# SCM PMA Supply Chain Models---A Case Study of Tesla Motors

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Abstract: Supply chain management in the automotive industry has always been concerned, especially in the emerging new energy vehicle industry in recent years. First of all, this paper analyzes Tesla through the partnership model of supply chain management, and the competitive advantages of this model applied to Tesla. Secondly, the supply chain model is combined with the management method of partnership and cooperation to further explain. In addition, Lotus Motors also serves as an auxiliary case for effective analysis. Finally, the effectiveness, efficiency and feasibility of the management method are also considered.

**Keywords:** Supply Chain Management, Supply Chain Model, Managerial Approaches, Practices, Competitive Performance

#### 1. Introduction

As one of the most important methods to enhance the competitiveness of enterprises, supply chain model has always been concerned in the business world (Ellram, 1991). Supply chain management is critical to the automotive industry, which is one of the most important economic sectors in the world in terms of revenue and also dominates in terms of quality expectations, product variety and process complexity (Sedex, 2019). In recent years, due to the advantages of energy saving and emission reduction, new energy vehicles, especially pure electric new energy vehicles are becoming the new favorite of consumers when buying cars. Tesla is a giant manufacturer of electric new energy vehicles.

This case study report aims to explains and critically analyze how a conceptual model of supply chain and a supply chain management method are applied in the Tesla Motors case, and make a comparison with the auxiliary case --- Lotus car. This analysis draws on two management methods, namely, the Close Partnership-Based Supply Chain Model and Partnership and Collaboration.

Essentially, this report is an analysis of the various types of partnerships into which Tesla has entered with various auto companies. The report first clarifies the concept of the Partnership Model. Secondly, the competitive advantages of this model will be elaborated and analyzed in combination with the Tesla case as to how these competitive advantages are related to the Tesla case. In the second part, it identifies and explains the supply chain management approaches employed in the Tesla case, and how this management method has been utilized to run the Partnership Model mentioned above. Finally, the effectiveness and efficiency of the management approaches and the feasibility of these approaches in realizing the strategic goals of the enterprise will be analyzed.

# 2. The Supply Chain Model of Tesla Motors

According to its corporate strategy, Tesla Motors has signed contracts and established different types of partnerships with many other motor companies. Therefore, the conceptual model Tesla Motors used in this case study report is Close Partnership-Based Supply Chain model. This section first defines and explains the theoretical principles of Close Partnership-Based Supply Chain, and then it performs a critical analysis of this supply chain model by drawing on relevant literature.

#### 2.1 Close Partnership-Based Supply Chain

# 2.1.1 Conceptualization of the Partnership Model

In order to improve supply chain performance, "partnership" between enterprises is essential as it can bring mutual benefits to enterprises and help them integrate with resources of both companies

(Lambert et al., 2004). According to (Yu et al., 2001), supply chain partnership is the relationship between two independent members in the supply channel in order to achieve specific strategic goals and interests by increasing information sharing.

The definition of "partnership" in this case study report is adapted from (Lambert et al., 2004): Partnership is a flexible business relationship between enterprises based on mutual trust, openness and risk and return sharing. With this strategic relationship, companies can achieve higher business performance through joint collaboration than without partnership.

(De Leeuw and Fransoo, 2009) hold the view that one aspect that is widely regarded as the most complete and typical characteristic of partnership is closeness. For this highly integrated partnership, De Leeuw and Fransoo (2009) refers to it as a close partnership. According to the above definition of partnership by Christopher and Jüttner (2000), close partnership-based supply chain can be conceptualized as a closely coordinated relationship formed between enterprises within the supply chain in a bid to ensure the achievement of a specific goal or benefit.

Shin et al. (2019) argues that the rationale behind the close partnership-based supply chain is that firms cannot completely achieve success on their own and therefore there is a necessity for corporates to seek partnerships with other entities in the supply chain. However, according to Suvorova and Tevanyan (2020), the basis of this partnership model is that enterprises aspire to concentrate key resources on their own professional expertise while delegating other functions to other enterprises so as to achieve a win-win situation for the participating members. As such, supply chain management emphasizes the sharing of information through partnership so that companies in the supply chain can obtain overall and long-term benefits. Yu et al. (2001) examined the benefits of Close partnership based supply chain in information sharing and found that companies in the supply chain can reap overall and long-term benefits (Rashed et al., 2010). In this way, supply chain members can benefit from lower inventory levels and realize cost reduction through partnership.

