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Article

Tactical issues in managing asymmetric supply chain relationships: Insights from case studies

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OPERATIONS, INFORMATION & TECHNOLOGY | RESEARCH ARTICLE

Tactical issues in managing asymmetric supply chain relationships: Insights from case studies

Shovella Santy Alrosjid¹, I. Nyoman Pujawan^{1*} and Niniet Indah Arvitrida¹

Abstract: Imbalances in bargaining position between companies in the supply chains lead to asymmetrical relationships. While a large body of literature has addressed asymmetrical relationships in the supply chain, not much work has been exploring the issues of tactical decisions. This study presents a framework and case studies regarding how dependent manufacturers deal with tactical decisions in the context of asymmetric relationships. We conducted four case studies and looked at the tactical decisions regarding capacity flexibility, planning time fencing that reflects planning flexibility, safety stock, rescheduling frequency, and information sharing. The study suggests that (1). Most relationships in supply chains are asymmetric. A focal company with less expertise receives less power distribution but greater uncertainty in supply chain relationships. (2). When dealing with asymmetric power relationships, dependent parties create capabilities to become responsive, but most of them implement reactive tactical strategies in the form of buffering or allowing frequent changes to schedules and not effectively sharing information with trading partners.

Subjects: Supply Chain Management

ABOUT THE AUTHORS

Ms. Shovella Santy Alrosjid is currently a doctoral student at the Department of Industrial and Systems Engineering, Institut Teknologi Sepuluh Nopember, Surabaya, Indonesia. She has been working as a supply chain professional for more than 15 years and her dissertation is looking at the buyer and supplier relationships under asymmetric relationships and the current paper is one part of her dissertation.

Professor I. Nyoman Pujawan has been researching extensively various aspects of supply chain management. He has published many articles in the area of supply chain modelling, inventory and transportation, sustainable supply chain, and supply chain strategies and operations, including the issues related to schedule instability and flexibility which have much relevance to this paper.

Dr. Niniet Indah Arvitrida has been working in the area of supply chain modelling with agent-based modelling approach and has published a number of article relevant to the research reported in the current paper.

PUBLIC INTEREST STATEMENT

Relationship among business partners is not always characterized by symmetrical power between the two. Very often one dominates the other. This situation would affect how each party would react. In this research we explore how the inferior party should respond to the dominant party. Our study suggested that the inferior party should have higher level of flexibility and responsiveness, but not with any cost. They still need to put some limits on the level of responsiveness and flexibility to ensure competitiveness and sustainability.

Keywords: asymmetric relationship; dependent partner; uncertainty; supply chain; tactical strategies; performance

1. Introduction

Asymmetric relationships are entrenched in almost all supply chain partnerships. Thomas and Esper (2010) explain that a supply chain is constructed from a series of multiple companies' interactions, which are more asymmetric than symmetric. Links between customers and supply companies are structured in a chain of trading relations wherein one party delivers power to another reciprocally. In the context of asymmetric relationships, imbalanced power distribution is unavoidable (Gundlach & Cadotte, 1994). A partner's dominance can be described as its ability to reposition itself in the relationship (Cox, 2001), create the other party's dependency, enforce its will on others (Emerson, 1962), and claim higher value in a distributive process (Gulati & Sytch, 2007). Domination can materialize from, for example, the relative proportions of partners' purchase and sales volume (Siemieniako & Mitreęa, 2018), the number of alternative sources or products (Gelderman & Van Weele, 2004), technology owned and information control (McDonald, 1999), and the degree of connection with others in the workflow (Cendon & Jarvenpaa, 2001).

While academics have paid much attention to understanding asymmetric relationships, few studies have focused on formulating supply chain tactical strategies for performance achievement in asymmetric relationships. Most published work on asymmetric relationships reveals strategic planning techniques such as emphasizing on product leadership, learning to work together (Siemieniako & Mitreęa, 2018), trust and knowledge sharing (Rungsithong & Meyer, 2020) and specific asset or resource investments (Pérez & Cambra-Fierro, 2015). Few studies have discussed how asymmetric relationships should be taken into account when making tactical-level decisions.

Tactical-level decisions address one or several quantifiable factors, such as capacity management (Okongwu et al., 2016), safety stock (Sridharan & Lawrence Laforge, 1989), frozen time fence (Robinson et al., 2008), rescheduling frequency (Vieira et al., 2003), and information sharing (Hall & Saygin, 2012). All those tactical approaches are common in planning practices. For example, frozen time fence relates to which portion of the horizon is locked, or information sharing relates to how a focal company receives type and level of information from partners. It is undeniably urgent that a focal company in an asymmetric relationship has superior performance in order to compete in the industry and survive in the supply chain. This question is particularly important for companies that are dependent on another party (i.e., that hold the disadvantaged position in an asymmetric relationship). How do these companies maintain high levels of customer service while maintaining efficient operations (Nudurupati et al., 2011)? If a company is a dependent party, its power is less and its level of uncertainty is higher. This is the question that we address in this paper, where we develop a conceptual framework and present four case studies.

2. Literature review

Discussions of buyer-supplier asymmetric relationships have emerged over the past several decades and have exposed both the negative and positive impacts of imbalanced power distribution. For instance, the literature has emphasized the prerequisites for symmetry and mutual collaboration and has regarded asymmetry as a negative influence; Joshi (1998) explains that the weaker manufacturer usually has no choice but to comply with the stronger supplier's demand due to longstanding relationships and the dominant partner's potential to demonstrate opportunistic behaviors (Gundlach & Cadotte, 1994). However, asymmetric relationships are not solely detrimental but can also have a beneficial impact. When a dependent partner is able to complement a more powerful partner's imperfections and learn to work together (Siemieniako & Mitreęa, 2018), the need for absolute symmetry is not necessary (Pérez & Cambra-Fierro, 2015). Small companies can also benefit from working with a leading company through, for example, empowering suppliers' negotiations with other buyers (Brito & Miguel, 2017) and securing weaker partners' market outlets and sales volume (Hingley, 2005).

