

# Supply Chain Management's role in Electric Vehicle Industry in Cost Reduction and Improvement of the Electric Vehicle Charging Infrastructure Ecosystem

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## Abstract:

There is a need to improvement of the value of the firm and the operations carried out through the supply chain process of any firm or business. There are several studies that have established that the logistics of the goods and services and supply chain management have huge scope in improving the financial results for the company. The intent of this study is to understand the factors affecting the supply chain management and improve the financial performance of the firm by implementing these strategies such as dedicated management staff, implementation of information technology in accounting and timely receipt of payments to reduce the accounts receivables and reconciliation activities, working capital management and improving cash to cash payments for improvement of the net present value. The paper studies all the available research and then summarizes the available options with a firm for improvement of the value of the firm and value of the operations.

**Keywords:** electric vehicles technology, electric vehicles charging infrastructure, supply chain.

## Introduction:

The supply chain management is a driving force in maximizing the complete value of the company or a firm by optimal utilization of the resources within (Stemmler, 2002). Both the suppliers and the customers are linked to each other using the supply chain network (Moritz, 2010). For instance, a product such as petrol or diesel is refined in a oil refinery and then it is distributed to the direct sales customers through pipelines or transport network through rail roads or tank trucks by road (Moritz, 2010). This involves transport agencies and for reaching out to the customers it involves marketing companies and the gas station dealerships (Prinz & Johnson, 2020). The companies are at upfront in terms of expansion of the businesses across the globe and have been at the forefront of leveraging technology and improve operations by use of best supply chain network and increase the profits by reduction of the costs involved in the network (Prinz & Johnson, 2020). Conventionally in past, the finance is involved only in a broader management of the expenses, audits, and overall savings on the procurement activities (Prinz & Johnson, 2020). However, with global trade it has become important to understand customs, excise duty and trade agreements effect on transactions during the

whole supply chain (Prinz & Johnson, 2020). For instance, VAT and local taxes pertaining to countries have increased the dependency of supply chain on finance (Moritz, 2010). So, there is a need in addition of dedicated staff or board of directors handling the issues and reduce the risks (Moritz, 2010). Thus, maximization of the value of the firm is likely to happen. The financial supply chain can be studied in several steps as mentioned below (Prinz & Johnson, 2020):

- (a) **Procurement to the payment cycle:** This is the phase when the company procures the raw materials for the products and services. The payments for the raw materials are done at this phase (Marak & Pillai, 2018).
- (b) **Management of Working Capital:** The current assets and the liabilities are required to be balanced for maintaining the working capital for the firm. The goal is to manage the working capital in such a manner that the assets and the liabilities are converted to cash easily at any time by improving the profitability. Inventory management for all the accounts receivable and the payable ones are maintained. Often the best idea is to negotiate the payment terms with the potential suppliers that the company has before making a deal. This could involve providing a revolving credit to the suppliers so that the purchase more products and hence reduces the inventory on hand and increase the company sales figures without hampering the loss due to offering the credit option (Prinz & Johnson, 2020).
- (c) **Ordering to the encashment cycle:** This involves keeping eye on the accounts receivables. The payments are to be accounted once received since the order is placed using indent management system. Although, invoices are issued for orders placed, it is the responsibility of the accounts to collect the payments on time to avoid undue losses due to interest earned on money yet to be received (Marak & Pillai, 2018).

### **Purpose of Research**

Information technology has always played a crucial role in all kinds of business operations starting from production to distribution to end customers (Moritz, 2010). There are several platforms that implement the management of the invoices, account payments and the sales order history and so on available through an ERP system (Stemmler, 2002). These systems allow any human errors while calculations and offers invoice payments in timely manner (Stemmler, 2002). Moreover, stock reconciliation activities by monitoring the day opening and closing balance through ERP sales report are simplified (Moritz, 2010). The ERP system can reduce the time in generation of invoices and negotiation with the suppliers as it is transparent, and all the activities are visible using the portals available to the customers (Marak & Pillai, 2018). The purpose of the research is to maximize the company value by effective handling of the supply chain activities by implementation of the information technology i.e., ERP system, designation of management staff in a non-conventional manner to reduce the risks due to global trading and losses due to taxation such as VAT and study

the factors influencing the supply chain management for improvement of the operations and the value of the firm (Marak & Pillai, 2018). There are several risks associated when firms do not integrate their finance teams in operations involved in the supply chain such as new opportunities are not utilized thereby significantly hampering the strengths in supply chain opportunities (Marak & Pillai, 2018). This inherent risk has increased due to the global market and the value of operations are required to be enhanced for strengthening the working capital and financial position of the company (Sukati et al, 2012).

### **Review of Literature**

As per studies by Sukati et al (2012), supply chain management is affected by factors such as “lean supply chain”, “agile supply chain” and “hybrid supply chain”. Moreover, it was inferred by the studies that the supply chain performance is strongly predicted by the extent of supplier partnership, the relationship with customers and the information communicated among each other (Sukati et al, 2012). The study presented a way how supply chain management staff can audit the performance and assess all the practices followed (Moritz, 2010). The greater the practices are followed the better is the performance of the supply chain (Sukati et al, 2012). The financial transactions taking place between the trading team or partners involved in whole purchase to sales of the products and services if improperly linked would result in severe effects in working capital of the company (Sukati et al, 2012). There is also need of implementation of the information technology for integration of the supply chain (Sukati et al, 2012). There are several dimensions there are to be explored such as costs, quality of the services and the profits by use of the information technology (Sukati et al, 2012). The need starting from procurement to payment, management of the working capital and ordering to the encashment cycle in business can be optimized using the efficient processes and capitalizing all the cost savings (Sukati et al, 2012) (Marak & Pillai, 2018).

