policy is tailored on the premise of building a sustainable ecosystem within the automotive industry in Malaysia. In addition to job creation and the development of the domestic supplier industry, local content policy fosters a competitive environment for raw materials and other OEM services [9]. This policy is in line with the government's national automotive policy, which intends to propel Malaysia as the central Southeast Asian market for energy-efficient vehicles and new mobility innovations. Its exposure to external risks is reduced by these policies, i.e., the price of automotive vehicles for the Malaysian market is easy to predict because the risks of currency fluctuations and global trade tension are reduced [8]. The automotive industry is one of the core industries in the world, and, as such, it is the base for the application of intricate management. Effective and efficient management principles have to be applied on production planning to achieve the desired outcome [10].

Concerning mass production, stratification leaves room for adaptation among focus producers provided they are well linked to reliable suppliers. In a focus production scenario, high volumes are produced to maximize efficiencies, whereas low volumes are produced to maximize flexibilities [10]. The configuration is a function of an entire organization's stratagem [11].

Mass production is a major focus for vehicle manufacturers. In a mass production scenario, the focus is on production outputs that are of low variety, high volume, low cost, and tight profit margins to gain increases in economies of scale. Unfortunately, mass production has issues in closing customer satisfaction gaps with respect to needing product design, multifunctioning, and other customizations [12]. In a bid to re-engineer their offerings in relation to market diversity, many firms in the automotive market often tend to change and adopt new strategic choices that encompass increased product variety. Contrary to popular belief, increased product variety brings competition and thus new challenges, all of which require improved strategic integration and system optimization [13].

The current production planning within the automotive sector needs to strike a balance between efficiency and flexibility and be profitable enough to cater to the demands of customers [14]. The more products are varied, the higher the cost, delivery time, and inventory will be. Additional complexities in component design, acquisition, and production volumes are faced by the suppliers [15]. One of the ways for organizations to address trade-offs in production strategies is the controlling of internal operational efficiency with supplier performance. Flexibility in manufacturing coupled with supply chain capabilities would help companies lower risks from variety while retaining market appeal. This mixed strategy is important in ensuring further sustainability and competitiveness in the automobile industry. Efficient procurement practices have become vital to motor vehicle manufacturers who wish to establish and maintain strong quality control systems and documentation. They are paramount in building and maintaining customer trust and satisfaction [16]. This standard can only be reached when suppliers hold industry quality credentials proving that they have met the automotive industry's minimum standards [17].

Within the automotive web of trading companies, the terms "vendors" and "suppliers" are not used interchangeably. Vendors are seen as business partners and provide raw materials, parts, or subassemblies necessary for the functioning and safety of automobiles. Vendors in the automotive industry are said to function in a tier system (Tiers 1–3) and are bound to quality management principles like IATF 16949. Vendors forge relationships of strategic alliances for a long duration with OEMs for the purposes of designing

products, innovating processes, and improving quality [18].

Vendors maintain a transactional relationship, as they provide basic operational goods or services such as packaging, uniforms, tooling, or maintenance supplies. Their scope of work does not include any engineering or safety-critical tasks [19]. Vendors tend to focus more on cost, delivery, and service than automotive standards. Managing vendor quality assurance has been a major problem in the automotive industry, especially in geographies where OEM localization programs are in place [20]. While localization brings in cost benefits and reinforces domestic supply chain, local vendors seem to struggle in compliance with global quality standards such as IATF 16949, and the end result is usually subquality deliverables, delays, and increased expenses. The problem is made worse with a total absence of vendor surveillance systems because OEMs require such systems to obtain real-time insight on supplier behavior and compliance.

This study aims to address this problem by investigating effective methods for monitoring vendor performance to safeguard OEM quality expectations in localization initiatives. The following sections will outline the research methodology, present a case study analysis of how a leading automotive brand monitors localization vendor performance, and conclude with key findings and suggestions for future research directions.

2. Research Methods

ABC Company, located in Malaysia, was selected for this case study. For confidentiality reasons, the actual automotive brands and corporate entities were replaced with placeholders such as ABC, Parent Company (Japan), XYZ Sdn. Bhd., and Local Conglomerate Company. ABC, being a subsidiary of Parent Company, Japan, has a substantial market share in commercial vehicle market in Malaysia. The company has done major reorganization of its business with its local partner, XYZ, which enabled it to strengthen its hold in the market and expand its operations in the country. Such restructuring improved ABC's assembly activities that required management of the supply chain to control outsourced functions on the quality of vehicles. ABC's assembly activities incorporate light-, medium-, and heavy-duty trucks and locally tailored pickups for the Malaysian market. During this period, formulation of new models gave the assignment primary strategic attention and served as a stimulus for revising and restructuring partnership arrangements. Subsequently, a joint venture contract was concluded between Local Conglomerate Company and Parent Company, with the former, through its fully owned subsidiary, establishing equity participation with XYZ. This venture was a significant achievement for ABC's corporate development. It also demonstrates the importance of joint ventures to enhance competitiveness in the automotive industry of Malaysia.

For data collection, semistructured interview, site visit, and documentation review were performed. The interview involved top management of ABC Company to understand how they monitor vendor performance and identify the issues they have faced for the latest three years. Meanwhile, site visit and documentation review focused on the actual practices for vendor monitoring systems. Vendor personnel (known as Vendor Management Team, VMT) were also interviewed during the sessions for further clarification, especially for cause-and-effect analysis. Some findings are discussed in detail in accordance with company policies as well as agreement with their stakeholders.