Previous studies consider asymmetric relationships a cause of uncertainty. The power imbalance in such relationships can create opportunistic behaviors and environmental uncertainty (Michalski et al., 2019; Pradabwong et al., 2015). The difficulty of optimizing individual companies' behaviors and inter-company coordination is evident, and a lack of transparency and of reliable, accurate, and timely information between partners is undeniable in asymmetric relationships. In other words, asymmetric relationships are a source of uncertainty.

To deal with uncertainty in an asymmetric relationship, a dependent company must define its standpoint. Based on that defined position, the company must decide what action is required to cope with the issue at hand, where it can be determined, and whether to take a tolerant-constructive or intolerant-deconstructive approach (Thomas & Esper, 2010). If the company decides to remain in such relationships or tolerant of the situation, it may be because they provide greater potential benefits than costs. Accordingly, a focal company that decides to tolerate asymmetric relationships will consider developing a constructive strategy to maintain its role in a supply chain. A constructive approach is developed to shape a more satisfactory form of relationships. However, because of the situation of dependent and dominant partners, a constructive strategy is more tactical rather than strategically attempt to reform the trading situations.

Uncertainty has been much discussed as a factor of performance in the supply chain tactical decision literature. Nyaga et al. (2007) explain the strategy of the configure-to-order environment on performance under conditions of demand uncertainty, investigating performance impact from the combined perspective of capacity configuration, demand variability, and demand skew. Gupta and Maranas (2003) propose a model that incorporates demand uncertainty in mid-term planning with manufacturing and logistics decisions.

Supply chain tactical decisions are commonly used to cope with uncertainty in mid-term planning. Several tactical approaches have become essential factors in influencing supply chain performance, including capacity tightness, time fences control, safety stock, rescheduling frequency, and information sharing. Capacity tightness has been shown to positively impact order fill rate and response time to customers (Nyaga et al., 2007) as well as on-time delivery rate (Hall & Saygin, 2012). Frozen time fences have a significant impact on performance because schedule flexibility in the proportion time interval delivers lower supply chain costs (Damand et al., 2019; Robinson et al., 2008). Another vital factor in performance is safety stock, which has been proven to determine schedule stability (Pujawan et al., 2014), level of customer service, and costs (Persona et al., 2007). Safety stock is considered the factor that can best reduce uncertainty (Kaipia, 2008; Sridharan & Lawrence Laforge, 1989). A positive correlation has been confirmed between updating a production schedule, known as rescheduling frequency, and performance (Muhlemann et al., 1982). However, Ganeshan et al. (2001) argue that frequent schedule changes will reduce performance. Another prevalent tactical planning consideration for performance improvement is the level of information sharing, which significantly contributes to customer satisfaction and costs improvement (Lee et al., 2000). The literature explains that, given the importance of performance for companies, supply chain accomplishment is interpreted as responsiveness to customer demand while operating efficiently (Neely et al., 1995; Nudurupati et al., 2011).

Even though asymmetric relationships are related to supply chain tactics and performance, many works on asymmetric relationships stop at the strategic level. There are clear limitations on dependent partners' ability to modify trading conditions and the behavior of larger partners, which do not easily accept leadership from others (Michalski et al., 2019). To this end, tactical planning that makes minimum changes to network design is more often implemented than tactical planning at the strategic level (Bilgen & Ozkarahan, 2004). Likewise, many works on tactical strategy that have used quantitative research to cope with uncertainty and improve performance have been less concerned about asymmetric relationships as a source of uncertainty. The existing research is much more interested in the quantitative technical aspects rather than

insights that can be used for real-world problems. Still, findings from the real-world cases are valuable in an analytical sense when they clarify understandings of existing theory (Pujawan et al., 2014). Table 1 summarizes the previous research on asymmetric relationships and supply chain tactical strategy, thus clarifying the focus and methodology of our research.

In the context of asymmetric relationships, simulations or mathematical models cannot investigate various non-quantifiable factors, such as level of dependency and partners' ability to modify trading conditions. Thomas and Esper (2010) reveal that a focal company's strategy is very much affected by its acceptance of asymmetric relationships. Likewise, some qualitative outcomes—such as confronting the benefits and costs of relationships, emotional responses to asymmetric relationships, and possible performance strategies—can only be expressed through empirical observations. This work provides more practical insights into the strategy applied by a dependent company when considering performance in asymmetric relationships.

3. Conceptual framework

We first develop a conceptual framework (Figure 1) that includes the variables affecting supply chain performance in asymmetric relationships. Our focus is on dependent companies in supply chains. The situation of a company in a more dependent position evokes environmental uncertainty, which can emerge from dominant partners through demand and supply uncertainty. Dependent companies can decide their tolerance and propensity for constructive strategy. Under environmental uncertainty, dependent companies need to make various tactical decisions, including capacity level, time fencing (which governs schedule stability), safety stock, rescheduling frequency, and level of information sharing. How these decisions are made will ultimately affect performance in terms of order fulfillment and cost-efficiency. Each element of the framework is explained further in this section.

3.1. Factors in asymmetric relationships

Many papers have attempted to explain cause and effect in asymmetric relationships. Early articles noted that distributive power is the main cause of power imbalance in such relationships. Cox (2001) explains that the buyer usually has power over suppliers, but a lack of substitutes, network effect, legal property rights, and brand can serve as suppliers' power. The buyer's power increases as a result of generating endorsements, connections with other workflows (Cendon & Jarvenpaa, 2001), relatively high purchase volume (Siemieniako & Mitreęa, 2018), and the number of alternative sources (Gelderman & Van Weele, 2004).

Because the dominant partner has a tendency to overpower the dependent one, some opportunistic attributes and behaviors can emerge, such as the dominant party's enforcing its will over another (Emerson, 1962). Consequently, external uncertainty becomes evident as a factor in the dependent partner's system (Pradabwong et al., 2015). Uncertainty can originate from the demand and supply flow, as described below.

3.1.1. Demand uncertainty

Demand uncertainty is a significant problem for manufacturers because it disturbs schedule stability and impacts performance. A manufacturer usually has no power to stop order changes from large and powerful customers (Pujawan et al., 2014). A large manufacturing company is more dominant in imposing a trading contract that maintains its more stable production schedule. Demand uncertainty in a supply chain relationship may take the form of changes in due dates, increases or decreases in order quantities, and cancellations or additions to the types of items ordered (Pujawan, 2004). Low demand forecast accuracy is also a source of uncertainty because manufacturers execute the current orders and prepare for future demand. As such, the accuracy of the demand forecast contributes to the stability of operations (Kaipia, 2008) and the possible impact on supply flow.