Steven M. (2014) presented an idea on how supply chain can be broken down into life cycle and then investigate the factors that are administered while transitioning from different life cycle stages (Steven et al, 2014). These stages are irrelevant to the product life cycle (Moritz, 2010). Moreover, the research postulated that the supply chain design is difficult to be studied by just one dimension (Steven et al, 2014). The multiple dimensions discussed were influencers, design decisions and building blocks which need to be studied empirically and analytically (Steven et al, 2014). Bandaly D. et al (2013), presented approaches in operational risk management for a communication and relation between the company and the partners involved during the entire supply chain (Moritz, 2010). The risk at the marketplace were identified as the uncertainty in demand, the exchange rates and its uncertainty and the material price uncertainty (Bandaly et al, 2013). The use of information technology was again highlighted with use of RFID in tracking the demand and the life cycles (Bandaly et al, 2013). Moreover, the need of ERP was also highlighted in managing and dealing with the risks with the supply and demand (Bandaly et al, 2013). Zulqurnain A. et al (2018), collaboratively studied the success factors in supply chain finance towards its effectiveness (Moritz, 2010). These factors were mainly the negotiation with

the suppliers, collaboration with new suppliers, digitization of the trading activities by use of information technology and the involvement of the financial institutions (Zulqurnain & Gongbing, 2018). Moreover, the small and medium sized firms have different solutions to the financing options which help them fix their credits and improve the performance financially (Zulqurnain & Gongbing, 2018). Due to which the supply chain management has become more intricate and requires a systematic analysis and study to understand the effects in the operations and improving the value of the operations (Zulqurnain & Gongbing, 2018).

### **Practical Application**

By performing the literature review it was identified the factors that can improve the value of the firm and the operations within a firm (Moritz, 2010). So, for any business firm these factors shall be implemented (Marak & Pillai, 2018). Firstly, a dedicated management staff that can analyse the finances during the entire supply chain management would ensure improved value of the operations (Marak & Pillai, 2018). This would ensure the management of the expenditures, procurement of the raw materials and the audits (Moritz, 2010). So, risk mitigation would be possible with global trading of the products and services (Steven et al, 2014). Secondly, implementation of the information technology by use of technologies such as ERP system, RFID and so on would help in invoice system management and timely receipt of the payments from the customers (Steven et al, 2014). Moreover, this would provide ease in tracking of the activities without human error (Moritz, 2010). Thirdly, the cash-to-cash cycle if improved would improve the net present value and hence improving the value of the firm (Marak & Pillai, 2018). The cash-to-cash cycle is used to reflect the financial benefits obtained from the Supply Chain Financing which is given by below formula (Marak & Pillai, 2018):

$$\text{Cash to Cash Cycle (C2C)} = \text{Days Inventory Outstanding (DIO)} + \text{Days Payable Outstanding (DPO)}$$

It is estimated that the net present value generated from the cash related to assets the value of the firm is going to improve (Marak & Pillai, 2018). Finally, the working capital management involves handing the inventory in such a manner that there is enough inventory to supply to suppliers and customers but at the same time no stockpiled inventory which is unused (Stemmler, 2002). This can be ensured by credit offerings to the supplier so that they can buy more and stock up the inventory at their end rather than at the company's end thus increasing the overall working capital of the company (Steven et al, 2014).

### **Application in the Electric Vehicle Industry**

The major challenges with the supply chain systems in the electric vehicle and charging infrastructure industry lies in the hands of major technology innovation companies. For example, the technology is growing and is in the hands of certain market players who can run a monopoly by offering price ranges that could be at premium rates. However, with literature review some of these issues can be addressed by cost optimization of the supply chain network from use of the methods such as dedicated staff for management of supply chain and use of IT resources in tracking the shipment and technological innovations. For example, production of the spare parts that fit to multiple different models of electric vehicles and charging stations increases the spare

parts availability widely in the supply chain network from different suppliers and manufacturers thereby reducing costs.

The ecosystem of electric vehicle charging stations comprises of customers, electric vehicles, and the owners at given location. To drive a smooth use and experience for both customers and the owners there is a need to optimize the ecosystem from both quality, cost, and efficiency standpoint. For example, a reduced cost of shipment of electrical energy from the power grid potentially encourages the customers to utilize the charging infrastructure at desired cost. Additionally, superior quality products in increased charging times and low failures ensures satisfaction from both charging equipment owner and customers.

## Conclusion

The value of the firm and the value of the operations can be significantly improved by working on the factors as discussed in this paper. There was enough evidence available from the journal paper review to substantiate the fact that information technology improves the process in management of the finances. An organization must strive towards improving its net present value by increasing the C2C payments and managing the working capital by maintaining the right inventory. Moreover, a need of dedicated finance management staff was highlighted for the purposes of supply chain management enhancement in terms of any loss of revenue due to international trading and taxes such as VAT. Although, there are several other factors that would also contribute towards the improvement of the value of the firm in supply chain management, but these enumerated ones were studied as part of this paper and evidence for their success in achieving finance benefits was established.

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All expert reviews at home and abroad indicate that wireless networks are probably not hazardous to health. ...When we measure in schools, the typical Wi-Fi exposure is around 20 parts per million international exposure guidelines. In contrast, children using mobile phones received up to 50% higher levels of education. Thus, a year spent in a classroom near a wireless network is equivalent to using a mobile phone for 20 minutes. If WiFi is to be removed from a school, mobile phone networks should also be turned off – as well as FM radios and televisions, as their signal strength is similar to WiFi in classrooms.