3. Result and Discussion

3.1. Vendor Monitoring

ABC has developed a vendor assessment process of tracking the quality of products supplied by vendors. A survey of the selected vendors is conducted monthly via a structured rating process for quality, punctuality, and pricing competitiveness. Any identified problems are addressed through corrective measures aimed at solving the problems and preventing their recurrence. These actions aim at sustaining high levels of vendor performance; hence, the production is not faced with excessive disruptions. Figure 1 shows the process of vendor monitoring.

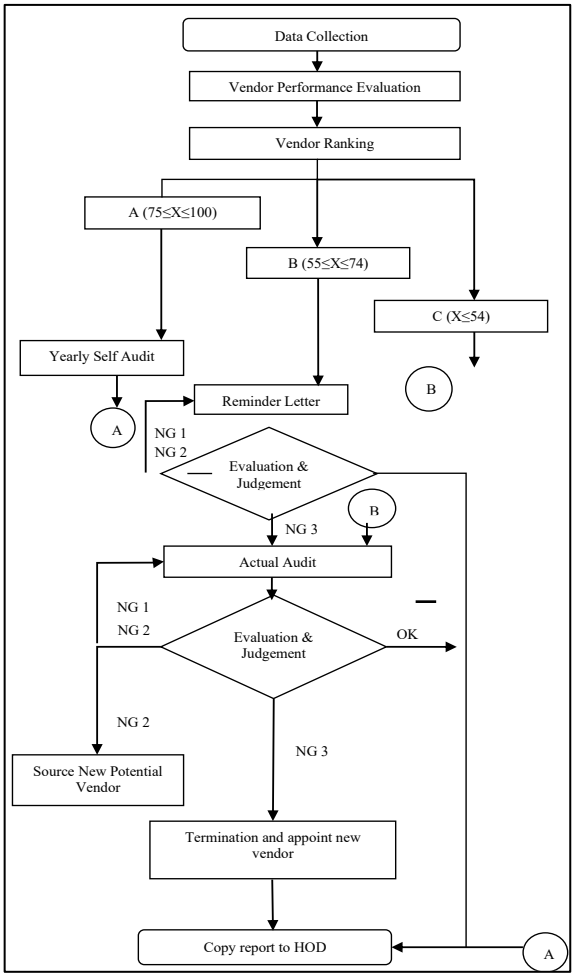

Fig. 1. Process flow of vendor monitoring.

3.2. Vendor Performance Evaluation

The VMT acquires documentation of the disciplines concerned and examines the contents on quality and delivery performance. They prepare a monthly quality metric and a monthly delivery metric summary from the issues described by the respective departments. These reports are instrumental in assessing vendor performance and are documented in the vendor performance sheet corresponding to the month in question. Delivery performance is ascertained from the delivery instruction (DI) date accompanied with the purchase order (PO) and the date on which the items are received, documented by parts and quantities. An example of DI and actual receipt dates for a vendor is shown in Table 1.

Table 1,
Example of DI for mechanism part.

MODEL: F													
NO	**PART NAME**	**QTY / VEHICLE**	**QTY ORDER**		**ACTUAL DATE RECEIVED**								
			LOT	**PCS**	12.12.20xx				14.12.20xx				
					556	557	558	559	560	561	562	563	
1	BLOWER UNIT ASM; 12V	1	8	96	27.12.20xx								
2	A/CON KIT(EVAPO); 12V	1	8	96									

MODEL: G													
NO	**PART NAME**	**QTY / VEHICLE**	**QTY ORDER**		**ACTUAL DATE RECEIVED**								
			LOT	**PCS**	5.12.20xx				10.12.20xx		19.12.20xx		
					289	290	291	292	293	294	295	296	
1	BLOWER UNIT ASM; 24V	1	8	96	27.12.20xx								
2	A/CON KIT(EVAPO); 24V	1	8	96									

MODEL: K												
NO	**PART NAME**	**QTY / VEHICLE**	**QTY ORDER**		**ACTUAL DATE RECEIVED**							
			LOT	**PCS**	07.12.20xx				10.12.20xx		19.12.20xx	
					543	544	545	546	547	548	549	550
1	BLOWER UNIT ASM; 24 V	1	8	96	27.12.20xx							
2	A/CON KIT(EVAPO); 24V	1	8	96	28.12.20xx							

MODEL: L								
NO	**PART NAME**	**QTY / VEHICLE**	**QTY ORDER**		**ACTUAL DATE RECEIVED**			
			LOT	**PCS**	27.12.20xx			
					38	39	40	41
1	BLOWER UNIT ASM; 24 V	1	4	48	27.12.20xx			
2	A/CON KIT(EVAPO); 24V	1	4	48	28.12.20xx			

The delivery summary (Table 2) includes a checklist on vendor performance. This checklist represents vendor performance from the three aspects of quality, delivery, and service. The vendor production check sheet is broken exclusively into three aspects. Meeting and maintaining the loss and gain ratio in production is crucial to the vendor's performance.

The quality appraisal is an analytic aspect concentrating on the rejection rates alongside the technical specifications and the returns of defective parts. These abovementioned elements are directive components of the vendor's product standard. Failure to meet the quality standard could trigger production delay and a rework of the order, causing customer dissatisfaction. This condition emphasizes the need for monitoring and having a fine-tuned strategy in place to control the substandard production from carrying on.