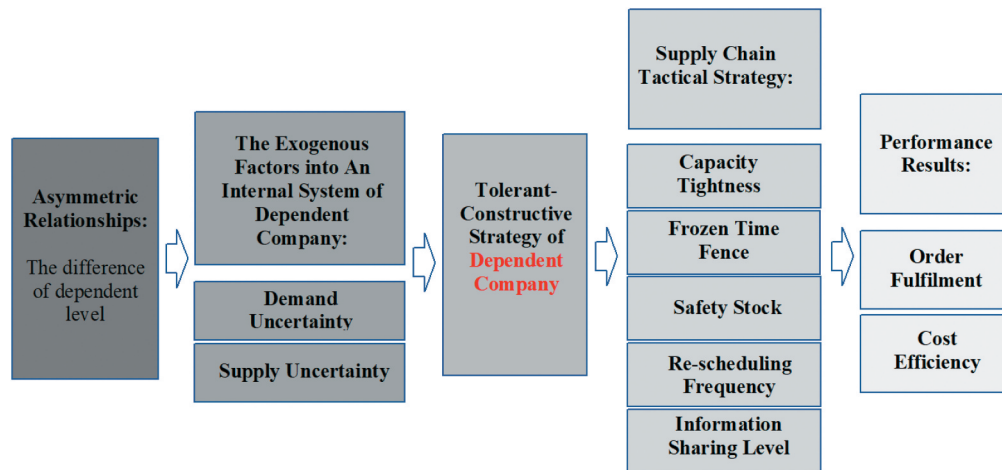
Table 1. Selected papers on asymmetric relationships and supply chain tactical strategy

Subject	Author (year)	Focus	Methodology	
Asymmetric relationships	Cox (2001)	Outlining how the power perspective can enhance effective procurement and supply chain management	Conceptual framework	
	Pérez and Cambra-Fierro (2015)	Learning from asymmetric relationship forms to create value and reduce risk in supply chain partnerships	Case study	
	Michalski et al. (2019)	Examining non-linear aspects of the asymmetry-performance relationship under varying conditions of trust and innovation	Survey	
	Joshi (1998)	Examining how and when the relatively dependent party resists the demands of its more powerful partners	Survey	
	Brito and Miguel (2017)	Investigating the influence of power asymmetry on governance and value appropriation	Case study	
	Gundlach and Cadotte (1994)	Measuring the dependence or power of dependent and dominant partners and exploring how they combine to affect other channel phenomena	Survey	
	Emerson (1962)	Constructing a theory of the power aspects of social relations	Conceptual framework	
	Thomas and Esper (2010)	Exploring the phenomenon of asymmetric supply chain relationships and investigating how firms manage these relationships	Case study	

(Continued)

Table 1. (Continued)			
Subject	Author (year)	Focus	Methodology
Supply chain tactical strategy	Nyaga et al. (2007)	Identifying the collective impact of configuration capacity and demand uncertainty at the service level	Simulation experiments
	Hell and Saygin (2012)	Investigating the effect of information sharing on on-time delivery rate and costs	Simulation experiments
	Okongwu et al. (2016)	Studying the impact of integrated supply chain tactical planning factors on performance objectives	Quantitative modeling and simulation experiments
	Gupta and Maranas (2003)	Incorporating demand uncertainty in mid-term planning of multiple supply chains	Quantitative modeling
	Ganeshan et al. (2001)	Studying the impact of selected inventory parameters and management techniques on the performance of retail supply chain	Simulation experiments
	Sridharan and Lawrence Laforge (1989)	Examining the viability and effectiveness of using safety stock to reduce schedule instability at the master production schedule	Simulation experiments
	Robinson et al. (2008)	Evaluating the relative effectiveness of frozen time fence strategies in the make-to-order two-stage serial supply chain	Simulation experiments
	Pujawan et al. (2014)	Obtaining insights into manufacturing companies' strategies for dealing with schedule instability	Case study

Figure 1. Conceptual framework of asymmetric relationships.



3.1.2. Supply uncertainty

Supply uncertainty is an essential factor for a manufacturer because of its relevance for the predictability of materials supply. Pujawan et al. (2014) explain that the supply lead time for materials procurement is uncertain in most cases. Many factors affect supply uncertainty, including process reliability at the supplier, quality and availability of raw materials, and the transportation process. Normally, to reduce uncertainty, a company maintains a long-term contract with a high level of commitment from suppliers (Pujawan et al., 2014). However, in asymmetric relationships, the company with the more dependent position has limited ability to impose changes on trading partners (Michalski et al., 2019).

While dependent manufacturers have more dependency on partners, such as degradation of their performance when they are away from the customers (Arora & Brintrup, 2021) and when they have higher suppliers innovation sharing (Wagner & Bode, 2014), they can also decide necessary action when dealing with asymmetric relationships. In light of the benefits of an asymmetric relationship, dependent partners can choose to tolerate it and develop a suitable strategy (Thomas & Esper, 2010). Suitable strategies include constructive approaches that consider the attributes and behaviors of the dependent and dominant partners. With the aim of achieving better performance, a supply chain tactical strategy can be developed to deliver extraordinary efforts and maintain a reasonable share to partners (Siemieniako & Mitreęa, 2018).

3.2. Tactical decisions

Strategies for improving performance vary from case to case. However, previous research has noted several strategies suitable for asymmetric relationships. Dominant partners are usually opportunistic and resistant to other parties' leadership (Michalski et al., 2019). Conversely, dependent partners are typically less flexible in making changes to agreements. Therefore, dependent manufacturers should opt for tactical decisions that involve fewer changes to partners' behaviors and network design (Bilgen & Ozkarahan, 2004) as well as buffer-oriented techniques (Kaipia, 2008) in order to achieve better cost and customer satisfaction (Nudurupati et al., 2011).

In this study, we address the following five tactical decisions, which are extremely important in ensuring that supply chain operations have sufficient flexibility and are protected from too much uncertainty.