Goffin et al. (2006) noted that the precondition for forming a close partnership is that a company can benefit from the partnership. In the long process of cooperation, companies will continue to consume management time and talent, therefore, it is necessary for the partnership to produce measurable increased benefits for the companies in the partnership (Christopher and Jüttner, 2000). Hence, it raises the threshold of a company to establish a partnership with others, and also requires a company to have strong long-term strategic planning abilities. But at the same time, this threshold can also be an advantage for those who want to establish a close partnership-based supply chain with a long-term vision with strong companies. This is because the potential benefits of close supply chain partnership can be converted into actual profits or benefits in only several years or longer after the establishment of supply chain partnership. Overall, only by focusing on the improvement of the overall competitive advantage of supply chain management and the long-term marketing strategy and being able to endure for a certain period of time, can enterprises obtain greater benefits from the supply chain-based partnership (Rashed et al., 2010).

#### 2.1.2 Four Steps of the Partnership Model

# **Facilitators Drivers** Decision to Compelling reasons to partner partnership growth

The Partnership Model

Components **Drivers** set expectatio of outco vities and processes that I sustain the partnership Feedback to: Drivers Facilitators Outcomes tent to which perfor meets expectations

Figure 1: The Partnership Model

The study in reference (Lambert et al., 2004) provides specific guidelines for how to use the partner

model (As shown in Figure 1). The establishment of the partnership model is divided into four steps: driving factors, promoting factors, component factors and the category of partnership is established at the final step. The implementation of these four steps in a real case will determine what type of partnership ultimately exists between enterprises, and the extent to which the companies in the partnership can achieve its desired performance.

- ①Drivers: After deciding to establish a partnership, first of all, it is necessary to search and select potential partners with cooperative intentions. When evaluating a driver, it is necessary to analyze and evaluate selected suppliers using certain selection criteria. During this stage, what is the most important is to set a measurable target performance for each of the company's collaborative projects (Lambert et al., 2004).
- ②Facilitators: The assessment of facilitating factors should focus on the potential for easy integration of the two companies, so the problem to be addressed is the suitability of the two companies, rather than the individual characteristics of each company.
- ③Components: Drivers and facilitators determine the possibility of partnerships, while component implementation determines the type of partnerships actually achieved. This factor is crucial because it involves planning for cooperation. The first step is to evaluate the current established partnerships (Suvorova and Tevanyan, 2020). At this stage, it is necessary to analyze the collaborative projects of each partnership and develop a phase plan for achieving the desired level of partnership development.
- The final component outcomes explains the extent to which the outcomes align with the realization of the overall goal and meet the expectations of the companies in the partnership. (Shin et al., 2019) The key to achieving the desirable outcomes depends directly on the drivers, which is why it is so important to spell out the drivers for each organization. The partnership will be considered a success if both parties can achieve their goals (Lambert et al., 2004).

#### 2.1.3 Limitations of the Partnership Model

A robust body of literature has stated that close partnerships are always feasible (Goffin et al., 2006). Studies by Monczka et al. (1993) have identified the advantages of this close relationship. However, close supply chain partnerships should not be regarded as a panacea (Johnston and Kristal, 2008), as supply chain partnership efforts do not always lead to improvements (Vereecke and Muylle, 2006).

In addition, there are some criticisms of "partnerships" noted by Christopher and Jüttner (2000) that most studies of partnerships are based on a limited number of interviews, and they usually only collect data from one side of the partnership. De Leeuw and Fransoo (2009) also have some concerns about partnerships, believing that close supply chain partnerships may have negative effects. For example, too close supply chain cooperation between companies can lead to companies staying in their comfort zone to some extent, thus leading to inertia and a lack of progress on collaborative projects.

#### 2.2 Competitive Advantages of the Partnership Model

(Suvorova and Tevanyan, 2020) The results of the study confirm that the partnership model is not only an effective supply chain tool for establishing new partnerships, but also highly effective for solving existing partnership problems. It helps to clarify the true interests of each partner company in the current supply chain as a stakeholder, and to agree on the expected strategic objectives (Maheshwari et al., 2006). Therefore, it is considered an essential feature of the supply chain.