Evaluation of delivery depends on data from DI, which assesses actual deliveries against the scheduled deliveries and the estimated quantities. This evaluation substantiates the vendors' claim regarding the timely completion of POs, which is essential for accomplishing the requirements of the just-in-time (JIT) system. Delivery on time and with precision is important in the automobile industry because the presence or even the slightest absence of some components can halt the entire assembly line and the associated operations, which can result in huge losses. These vendors' claims are verified through VMT on a monthly basis, and then steps are taken to correct the capacity planning and any other associated operations.

Table 2,
Example of delivery summary.

MODEL	**RECEIVE**	**DI VS ACTUAL**			
		DI		**ACTUAL 1**	
		LOT NO.	**DATE**	**LOT NO.**	**DATE**
F	1st	556-559	12.12.20xx	556-559	27.12.20xx
	2nd	560-563	14.12.20xx	560-563	27.12.20xx
G	1st	543-546	07.12.20xx	543-546	27.12.20xx
	2nd	547-548	10.12.20xx	547-548	27.12.20xx
	3rd	549-550	19.12.20xx	549-550	27.12.20xx
K	1st	289-292	05.12.20xx	289-292	27.12.20xx
	2nd	293-294	10.12.20xx	293-294	27.12.20xx
	3rd	295-296	19.12.20xx	295-296	27.12.20xx
L	1st	38-41	28.12.20xx	38-41	28.12.20xx

3.3. Vendor Ranking

The VMT, as outlined in Table 3, assigns specific performance categories worth a total of 68 points and uses a scoring system to evaluate a vendor's performance in each category. This point system simplifies, tracks, and delineates follow-up action on vendor performance.

Vendors scoring 75–100 points in Category A are labeled as high performers and, owing to their tendency to maintain quality and on-time delivery, are subjected to annual self-audits. Category B (55–76 points) vendors are, for example, the suppliers of the blower and air-conditioning mechanism components and are self-audited every 3 months. Beyond this period, essential performance reminders are issued. This action, taken in under 3 months, serves as a warning sign to vendors with excessive delays.

Vendors whose scores fall under 54 points, referred to as Category C, are treated as underperformers. Each of them is subjected to an on-site audit to ascertain the deficiency, the root cause, and the timeliness of the corrective action being taken or the determination of the action being generated.

The reminder is gradual and cumulative to ensure responsibility and improvement over time. The first reminder is sent at the start of the fourth month of exhibiting performance in Category B for three consecutive months. If no improvement occurs, the second reminder, which is within 2 months, is sent, visibly followed by a third reminder in the first month after the second reminder. This tiered response allows the vendors to attempt to fix the performance gaps while making it clear that the underlying problem is serious.

By introducing an evaluation of the vendors based on the quality, timely delivery, and level of service, the VMT does not only exert control over the reliability of the suppliers, but it also fosters a culture of improvement within the vendor system. This cautious performance assessment system of the vendor supply chain on disposable supplies in the field, also within the automotive industry, can guarantee the continuity of the supply, reduce the risk of continuity disruption, and meet the practices in the supply chain management.

Table 3,
Vendor ranking list.

Category	Point	Action	Remark
A	75≤x≤100	Self-Audit	Yearly
B	55≤x≤74	Reminder Letter	3 months in a row
C	x≤54	Actual Audit	Immediately

Note: First reminder: 3 months in a row
Second reminder: 2 months after the first reminder
Third reminder: 1 month after the second reminder

Vendor ranking information is transferred to the vendor performance chart on a monthly basis. The percentage of conformance for each vendor is tracked and compared against the previous month's to identify trends in performance. In case of reducing performance of a vendor and downgrading of its level, a short description of the facts of the deficiencies is written down to be reviewed. Whenever a major change occurs, i.e., when the rating score of a major supplier of parts drops significantly, the VMT examines the particulars of the weakness with the supplier to establish whether production-related problems that are impairing their capability to deliver parts exist. Depending on the rating of performance, the VMT subsequently takes the relevant corrective or improvement measures in assisting the vendor to fix the problems and in ensuring that production objectives are met at all times.

3.4. Self-Audit

The VMT executive has the mandate of providing the audit evaluation sheet to the vendors concerned. The vendors shall conduct a self-assessment and submit the form within 3 weeks to the VMT. The nonresponse by a vendor within the stipulated time period will lead to the issuance of a reminder letter by the VMT, ensuring that they comply with the evaluation process.

3.5. Reminder Letter and Actual Audit

As the next step toward making improvement actions, the VMT needs to identify vendor performance measures. When a vendor is in Category B ($55 \leq x \leq 74$) for 3 months or more in any performance element, the VMT will send the first reminder letter for improvement. In case the performance keeps on worsening, then a second and third reminder letter will be sent as an escalation action. When the vendor continues to perform poorly, a process audit shall be commenced to measure the adherence to the expectations of ABC.

The VMT executive will prepare and submit the necessary documents and inform the vendors of the schedule of audit at least 2 weeks prior to the audit. The executive will track the vendors to ensure that they accept the audit. procurement and production planning are the functions connected with the appointment of auditors, wherein the head of department (HOD) appoints them at least a week prior to the audit. Finalization of requirements is done through a preaudit discussion. In the event that a nominated auditor cannot do so, an official letter of unavailability should be provided. An actual audit is then conducted on the basis of the standard operating procedure of monitoring the vendor.