3.2.1. Capacity flexibility

Capacity flexibility is a reactive strategy that enables a manufacturer to cope with the uncertainty that emerges from asymmetric relationships. It represents the ratio of available capacity to

average demand. Manufacturers tend to buffer themselves with extra capacity. Instead of negotiating the accuracy of the information provided by customers, companies prefer to serve customers at their own risk. Previous studies have presented the results of the capacity flexibility strategy in managing operations (Hall & Saygin, 2012; Nyaga et al., 2007; Okongwu et al., 2016). High capacity flexibility indicates that the dependent manufacturer is highly capable of responding to unstable demand patterns on the part of the dominant partner.

3.2.2. *Time fencing*

Time fencing is another reactive strategy that a manufacturer can choose to deal with uncertainty in asymmetric relationships. Here, the planning horizon is divided into multiple segments, in each of which the plan's flexibility level is determined. A certain plan in the near future may be frozen to avoid many disturbances to a plan that has been partially executed. While imposing a frozen schedule limits responsiveness, it provides much better stability, which is required for the production facility to perform more efficiently (Damand et al., 2019; Pujawan, 2004; Robinson et al., 2008)

3.2.3. *Safety stock*

Safety stock is a common strategy for dealing with uncertainty on both the demand and supply sides (Angkiriwang et al., 2014). Safety stock maintains customer service level in situations where demand exceeds prediction and/or delays in supply. In the manufacturing environment, safety stock maintains stability in the production schedule as well as performance in terms of costs and customer service (Kaipia, 2008; Persona et al., 2007). When dealing with dominant partners, it is essential for dependent companies to have the right amount of safety stock.

3.2.4. *Rescheduling frequency*

Rescheduling updates an existing production schedule to respond to uncertainty. It is a reactive strategy that enables a manufacturer to respond to changes due to demand, supply, or internal factors. Vieira et al. (2003) explain that, in dynamic and stochastic manufacturing environments, planners must not only create high-quality schedules but also respond quickly to unexpected events. The right rescheduling frequency should provide the best balance between schedule stability and responsiveness to customers (Pujawan et al., 2014).

3.2.5. *Information sharing*

Unlike the other discussed strategies, information sharing is a more proactive strategy that addresses the basic causes of uncertainty by reducing information bias. In asymmetric relationships, improvement in information sharing is essential due to the difficulty of optimizing inter-company coordination. Many works explain that level of information sharing affects supply chain performance (Hall & Saygin, 2012; Lee et al., 2000). However, because dominant partners usually do not easily accept others' initiatives, the benefits of increased information sharing need to be explained to partners.

4. Case studies

The relationship between companies in the supply chain has been well studied, however, the impact of the companies' position in the relationship to performance has not been sufficiently explored. The primary reason is insufficient empirical data on broader supply chain networks (Arora & Brintrup, 2021). To explore the phenomenon of manufacturers who cope with asymmetric relationships, we conducted four case studies involving four dependent manufacturing companies in Indonesia. Case study research can collect rich and profound information through in-depth questions that can deeply explore a phenomenon (Kähkönen, 2011). The case companies were selected based on their ability to interact with dominant partners while having different intensities and forms of asymmetric relationships. The case studies are not representing all situations, but we have picked the cases that represent the situation with a low bargaining position, tolerate imbalance power, and attempt to build constructive planning to cope with the situation. We prepared a list of open-ended questions representing the elements of the framework before interviewing each case company. In each case, two to three individuals in managerial positions

were interviewed in separate meetings, after which we followed up via electronic messages. Several functions are involved in these case studies, including operational director, general manager, supply chain manager, sales manager, production manager, and quality assurance manager. Along with the interviews, we collected and analyzed relevant data that could support the understanding of asymmetric relationships. A similar approach has been used in few previous research (Kaipia, 2008; Pujawan et al., 2014). The details of each case are explained in this section, while Table 2 summarizes the cases for comparison.

4.1. Case 1: Company A

Company A is a manufacturer of electronics products, such as home entertainment and professional audio systems. It is a subsidiary company of a global brand electronics. The production facility has more than 1,000 employees and is located in East Java, Indonesia. The facility is designed to produce 1.5 million unit products per year with a current utilization of around 50–60%, with one shift each day and five working days per week. About 200 finished goods are produced involving about 8,000 components, 60–70% of which are obtained from overseas. The production volume fluctuates throughout the year to account for seasonal demand.

The company's customers include multi-channel distributors and corporations. They typically order in two different conditions: regular and project-based. Regular orders are characterized by more accurate forecasts, more manageable lead times, and demand time fences, while project-based orders are usually short term, have shorter lead times, and display sporadic time patterns. Project-based orders account for about 30% of the company's annual sales. To achieve on-time delivery, the company must issue early orders for components with long lead time before confirming a project.

On the supply side, managers said that there is a risk when they interact with specific high-tech electrical parts suppliers because of long lead times, high prices, and product availability. For example, the smartphone industry's increasing demand can affect the price and availability of parts because makers or traders prioritize more potential buyers. Some electrical components have a lead time of more than nine months, beyond the forecast horizon. About 30% of purchases are categorized as high-risk components, and about 40% are from single suppliers.

We classified this company as a dependent partner with uncertainty coming from two sides, with both buyers and suppliers posing greater power. From the demand side, there is no limit of rescheduling frequency, in particular for the project-based orders. Customers require a highly flexible response to any changes in the orders. Fortunately, for the regular orders, customers agree to have some level of frozen orders. The demand forecast accuracy is in the range of 75%–80%. Information sharing is limited at this time, but the company has considered implementing advanced inventory information sharing. From the supply side, the uncertainty is associated with the uncertain arrival of materials due to suppliers' quality and processes. In order to respond to those powers, Company A made the tactical decisions to relax capacity, order components in advance, and use safety stock. The company's safety stock level is to cover more than three months of demand, indicating a relatively high buffer to deal with uncertainty.