Boddy et al. (1998) has pointed out that one of the competitive advantages of partnerships is that it provides customers with unique strategic partnerships. An important feature of the partnership model is that the partnership is flexible, rather than fixed, and it is not a relationship that can be established by any particular type of enterprise (Ryu et al., 2009). In the case of Tesla, Tesla has actively engaged in different types of flexible partnerships with many companies(Karamitsios, 2013). First, it maintains close partnerships with four suppliers, including Lotus Automobile and Panasonic and so on. Two of the suppliers had stakes in Tesla while the other two did not. In addition, Tesla has developed an R&D partnership with Panasonic in which Tesla and Panasonic's R&D departments collaborate on projects aimed at developing more efficient batteries. It also collaborated with Dana Holdings, developing heat exchange technology to maximize the efficiency of on-board weather control systems. Finally, when Tesla cooperated with three original equipment manufacturers such as Toyota and Daimler, Tesla took full advantage of the technical advantages of these companies to develop and promote its various components and products. At the same time, Tesla has taken advantage of its unique ability to produce

green cars by forming a partnership with the U.S. government and obtaining a loan to produce cheaper and more fuel-efficient cars. These flexible customizable partnerships allow Tesla to gain a competitive advantage by leveraging the strengths of various car companies.

Furthermore, partnerships enable both partners to achieve cost reduction and reduce duplication of workflows (Srivastava et al., 2017). When companies evaluate the potential to reduce costs through partnerships, they find substantial potential for savings (Lambert et al., 2004). Therefore, realizing cost savings is a competitive advantage of the partnership model. Take the partnership between Tesla and Lotus as an example, for Tesla, it was expensive to build a new factory, but Lotus had a factory in the UK that could be directly provided to Tesla for production, thus saving a lot of plant construction and inventory costs for Tesla (Lehmann, 2009). Furthermore, Tesla's Roadster was similar to Lotus' Elite, thus they were able to share the same platform and save costs (Eberhard, 2006). Likewise, Tesla's licensing of the security system from Lotus saved them the cost of purchasing the system from an outside vendor. In addition, due to the falling exchange rate of sterling, Lotus's manufacturing plant was able to provide a lower cost, which was ideal for Tesla (Eberhard, 2006). Therefore, by developing a close partnership, Tesla has saved objective costs in system, manufacturing and storage, and thus improved its competitive edge.

Moreover, for organizations, partnerships with industry leaders enable a company to increase technical cooperation, learn from the experience of industry giants, and achieve stability in a market full of uncertainties, thereby gaining a competitive advantage (Duffy and Fearne, 2004). De Kok et al. (2005) found that close supply chain partnerships are particularly effective in helping companies in highly volatile markets. Take the Tesla/Toyota partnership. Tesla received investment and equity from industry giant Toyota to help it develop electric cars; Accordingly, Tesla obtained Toyota's expertise and technical support related to Model S vehicles. For Tesla, the partnership with Toyota is not only a close technical exchange, but also an infusion of capital from the industry giant. The close partnership also enabled Tesla to purchase its own factory for car production from Toyota at a lower price. With the advanced technology and abundant capital from Toyota, Tesla's competitive advantage has been boosted.

In addition, the establishment of partnership is conducive to promoting customer satisfaction and acquiring competitive advantages from customers. Partnerships can help companies update production and distribution equipment, increase investment in technical transformation, improve product and service quality, thus leading to increased user satisfaction (Spekman et al., 1998). Taking the four types of partnerships in the Tesla case as an illustration, Lotus, the supplier, supported Tesla's manufacturing plant, production equipment and safety systems; Panasonic, which has an R&D partnership with Tesla, helped improve Tesla's next-generation battery technology (Tesla Motors, 2011); Daimer incorporated Tesla's products into its first electric car. Toyota, a fellow OEM, also provided engineering and production technology to Tesla. All these have contributed to Tesla's further upgrading and transformation of the newly launched model X, both in terms of technology and production, thus helping Tesla gain customer satisfaction in the automobile market.

# 2.3 Managerial Approaches

Based on the above discussion, the current report confirms the credibility of these partnership models (Lambert et al., 2004). Through the analysis of Tesla's case, it is found that the basic components of the model are sound, and Tesla's flexible applications of the target type of partnership is in place. Due to the need for improving the conceptual model --- the partnership model mentioned above, an operational supply chain management method, partnership and collaboration, was employed by Tesla to facilitate the formation of a close partnership between Tesla and its partners.