After the audit, the VMT executive monitors and reviews the plan of improvement on a monthly basis by the vendor. In case the vendor does not comply with the requirements for improvement of ABC within the time frame agreed by the two parties, a second audit will be carried out. At this point, the VMT can start investigating other possible vendors to replace it, in consideration of the eventuality of the termination of the contract. In case the vendor fails to comply following the second audit, a third and final audit is done. When the vendor fails to meet the required standards, the VMT will officially declare the end of the business relations and will introduce new vendors to ensure the supply of parts. The HOD of the VMT reviews the summary report of the audit process and its results and provides approval.

3.6. Price Increase or Decrease

Price plays a vital role in the selection of vendors, especially in the quest to cut costs as part of the cost reduction strategy of ABC. Price increase is often demanded by vendors with time to remain profitable and compensate for the increase in production costs. As part of the vendor monitoring process adopted by ABC, whenever an offer of price modification, either incremental or decremental, is sent to ABC, it will be under a thorough review by the VMT executive. In case the vendors demand a price hike, the VMT engages in a bargaining process that tries to come up with an agreeable price between ABC and the vendor. In case the management at higher level does not approve of the proposed increase, the VMT will restart the negotiation process with the vendor and get a better revised price. At the same time, the VMT can consider other vendors in accordance with the localization program procedure, which will protect the access of ABC to several supply sources. When an agreeable price is determined, the VMT executive will produce a part or model price summary, which will then be put before the HOD, senior manager, or any other higher authority. After approval, the revised price is included in new POs of the parts. A duplicate of the price summary will be sent to the accounting and procurement department to be documented and acted upon in the future. This systematic process ensures that pricing decisions are open, strictly appraised, and part of the overall cost management and localization objectives of ABC.

3.7. Negotiation

Evaluation of any approach to supply chain management within ABC Company's boundaries indicates that the company has the responsibility to prioritize the negotiations on the key dimensions of the contracts to be competitive for the long haul. The negotiations focus on the four dimensions of quality, delivery, payment, and service cost, which collectively establish the effectiveness and durability of the relationship between the buyer and the vendor.

Quality assurance is a key concern by both parties in a negotiation, given that it is the cornerstone of a satisfactory service and the reliability of constituent components of vehicles. Vendors are expected to meet defined standards, achieve zero defects, and continuously improve. Delivery is also crucial for the minimization of lead periods and supply chain disruptions within JIT centers and the production of lean producers in the automobile industry. If delivery is late or inconsistent, it has a multiplying effect on the entire assembling activity, increasing the operational cost and decreasing production efficiency.

The payment terms of ABC and its vendors are subject to negotiation to align their cash flow needs. For the manufacturer, favorable payment terms on account of delayed payments help maintain cash flow and reduce liquidity and working capital stress. Meanwhile, timely payments to vendors assure them operational stability and investments into further production capabilities based on collaborative units and foster long and lasting unit relationships.

These negotiations cannot be considered simply transactional negotiations anymore; the quite complicated web system, on which they are founded, is strategic. They are the initial step in closing their score to develop relations with the suppliers through the adoption of ABC's set out objectives for quality to realize high margin, financial buffer, and strategic financial flexibility. These established practices are significant for seamless control and enhancement in the entire supply chain in the present automation world with such narrow margins but high customer expectations.

3.8. Vendor Performance Issues

After choosing the vendors, ABC Company then embarks on carrying out a stringent monthly performance appraisal. The given arrangement offers the freedom to consider the competencies of the vendors, identify trends, and solve issues as soon

as possible. The given assessment is focused on three key factors such as the quality of services and products and the timeliness of delivery. The primary aim is to safeguard uninterrupted vendor operations and reduce the chances of system breakdowns during the production phase.

The vendor tier is established on the basis of a comparative evaluation of the performance score trends over a given period of time. In the event that a vendor remains in Category C for a period of three consecutive months, termination will become applicable. ABC Company will, in that case, start devising a vendor replacement strategy. This action is necessary to avoid a supply disruption, which, in turn, would affect the production schedule. The quality limits set for any of the supplied materials and components become a major determinant in the uninterrupted production and guaranteed customer satisfaction. Therefore, meeting the technical and other specifications set or endorsed by ABC Company is crucial.

The vendor must have no warranty claims, no rework, and no line stoppages due to quality problems to be the recipient of the greatest distinction. All flawed materials are sent back to the vendor, then they get validated and replaced so that the production line is not compromised. The service is evaluated on the basis of how the vendor solves problems and the quality of the sustained communication and availability of on-site services. The rating is presented via a feedback overview from the different personnel involved in the work with the vendors, including those involved in the procurement, quality control, and production schedule.

The most decisive factor of the evaluation criteria is always delivery performance. JIT production systems require timely delivery of components. However, the reality is that a number of the suppliers that provide local components to ABC are having issues with late deliveries, posing a substantial threat to the continuity of production. Out of 67 local vendors that had been tested, few have been found to have consistent delivery issues. These suppliers are strictly checked in terms of mid- and end-year performance analysis, and corrective measures are taken to reduce the chances of delays in production.

4. Case Study

A consistent trend of the vendor WHN being in Category C of the vendors' ranking is determined after performance appraisal. This issue is a repetitive problem and a clear indication that a critical review of the performance of WHN is necessary to pinpoint countermeasures to the issues that have led to late deliveries. WHN is mandated to provide chassis frames and other associated parts, which are significant in the production processes of ABC. Figure 2 demonstrates that chassis frames are a significant part of the general process of chassis assembly. In the meantime, Figure 3 provides a precise description of part requirements that suppliers, such as WHN, need to address to satisfy the production needs of ABC. Ensuring that these specifications are met at all times is important because a variation in them will directly affect the assembly quality and delivery schedules.