4.2. Case 2: Company B

Company B is a subsidiary of a multinational company that specializes in the manufacturing of cosmetics packaging. The company produces two kinds of tube packaging—aluminum barrier laminated (ABL) and plastic barrier laminated (PBL)—to serve prestigious brand companies in Indonesia, such as toothpaste, skincare, and other toiletries and cosmetics producers. The facility is located in East Java, Indonesia, and has around 300 employees. The production capacity is 60 million tubes per month, with full operation of 24 hours per day, seven days per week. Capacity usage is approximately 60% for ABL facilities and 85% for PBL. There are currently about 1,000 finished products, produced by high-end printing machines and supported by around 300 components. The machines also deliver more cost efficiency in operations than the conventional one. The

company leads in Indonesia with about 30% market share. Both demand and supply are dominated by domestic trade with seasonal fluctuations in volume.

Company B's major customers are four multinational companies that dominate 80% of Company B's sales volume. Typically, the holding company has made strategic agreements with customers in terms of price, volume, and period of delivery. At the country level, the company has to manage a strategy to satisfy these agreements, sometimes with a tight operations cost, whereas the typical customers require very high flexibility to cope with demand uncertainty. Changes can occur at any stage of the order fulfillment process, and Company B needs to be sufficiently flexible in responding to those changes. Dominance also comes from customers when they are about to make decisions regarding the supply side, where the major components and suppliers are decided not by the company but by the customers who will purchase the products. Unfortunately, these chosen suppliers often pose delivery problems, especially during the peak season. Delivery lead time from suppliers is uncertain. Some parts, such as plastic injection components, are supplied by single suppliers.

It is evident in this company that asymmetric relationships are present in partnerships. Based on these observations, Company B tends to be a dependent partner. It attempts to be flexible with partners' requests. Safety stock is available both for raw material and finished goods, with some items monitored weekly by customers. Capacity flexibility is moderate to anticipate order changes by customers. Rescheduling is frequent—as often as every day—while the frozen time fence is very short because it is possible to insert or change orders as long as the company can support these revisions. Information sharing is in the form of a demand forecast with a low accuracy of less than 50%.

4.3. Case 3: Company C

Company C is part of a national group of plastic packaging producers. Located in East and West Java, Indonesia, the company has several machines that can produce rigid plastic packaging products such as bottles, caps, and jars. The company employs about 800 people who work 24 hours per day, seven days per week. They serve large multinational fast-moving and consumer goods (FMCG) companies, the crop science industry, the pharmaceutical industry, and other local companies with a sales composition of 50%, 25%, 5%, and 20%, respectively. The production capacity is 1,000 tons per month, 70% of which is contributed by the East Java plant. Capacity utilization is in the range of 65–70%. Because competition is intense, the company accentuates its high flexibility in order to gain market share. The majority of sales are domestic, while the main raw materials, such as resin, are imported.

Company C trades with several multinational companies. These relationships are merely transactional, rather than collaborative. Managers said that improvement projects tended to bring advantages for their customers only. The company always attempts to fulfill customer requests, including frequent order changes. When a demand spike is approaching, customers force the company to deploy more capacity for them. In some cases, orders are postponed or canceled after capacity has already been allocated to them.

The main raw materials are resin and colorant. The suppliers are large makers, and the company absorbs only a small proportion of suppliers' capacity. The payment terms disadvantage the company: Short payment terms are allowed by suppliers, while long payment terms are requested by customers. In some cases, if payments to suppliers are delayed, materials arrivals are delayed as well. The low forecast accuracy from customers also results in delayed delivery of supporting materials, such as carton boxes and stickers.

In this case, asymmetric relationships exist wherein Company C is a dependent partner. Based on these observations, the company receives frequent changes in orders from the customers. No frozen schedule is possible, as customers are powerful and can alter orders at any time.

Information sharing is consistent with the level of demand forecast, but its accuracy is low. In dealing with this situation, the company maintains extra capacity and a sufficient level of safety stock. The planning system is also required to have a high level of flexibility to enable the company to do frequent replanning and rescheduling.

4.4. Case 4: Company D

Company D is a subsidiary of a multinational company that produces cigarette filters. The company is located in East Java, Indonesia, and is the only facility in the country that produces cigarette filters independently rather than as part of a cigarette company. About 300 types of items are produced. The innovative finished goods serve both domestic and overseas customers. The production capacity is about 18,000 tons per year. Nowadays, capacity utilization is about 80%, but normally the company's capacity utilization ranges from 40–80%.

Company D's customers are multinational companies, large national group companies, and small and medium enterprises. Customer orders are characterized by short notice and frequent sudden changes. Customers sometimes also request that the company adhere to new product specifications but with a requirement to perform production trials. After a trial run, the products are delivered to customers for further trial in cigarettes. Conducting and obtaining results from cigarette trials takes time—four to five days in some cases—resulting in unutilized machines.

The major materials used to produce cigarette filters are tow and plug wrap. Together, these two materials count for 80% of total material costs. There are few suppliers of these materials in the world. In such an oligopolistic market, suppliers can negotiate price changes, refuse customers' delivery rescheduling requests, set high minimums for order quantities, and alter the delivery schedule (advance or delayed) by themselves. Tow and plug wrap are made from natural raw materials. The lead time is long and uncertain, resulting in the need for the company to keep high safety stock.

The asymmetric power is obvious in these relationships. Instead of altering trading conditions, the company prepares reactive strategies, such as preparing extra capacity, keeping safety stock, and frequently rescheduling its operations. Company D also implements a two-week frozen time fence, although in fact it is not entirely frozen as several orders can still be inserted within this period. The demand forecast information is implemented but with low accuracy (about 40%). Therefore, the company usually predicts demand on its own.

5. Analysis and discussion

Our four case studies confirmed the presumption that asymmetric relationships are evident in the supply chain. Asymmetric relationships exist on both the supply and demand side because of differences in power distribution that make dependent and dominant partners recognizable. In all cases, asymmetric relationships induce uncertainty at various levels. In this section, we discuss the findings from the four case studies described above.

5.1. Power distribution and uncertainty in asymmetric relationships

The four case studies suggest that imbalanced power distribution is unavoidable because each party's dependency level in a relationship is different. A prominent issue in asymmetric power distribution is uncertainty. Dominant partners ignite uncertainty, while dependent partners must respond to it. Uncertainty itself has been an interesting topic in the supply chain literature; it is often the result of other parties changing orders, placing orders with short notice, or providing inaccurate demand predictions (Angkiriwang et al., 2014; Nyaga et al., 2007; Pujawan et al., 2014).