Supply chain partnerships and collaboration are often viewed as powerful tools to achieve effective and efficient supply chain management (Arshinder and Deshmukh, 2008). Since Tesla has established various types of partnerships with many automobile companies, the implementation of the management approach of partnership and collaboration mainly relied on the partnership model, with collaboration as an auxiliary means.

Although there is an overlap in the meaning of partnerships and collaborations, they are often different in practice. Collaboration is more concerned with relationships between organizations that are informal (De Leeuw and Fransoo, 2009), as it rarely involves formal agreements. Rather, it may be based on discussions with like-minded companies, keeping a mutual assessment of the progress of joint activities. In comparison, partnership is typically used to describe a deeper form of cooperation, one

that is often formalized. They tend to be long-term joint efforts to achieve a shared goal (Soosay et al., 2008). Prospective companies usually want to identify themselves as partners, seeking for clear roles and responsibilities.

To establish a partnership, it is a prerequisite for the partnership to identify and agree on drivers, enablers, business process components, and expected outcomes (Suvorova and Tevanyan, 2020).

- (1) Drivers. After deciding to form partnerships with other organizations, drivers are needed to select companies that are willing to cooperate. The choice of drivers should depend on whether a company is trying to achieve the desired goals and then looking for companies that fit the criterion (Mofokeng and Chinomona, 2019). A strategic objective should be set to measure the cooperation projects established by the company and its partners (De Leeuw and Fransoo, 2009). One example in the Tesla case is the partnership between Tesla and Lotus. Initially, Tesla's driver was the need for acquiring car models. To achieve this goal, Tesla held a design competition, and Lotus' design department stood out. That means Lotus had the car model Tesla wanted. In addition, Lotus' participation in the Tesla design competition was a sign that Lotus was at least cooperative. From then on, the close cooperation between Tesla motors and Lotus began (Eberhard, 2006).
- (2) Facilitators. Facilitating factors represent auxiliary environmental factors that promote partnership building (Srivastava et al., 2017). Enablers include not only the external environment, but also whether the identity of the corporate and style of the partners are compatible with each other. Tesla, for example, ended up forming a partnership with Lotus, which is not only because of the design competition Tesla held, but also because Tesla and Lotus had complementary styles. To be elaborated, Tesla and Lotus have a similar model, so they can share a platform, which has greatly improved the efficiency of the product line. Second, Tesla needed a manufacturing plant, which was too expensive to construct by itself, and Lotus complemented Tesla in this aspect as it had a factory to provide to Tesla. In addition, Lotus' assembly line was able to disperse different models on the same production line, and this series of complementarities made Lotus and Tesla a natural partner (Eberhard, 2006).
- (3) Components. Component factors represent the collaborative projects and processes for establishing and maintaining partnerships. First, a company needs to assess the partnerships the company has actually established and maintained. Second, the company's joint projects with each partner need to be analyzed, and then a plan needs to be developed to achieve the desired goals established by the partnership (Suvorova and Tevanyan, 2020).

The companies need to identify cooperation projects, such as setting up a joint working group and establishing communication links to support the realization of the target partnership. For example, in the case of Tesla, Tesla established a close partnership with Daimer (Karamitsios, 2013). Daimer's management chose to invest in Tesla and take a seat on Tesla's board of directors, responsible for developing a vision for this relationship. They also need to take collective responsibility for ensuring that progress is made towards achieving the level of supply chain performance expected by both companies.

An examination of the component factors in the Tesla case shows that Tesla has established cooperative projects in various types of partnerships. First of all, Tesla has established three types of partnerships, namely supplier partnerships, R&D partnerships and OEM partnerships. Tesla planned to work with suppliers to buy chassis, batteries and carbon fiber bodies. With regard to R&D partnership, the R&D departments of Tesla and Panasonic conducted joint activities to develop the next generation of batteries and Dana Holdings was responsible for developing heat exchange technology for Tesla. Tesla also planned to work with OEMs to exchange technology and help each other develop batteries and electric cars. The American government also struck up a partnership with Tesla, granting it a loan to speed up the production of fuel-efficient cars. Similarly, in the case of Lotus (Hethel, 2020), an engineering partnership led by Lotus has also won support and funding from the UK government. Lotus planned to work with supply chain partner Sarginsons Industries and leading academics at Brunel University London to develop an entirely new architecture for the next generation of battery electric vehicles.