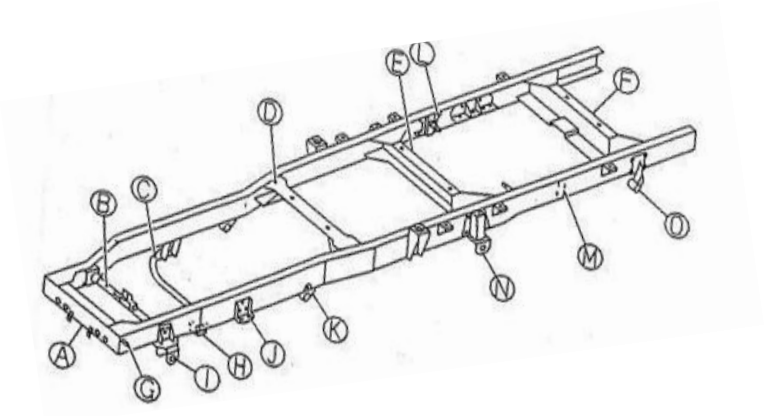

Fig. 2. Frame for chassis assembly.

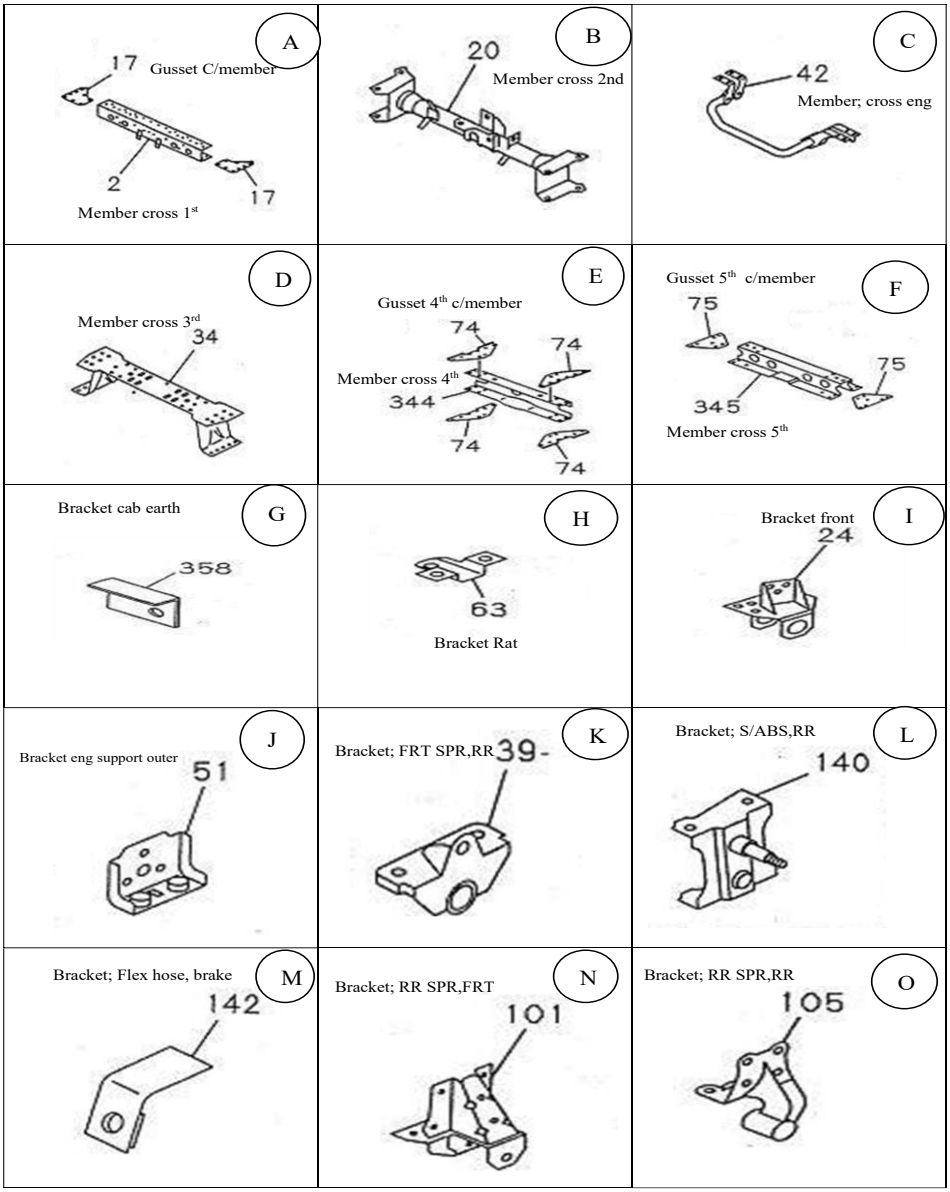

Fig. 3. Assembly part for chassis frame.

Numerous elements may play a detrimental role in the overall performance rating of a vendor. Figure 4 presents an analysis provided by ABC regarding the issues on late deliveries of WHN and pays attention to the root causes, which are defined as man, method, material, and money. These factors are basic to the capability of a vendor to fulfill delivery pledges.