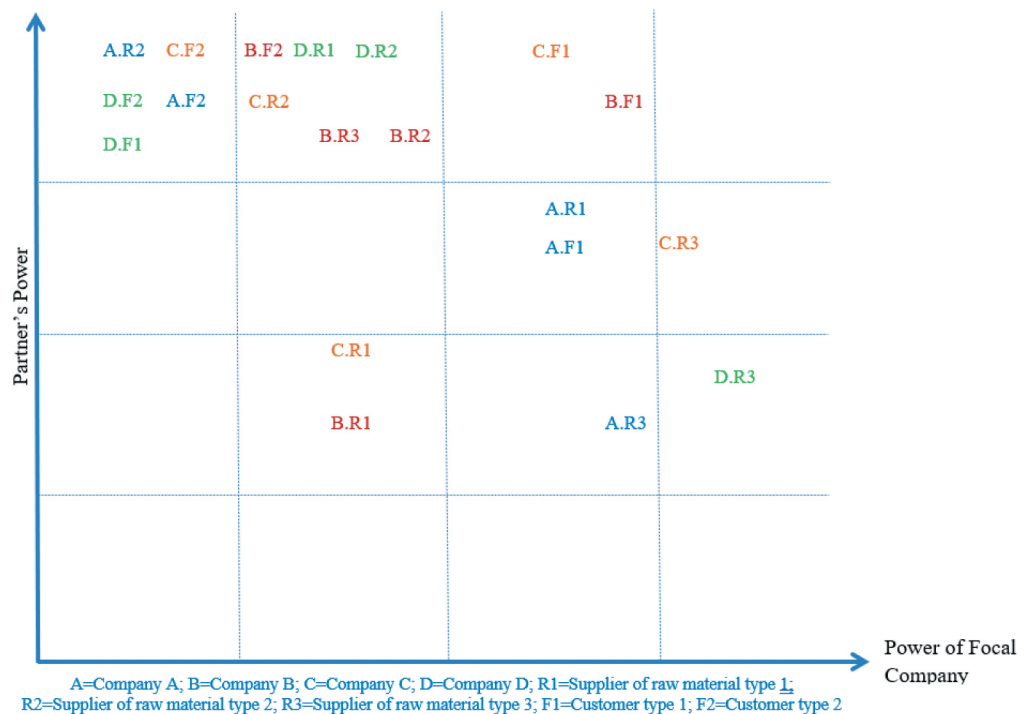
All cases invested in both tangible and intangible expertise to position themselves in supply chain relationships. So that they could be more responsive to partners with greater power. Companies A and D actively developed product innovation to penetrate niche markets. However, their partners also compete to increase their expertise. Suppliers invent specific components, such

as high-end electrical parts that form the brain of electronics products. Meanwhile, single suppliers of injection plastic continuously improve their secondary process for product appearance. Both efforts result in Company A's being highly dependent on these parties. Similarly, tow and plug wrap suppliers widened their gap with customers through excellence and the rarity of the technology used to produce the products. Hence, Company D is also highly dependent on them. For Companies B and C, the main raw material suppliers are determined by the main customers. Therefore, their dependency on typical suppliers is excessive. For these supply streams, uncertainty flows from those dominant suppliers.

On the demand side, customers are typically treated like kings. This is more verifiable in asymmetric relationships. Order and schedule changes, even on short notice, are always served by the case companies, particularly for special customers. If a company's dependence on a customer is very high, it makes a greater effort to satisfy that customer. Company A has project-based customers, Company B and C have large FMCG customers, and Company D has large cigarette company customers, who contribute significantly to their sales and endorsements. As such, they are treated as special customers. To satisfy customers, the case companies are willing to incur extra costs, adhere to customers' wishes with no direct benefit for themselves, change their plans, and so on. Ideal collaboration has not been achieved, although working closely together from the planning stage through the delivery of products can optimize benefits for supply chain members (Pradabwong et al., 2015; Siemieniako & Mitreęga, 2018; Simatupang & Sridharan, 2008).

To clarify the presence of different power distributions in asymmetric relationships, Figure 2 depicts the relative position of focal companies' power with regard to their partners. The position also represents the level of uncertainty that cannot be dismissed by dependent partners in asymmetric relationships. The case companies are represented by A, B, C, and D, respectively. R1, R2, and R3 represent suppliers of different types of materials, while F is used to represent the customers (F1 for regular customers and F2 for special customers). As shown in Figure 2, 13 out of 20 relationships are characterized by dominant partners. Dominant partners can be on the

Figure 2. Power positions in asymmetric relationships.



upstream or downstream side. This finding supports previous studies that proclaim the inequality of power distribution in a network (Arora & Brintrup, 2021; Emerson, 1962; Kähkönen & Virolainen, 2011).

All of the above indicates that imbalanced power distribution creates asymmetric relationships, which pose uncertainty for dependent partners. However, much of the research on asymmetric relationships has not considered variations in power position or the uncertainty of dependent parties. Accordingly, this research proposes the following:

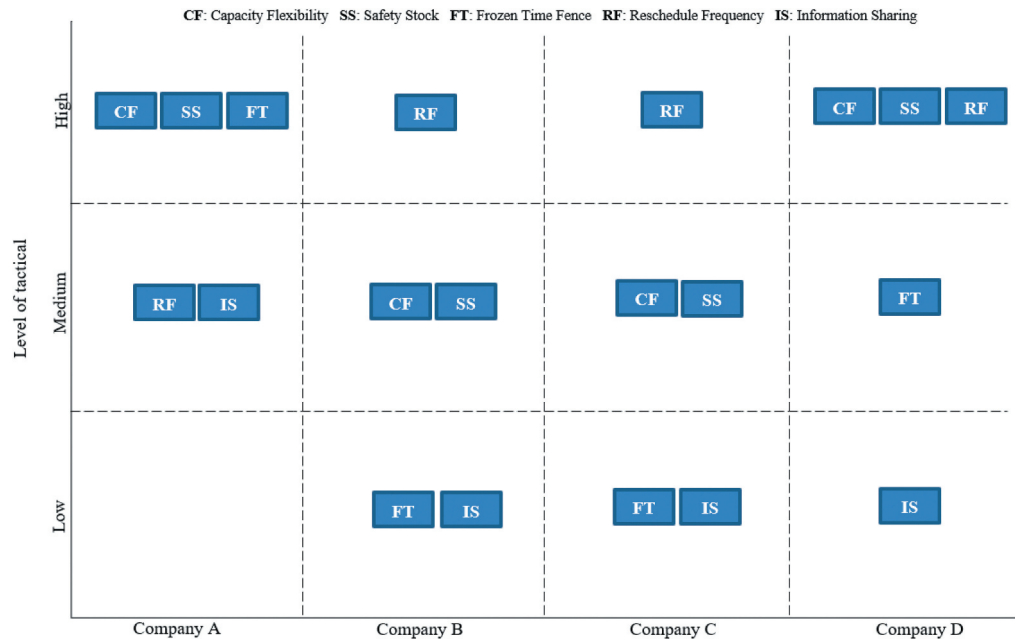
Proposition 1: *Most relationships in supply chains are asymmetric. A focal company with less expertise receives less power distribution but greater uncertainty in supply chain relationships.*