(4) Outcomes. This factor indicates the extent to which the goals actually achieved are in line with the company's expected goals. In fact, the outcome factor is directly determined by the driver factor (Arshinder and Deshmukh, 2008). Therefore, during the stage of components, it is important to establish specific goals and plans for implementing the drivers. While Tesla and Lotus worked out well as a short-term partnership, Tesla preferred to become an independent automaker with its own factories and product lines. As a long-term partnership, Tesla and Toyota both wanted to learn something from each other, in addition to collaborating on electric vehicles and providing engineering support. Toyota

wanted to learn from Tesla's spirit of risk, rapid decision-making and flexibility whereas Tesla wanted to draw on Toyota's legendary engineering, manufacturing and production expertise. Tesla and Lotus focused on the technical side of the partnership, which ended only as a partnership; While the cooperation between Tesla and Toyota not only exchanges technology, but also brings output from corporate values. This deep communication into enterprise architecture and enterprise spirit has made the partnership between Tesla and Toyota more long-term and stable.

#### 2.4 Effectiveness, Efficiency and Feasibility

#### 2.4.1 Effectiveness

In terms of realizing the strategic objectives of supply chain, the management method of partnership and collaboration is quite effective. Although it faced difficulties at the beginning, it achieved remarkable results in the end. In the case of Tesla, Tesla did not have the money to buy a factory at the beginning, so it had to build a supplier partnership with Lotus so as to use Lotus' factory to manufacture cars and share the assembly line with it. Later, Tesla obtained the investment of several automobile companies through establishing various types of close partnerships, and bought a factory of its own through the most important partnership with Toyota, successfully realizing their goal of "becoming an independent automobile manufacturer. The strategic goal of having its own factory and a wide product line".

# 2.4.2 Efficiency

The management method of partnership and collaboration is relatively efficient in the case of Tesla. Although many partnerships are long-term relationships, formal agreements or contracts signed to carry out a long-term cooperative project for the common performance goals are often inefficient in the short term. But partnerships can also be short term, around a specific project with a short time span that requires a more formal relationship. In the case of Tesla, both Tesla and its partners assumed clear responsibilities. For example, Lotus provided factories for Tesla and Toyota provided technical support for Tesla. In fact, in the case of Tesla, such time-limited partnerships were more adopted, so the efficiency of realizing supply chain goals is relatively high.

#### 2.4.3 Feasibility

The management method of partnership and collaboration is relatively feasible in terms of the Tesla case. In the case of Tesla, the partnership of Tesla has a clear classification and framework, and the partnership has a clear cooperation plan for the realization of supply chain objectives, so the management method of partnership and collaboration can be easily brought into the case for analysis. However, (X), which focuses on the development of collaboration, points out that there is a lack of clear realizability regarding the implementation of collaboration. One difficulty in moving research from theory to practice is that the complexity of implementing this management approach is often overlooked. For example, one of the managers in study 1 stated that he did not fully realize the difficulties in implementing collaboration until he tried to introduce it to his company.

# 3. Conclusion

The purpose of this report is to put forward a conceptual model, analyze the model and its competitive advantages based on the Tesla case, and finally put the model into operation with a supply chain management method. Taking partnership Model as a conceptual model, this case study report mainly discusses four issues. First of all, according to the literature analysis, the concept of partnership model is summarized as the mutual trust and mutually beneficial cooperative relationship established between enterprises in order to obtain more benefits. Secondly, it is discussed that the establishment of supply chain partnership is not only conducive to the development of flexible cooperative relationship, but also can reduce the inventory cost of products in the whole supply chain through frequent technology sharing, so as to improve the operation performance of the whole supply chain and customer satisfaction. In addition, the Tesla case is mainly combined with the four decisive factors of partnership model, supplemented by partnership and collaborative supply chain management methods, to analyze and interpret the partnership Tesla has established in detail. Finally, it is concluded that partnership and collaboration management methods are effective, efficient and feasible. Through this study, enterprises can better understand the impact of close partnership on the realization of enterprise supply chain strategic goals.

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# International Journal of Frontiers in Engineering Technology

# ISSN 2706-655X Vol.4, Issue 4: 33-40, DOI: 10.25236/IJFET.2022.040405

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