Under its vendor management approach, ABC has come up with a set of curative actions that address such issues. It refers to finding out the corresponding countermeasures and to taking specific improvement measures. The following section will explain the exact issues at WHN and how ABC addressed them to guarantee the performance of the vendors and their production.

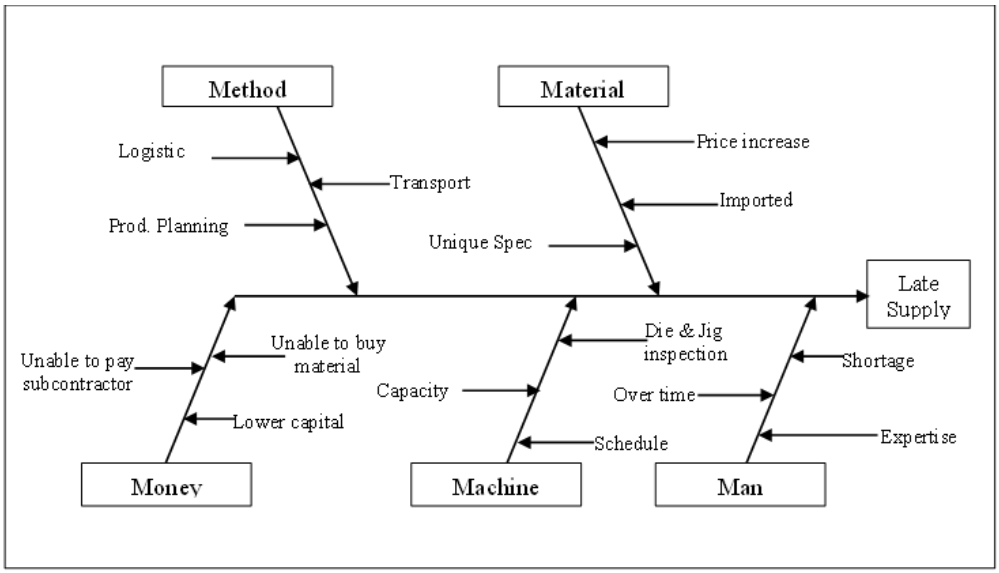

Fig. 4. Cause and effect diagram for WHN.

One of the concerns with WHN is that they suffer problems in procurement of raw materials, which might be a result of internal problems such as strained relationships with suppliers or the constant last-minute orders by ABC. The problems faced by WHN in obtaining materials are exacerbated by the fact that WHN acts pre-emptively to overcome the stretching lead times and production schedules, which in turn increases production costs and lead times further. Whenever this issue happens, WHN tends to turn to the secondary market to buy materials as a result of unforeseen spools. These problems eventually render WHN uncompetitive on the market because of the inability to produce consistently and fulfil unpredicted demand within a short time.

To reduce WHN's operational blockage and inability to meet the demand of unanticipated orders, ABC has instituted the following tactical countermeasures to WHN's dependency on secondary market procurement of raw materials.

•Direct Material Procurement: WHN is able to shift the raw material operational blockage to ABC, which assumes responsibility of WHN's raw material sourcing and internal blockage originating from WHN's complex and multi-tier suppliers.

•WHN's Given Material Order Scheduling: WHN is compelled to follow the order material schedule sequence submission, which relieves WHN's complex and expensive production work orders due to WHN's option of WHN internal production. The material orders are moved in the sequence to allow WHN to avoid congestion in internal production.

•Expected Targeted Delivery Date: Suppliers are required to ensure that internal remote production has the necessary raw materials prior to the closing date; failure then leads to a punitive action.

•Conditional Breakdown Reinforcement: WHN is permitted to send unmanned stock to avoid congestion and accumulated work target due to mechanical failure conditions. WHN aggregates remaining stock, which is then dispersed to the satellite WHN operational sites to maintain operation while WHN resolves target block due to mechanical conditions.

•Several interconnected factors have severely affected WHN's overall performance. These factors consist of logistical delays, inadequate manpower, ineffective planning, financial restrictions, insufficient machine capacity, and production balance constraints.

•Logistical delays: WHN's ineffective control over the flow relative to the provision of goods and services and over the connected financial transactions is referred to as WHN's logistical delays. The inefficiency of order fulfilment, warehousing, material handling, and inventory control processes result in loses of the organization. To eliminate this inefficient system of forecasting and of order transactions, WHN has been given a new truck and support under DI. ABC, in case of extreme urgency, has its own transportation to ensure that no production is halted.

•Diminished Workforce: WHN has constant shortages of workers and employees that are trained in what to do, particularly in the welding and assembly operations. Workers should have the necessary skill sets and be able to complete the job

descriptions ascribed. This situation is resolved by ABC by identifying which workers should be put under contact and do more than one shift. WHN and other organizations have established motivational incentive strategies such as bonuses to increase the number of workers. WHN has also expanded training programs to improve employees' willingness to use modern machinery and take production shifts.

•Use of Machines: WHN's equipment stamping capacity cannot fulfil ABC's demand. Machine scheduling delays, die and jig monitoring deficiencies, unbalanced machine loading, and a lack of machine maintenance often contribute to equipment breakdowns and downtime. Production capabilities are additionally limited by aging machinery. ABC and WHN are tackling these issues by transferring manufactured stamping dies to subcontractors, outsourcing selected stamping operations, purchasing new die-stamping machines, and adding a second shift. ABC provides contract manpower to assist WHN with new equipment and machine repairs.