5.2. Asymmetric relationships and supply chain tactical strategy

Better performance is an objective of companies over time, as it is an effort to gain competitive advantage (Nudurupati et al., 2011). Tactical decisions as medium-term planning, which is not changed often, affect an organization’s operational and financial performance (Bilgen & Ozkarahan, 2004; Seiler et al., 2020). The case companies develop a constructive strategy in dealing with dominant partners (Thomas & Esper, 2010). Moreover, as observed in all cases, dependent partners must be flexible and responsive to their supply chain partners. The case companies are aware of their inferior relative power and hence adjust with either reactive or proactive strategies. An obvious impact of being the dependent partner is exposure to uncertainty, which needs to be addressed with appropriate tactical decisions. Our results relate to a previous study by Thomas and Esper (2010), which found that tolerance can occur because it is the rational decision from a business perspective.

The summary of tactical decisions is shown in Figure 3. It is interesting that all four companies use safety stock and capacity allowance at least at a medium level. This is in line with the observation by Angkiriwang et al. (2014) that, when dealing with uncertainty, companies often choose reactive rather than proactive strategies. Safety stock and capacity allowance are the two most popular buffering strategies. They are relatively easy to implement and safe when dealing with uncertainty but need additional investment and hence result in higher costs.

Figure 3. Level of tactical strategy in asymmetric relationships.



Companies A and D produce innovative products with a rapid life cycle, high products category, relatively low volume in each stock keeping unit, relatively high margin, and high technology content. They set high capacity flexibility, meaning high capacity allowance. Moreover, they are willing to allocate a capacity buffer for special customers. Companies B and C produce functional products (the packaging of toiletries, cosmetics, and chemicals manufactured goods). Products have a relatively long life cycle (design changes only in printings or colors), low variation in families of products, high volume in each family level, and relatively tight margins. They set a medium level of capacity flexibility, which also means a medium level of capacity buffering. Likewise, companies B and C deploy a medium level of safety stock. The tactical strategy selection relates to an early and often-cited model developed by Marshall Fisher wherein strategic choices are influenced by product characteristics (Fisher, 1997).

It is also interesting to note that the level of planning firmness varies from case to case, but in general, companies could not freeze production schedules for a long time. The exception is Company A, which imposes a two-month frozen schedule for regular orders but no frozen schedule for project-based orders. The other three case companies provide a great deal of flexibility for customers to change orders. Companies B and C only set frozen schedules for short periods of time, while Company D is able to set such schedules at a medium level. The variability of tactical designs allows supply chain partners to identify acceptable rules for performance (Simatupang & Sridharan, 2008).

The rescheduling frequency is at least medium. This also supports our contention that these companies are in a disadvantageous position in the supply chain relationship. High rescheduling frequency means that the company is forced to frequently adjust to new situations. Rescheduling frequency reflects how often a company must adjust to the most recent information. While this is an indication of company's ability to respond to changes, it may also increase operational costs. Three out of four cases are characterized by high rescheduling frequency. Only Company A has a medium level of rescheduling frequency, perhaps corresponding to this company's ability to impose a relatively long frozen schedule.

Information sharing is low for Companies B, C, and D and medium for Company A. This makes sense given that, under asymmetric power dynamics, relationships are more adversarial, and both parties are thus less obliged to share information. Although there are information flows, the quality of information is low. As indicated in the case described above, most forecast accuracy is low.

Based on the above discussions, dependent parties show some commonality in their tactical strategies when dealing with asymmetric relationships. Most of them need to be flexible in their planning system to absorb the medium-term uncertainties. Even though the degree of flexibility is not the same, but dependent parties can survive and sustain their business if the dominant parties see them as responsive partners. However, companies create such responsiveness through reactive than proactive strategies. Reactive strategies such as adding safety stock, having extra capacity and adding lead time buffers are easier to implement compared to more proactive strategies such as progressively reducing uncertainty and lead time. Interestingly, these companies also do not see much value in information sharing across the supply chain, but this is more because of the quality of the information. Hence, this research makes the following proposition

Proposition 2: *When dealing with asymmetric power relationships, dependent parties create capabilities to become responsive.*