•Financial Constraints: WHN's failure to purchase raw materials timely prevents production from being commenced. WHN's production disruption is only exacerbated by outstanding supplier payments. ABC directly purchases raw materials and pays WHN's suppliers on its behalf to help WHN with cash flow. WHN has requested support until outstanding obligations are settled.

•Joint Countermeasures: ABC focuses on WHN's performance monitoring through audits. Periodic audits guarantee that corrective actions are provided. ABC also mandates that WHN team members communicate routinely to validate their adherence to the DI to ensure that deliveries are made. Penalty charges are applicable for lost production due to the line being down because of delayed deliveries. This joint effort seeks to raise the performance of the vendor by improving the reliability of deliveries, enhancing the financial performance, and, ultimately, achieving sustainable growth of both parties.

Therefore, ABC issues reminder letters to vendors as part of its feedback mechanism and to encourage continuous improvement. If a vendor fails to demonstrate significant performance improvement, ABC will initiate a follow-up process audit to assess their progress and determine whether they remain eligible to stay on the vendor list or should be eliminated immediately. A comprehensive report, including the objectives and summary of vendor evaluations, is then prepared to guide further corrective actions and improvement initiatives.

Several factors contribute to vendors being categorized as "C," with the major root causes originating from the vendors themselves, as illustrated in Figure 5. Figure 6 provides a breakdown of problem contributions from the vendor's side, while Figure 7 highlights issues contributed by ABC. Based on the cause-and-effect diagram, the most significant vendor-related problems are linked to the five critical factors of operations management: method, machine, manpower, money, and material. Ineffective management of these resources ultimately undermines the vendor's ability to meet ABC's stringent quality, cost, and delivery requirements.

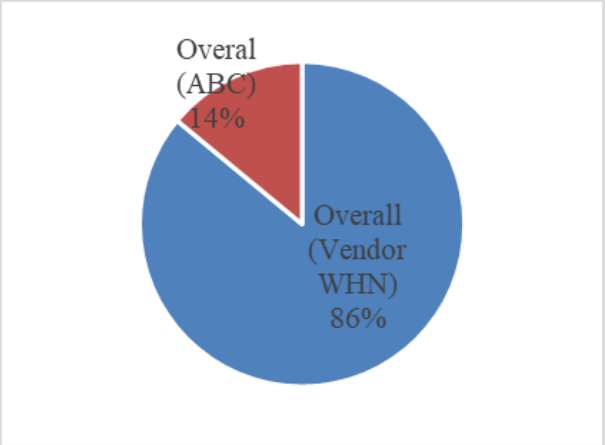

Fig. 5. Overall contribution of problems under "C" category.

4.1. Strategic Response

Outsourcing in supply chain management is not only a cost-saving measure but also a strategic tool for risk mitigation and performance assurance [21]. In the case of ABC, outsourcing became necessary when WHN consistently underperformed, particularly in delivery reliability. Despite ABC's extensive countermeasures such as financial assistance, training, and process audits, WHN remained a "C" category vendor, posing a threat to ABC's production continuity. This situation aligns with the findings obtained by Krause et al. [22], who emphasized that when supplier development fails to yield performance improvement, supplier substitution becomes inevitable to safeguard operational performance.

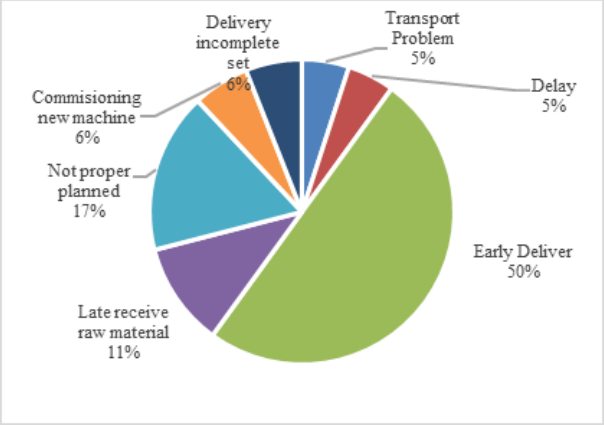

Fig. 6. Contribution of problems under "C" category from WHN.

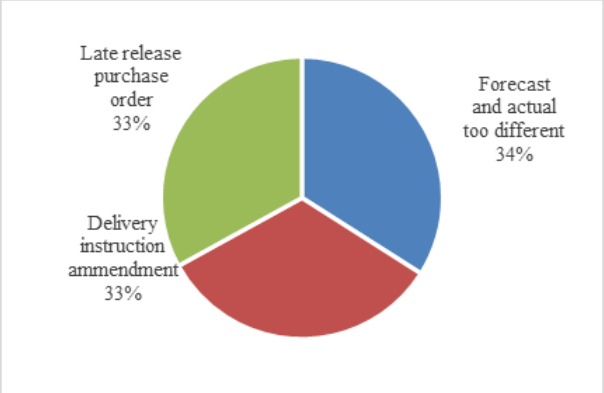

Fig. 7. Contribution of problems under "C" category from ABC.

To counter such risks, ABC embarked on its localization program, which is a supplier development and replacement system. This proactive strategy has seen supply chain resiliency maintained through the selection of a new vendor. Vendor IBM had 2 months to prove their efficiency before the elimination of WHN. The participation of the VMT was essential because they evaluated the ability of IBM with major requirements including pricing, quality, capacity, location, and delivery performance. This systemic review is indicative of industry's best practice in supplier qualification and risk assessment, in line with the ISO/TS 16949 automotive supply chain standards [23].