Table 2. Summary of case studies

Type of products produced	Company A	Company B	Company C	Company D
	<i>Electronics products</i>	<i>Tube packaging</i>	<i>Rigid plastic packaging</i>	<i>Filters for cigarettes</i>
Characteristics of company	<ul style="list-style-type: none"> High-tech, innovative products with about 200 varieties World brand market leader with about 30% market share Multiple processes with eight weeks of production lead time Competitors are manufacturers within the group and other brands Production planning based on two months' firm orders Long waiting period for safety standard approval 	<ul style="list-style-type: none"> Functional products with printing excellence for about 1,000 varieties Indonesian market leader with about 40% market share Simple process with one week of production lead time Competitors are mostly the same makers in Indonesia Production planning based on weekly delivery instructions from customers 	<ul style="list-style-type: none"> Functional products with service flexibility for about 300 varieties 2nd market leader in Indonesia with 30% market share Simple process with one week of production lead time Competitors are mostly the same makers in Indonesia and customers' oversea subsidiary manufacturers Production planning based on weekly delivery instructions from customers 	<ul style="list-style-type: none"> Highly scientific, innovative products with about 300 varieties Only independent cigarette filter maker in Indonesia with 30% market share Multiple processes with two weeks of production lead time Competitors are customers Production planning based on bi-weekly orders that can be changed every time
Characteristics of demand	<ul style="list-style-type: none"> 30% from powerful project-based customers Short notice forecast for project-based orders Easy for project-based customers to alter orders Relatively stable orders 	<ul style="list-style-type: none"> 80% from powerful multinational companies Low forecast accuracy from main customers Easy for customers to switch order proportions High level of order changes 	<ul style="list-style-type: none"> 70% from powerful multinational companies Low forecast accuracy from main customers Easy for customers to switch order proportions High level of order changes 	<ul style="list-style-type: none"> 80% from powerful multinational and large local companies Low forecast accuracy from main customers Customers dictate price, delivery, and lead time High level of order changes
Characteristics of supply	<ul style="list-style-type: none"> Long lead time and uncertain supply for specific electrical components (more than nine months) Supply risk when dealing with a single supplier of molding product 	<ul style="list-style-type: none"> Customers decide main raw materials suppliers Suppliers have a closer relationship with customers Moldings owned by suppliers, then has risk of single supplier 	<ul style="list-style-type: none"> Customers decide main raw materials suppliers Non-negotiable payment term reveals gap in cash flow High minimum order quantity is applied Supporting RM relies on the accuracy of the company's demand forecast 	<ul style="list-style-type: none"> Limited number of tow and plug wrap suppliers Long lead and large MOQ Because it is a natural product, variability in tow quality is high Supporting RM relies on the accuracy of the company's demand forecast

(Continued)

Table2. (Continued)

Type of products produced	Company A	Company B	Company C	Company D
	<i>Electronics products</i>	<i>Tube packaging</i>	<i>Rigid plastic packaging</i>	<i>Filters for cigarettes</i>
Impacts	<ul style="list-style-type: none"> • High RM inventory (more than three months) • Medium to high schedule instability • Irregular cost for RM or FG delivery 	<ul style="list-style-type: none"> • High schedule instability • Delayed delivery for some customers • Inventory buffer in RM and FG 	<ul style="list-style-type: none"> • High schedule instability • Tight cash flow • Unplanned overtime results in high overtime costs • Inventory buffer in RM and FG 	<ul style="list-style-type: none"> • High RM inventory (about three months) • High schedule instability • Idle capacity • Frequent production changeover
Strategies applied	<ul style="list-style-type: none"> • Tolerant-constructive to asymmetric relationship • Safety stock • Capacity buffer • Shorter frozen time fence for project-based orders 	<ul style="list-style-type: none"> • Tolerant-constructive to asymmetric relationship • Safety stock • Capacity buffer • Liquid frozen time fence • Overtime hours 	<ul style="list-style-type: none"> • Tolerant-constructive to asymmetric relationship • Safety stock • Machine at customers' site • Liquid frozen time fence • Overtime hours 	<ul style="list-style-type: none"> • Tolerant-constructive to asymmetric relationship • Safety stock • Capacity buffer • Liquid frozen time fence • Overtime hours

Proposition 2a: *Most dependent parties implement reactive tactical strategies in the form of buffering or allowing frequent changes to schedules.*

Proposition 2b: *Most dependent parties do not perceive information sharing as a viable way of dealing with dominant business partners.*

6. Concluding remarks

6.1. Summary

This work presents a framework and case studies exploring asymmetric relationships in the supply chain. As explained and supported by previous studies, most supply chain relationships are asymmetrical, with one party dominant over the other. This is mainly due to differences in the proportion of purchases or sales and the ownership of important resources or expertise. The case studies offer an understanding of the causes, complexities, and impacts of manufacturers' asymmetric relationships. We also explore various tactical decisions that dependent parties can make to deal with more powerful parties in the supply chain. Although previous studies explain that asymmetric relationships induce uncertainty (Michalski et al., 2019; Pradabwong et al., 2015), to the best of our knowledge, we are the first who develop a connection between power distribution and tactical decisions. Previous literature solely explains tactical decisions without considering the dependent partners' position in the asymmetric relationship (Hall & Saygin, 2012; Okongwu et al., 2016).

There are a number of interesting findings from the case studies in this work. First, a focal company with lesser expertise has less power but greater uncertainty in supply chain relationships. Second, in dealing with uncertainties from supply chain partners, dependent companies tend to be more reactive than proactive, with most performing what is called a specific constructive tactical strategy. These tactical strategies are quite common among dependent companies, mostly in the form of buffering and allowing customers to change orders. What is less common is the exchange of information among trading partners. This is an interesting finding; the literature on supply chain management has long advocated the need for information sharing, but this seems not to be

occurring in asymmetric relationships. Even when there is an attempt to share information, the quality of information is insufficient to make good decisions.

6.2. Managerial and theoretical implications

This study indicates that dependent companies cope with asymmetric relationships in a primarily reactive way, rather than introducing fundamental changes to the system. However, they are willing to improve communication with partners by extending information sharing. This relates to their position in that it is not easy to change the trading condition and position of the dominant partner, who does not find it easy to accept leadership from others. However, with appropriate planning, tactical strategies can result in better performance.

Managers should focus on developing the right capacity flexibility, keeping the right amount of safety stock, and setting appropriate frozen time fences and rescheduling frequencies. Together, these factors indicate a company's flexibility in responding to more powerful parties. However, the focus should not be solely on responsiveness, as dependent companies also need to make sufficient profit to grow and to sustain themselves. As the above parameters collectively impact cost and responsiveness, managers need to think holistically rather than make a single decision at a time. For example, setting a longer frozen period may result in lower safety stock. Understanding the interrelations among these decision parameters is extremely important.

Future studies might explore the interrelations among tactical decisions. Companies may require a more powerful tool to predict the collective impact of changing parameter values and to identify which combination is the best under certain conditions. In particular, when the situation is more dynamic due to the COVID-19 pandemic, how do dependent companies adjust their tactical decisions? Is there any possibility to adjust decoupling point design to bring adaptability to a changing environment? All of these are important questions that need to be addressed in future studies.

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