The case of IBM appointment reveals that a supplier replacement process should have several critical success factors:

•Competitiveness in terms of costs: The financial viability of ABC is proved.

•Quality and compliance: Product conformity and industry standards are met.

• Operational capability: Chassis frame assembly is done in-house and gets rid of delays through subcontracting.

•Strategic position: Transport lead time and risks are lowered.

•Transfer of knowledge: The knowledge on DIs and schedules ABC used led to less transition barriers.

In choosing IBM, ABC not only mitigated the short-term risks of its supply continuity but also diversified its supplier base and helped its suppliers by improving their capabilities. This increasing availability of reliable suppliers will strengthen the resilience of the supply chain and decrease reliance on single, high-risk suppliers. Moreover, this case shows that supplier development and outsourcing are two strategies that are connected with each other. Outsourcing is the ultimate protection to maintain production performance in the event that direct development (e.g., training, financial support, and audits) fails. The successful integration of the IBM in the case of ABC highlights the importance of the systematic processes of evaluating suppliers, planning ahead, and establishing localization mechanisms in enhancing the competitiveness of the supply chain in the long term.

5. Conclusion

The outcomes of this case study highlight the role of organized monitoring of vendor performance in the Malaysian automotive manufacturing sector within the localization policy of the country. ABC's systematic vendor rating system was capable of identifying the problem vendors such as WHN and implementing corrective measures to the level of replacing the vendor. The case of WHN was representative of the situation of local sellers that are burdened by the lack of resources, a pool of trusted assistants, technologically advanced production processes, and investments. The inability of WHN to perform satisfactorily even with proactive efforts by ABC to resolve the issue, such as direct PC material purchase, speeding up the payment of terms, shipping of materials, and monitoring of the delivery, led to the replacement of WHN by IBM. The replacement highlights the roles of supplier outsourcing and development. The factors that defined the choice of vendors by ABC included the reduced price, the capability of the vendor to be operational, and the proximity to the geographical location to prevent disruptions of production. Supplier outsourcing and development, in this case, counterbalance each other to enhance

automotive manufacturing. ABC's vendor development integrates performance below international standards with internal standards such as IATF 16949.

The financial support mechanisms and logistical support add an integrated approach to vendor activities. This approach integrates operational aspects and strategic objectives. Therefore, future research should target the use of digital technologies in vendor management for further insight and rapid decision-making. Adding sustainability criteria in the evaluation of vendors can align vendor activities with sustainability objectives. Further studies can analyze how the replacement of vendors will affect the stability of the supply chain, the cost structure, and the innovative potential of the system. Cross-industry integration of ABC's model could prove its versatility and broad applicability. Finally, minimal engagement at the policy level for cross-industry integration will allow the incorporation of vendor adoption practices into local supplier development programs. Such collaboration will enhance the national supply chain in automotive manufacture and the position of Malaysia within the international supply chain of automotive industry.

Conflict of Interest

There is no conflict of interest for authorship, research, and/or publication.

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مراقبة أداء الموردين في صناعة السيارات في ظل استراتيجية التوطين

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المستخلص

نظراً إلى طبيعة المنافسة الشديدة في صناعة السيارات، لابد من تحليل ومراقبة أداء الموردين لضمان استمرارية الإنتاج، مع تقليل التكاليف إلى أدنى حد ورفع مستوى الجودة والخدمة إلى أقصى حد. يهدف هذا البحث إلى تحليل ممارسات مراقبة أداء الموردين لدى الشركات غير الماليزية في إطار استراتيجيات التوطين المتوافقة مع سياسات صناعة السيارات الوطنية. أُجريت دراسة حالة في شركة ABC، وهي شركة يابانية رائدة في تصنيع السيارات في ماليزيا، من خلال ثلاثة مناهج بحثية رئيسية: المقابلات شبه المنظمة، والزيارات الميدانية، ومراجعة الوثائق. ركزت المقابلات مع الإدارة العليا على فهم عملية مراقبة أداء الموردين والتحديات الراهنة، بينما ركزت الزيارات الميدانية ومراجعة الوثائق على الممارسات الفعلية. تم اختيار شركة WHN كمورد إضافي في دراسة الحالة. أظهرت النتائج أن ضعف أداء الموردين ملحوظ، مع وجود عدة أسباب جذرية، مثل نقص المواد، ومحدودية القوى العاملة، ومشاكل في طاقة الآلات، والقيود المالية. تم إجراء تحليل السبب والنتيجة لتحديد الأسباب الجذرية بالتفصيل. توصلت الدراسة أن شركة ABC ستقوم بإنهاء التعاقد مع الموردين الحاليين المصنفين ضمن الفئة "ج" لمدة ثلاثة أشهر متتالية، والذين يُعتبرون من ذوي الأداء الضعيف. كذلك ستقوم نفس الشركة بتحديد وتطوير موردين مؤهلين جدد ليحلوا محل المورد الحالي. توضح هذه الحالة أهمية مراقبة الموردين، والتقييم الشامل، والتطوير لتحقيق الأداء الأمثل. كما تقيّم أهمية التنافسية والتوطين في استراتيجيات قطاع السيارات، ومرونة سلسلة التوريد، واستدامة آليات المراقبة التكيفية.