# SUPPLY CHAIN – ENABLED BUSINESS MODEL IN COMMODITY LIKE PRODUCT INDUSTRY

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**ABSTRACT**

The chemical industry is characterised by commodity like products, thus making it hard for companies to differentiate using traditional differentiators like product or price. Leveraging on supply chain process is seen as a potential way to create value for customers, thereby potentially resulting in a new business model. The essence of this research is to develop a supply chain-enabled business model in two phases where the first phase focusses on defining the value proposition by grouping customers based on their logistics requirements and the second phase centres on possible operational innovations in the logistics function of supply chain. This involves building a predictive model using logistic regression to forecast the likelihood of shipment delay, thus helping practitioners plan their transportation process to serve the time sensitive customers better.

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**KEY TAKEAWAYS**

1. Developing a guideline for supply chain enabled business model.
2. Logistics attributes could potentially create value for customers and help identify value creation avenues.
3. Improve logistics process to serve customers better by building a predictive model to counter problems associated with lead time variability.

## Introduction

The chemical industry is generally characterised by commodity like products that are high volume and undifferentiable. These products are made to standardized specifications often produced with technology that is available among most competing firms and certain products exhibit price volatility. McKinsey's research (2017) addresses the commoditization trend sweeping the speciality chemical industry where "product innovations of the current generation become standard products of the succeeding generation" at ever increasing pace. Considering the above research setting in mature industry like chemicals where product innovation and differentiation is saturated, it is hard to deliver differentiated value to customers using traditional differentiators like product or price. This situation offers a compelling use case for company X operating in chemical industry to create value for its customers by leveraging on its process rather than relying on its commodity like product as the former is more sustainable and difficult to reverse engineer. Supply chain process is one of the promising processes within a firm where there is potential to innovate and provide value in terms of services to customers. For instance, the logistics function of supply chain which aims at delivering products to customers at the right time in the right place offers opportunities for innovation to provide new or improved services to customers, thus, capable of directly impacting the value proposition. Therefore, leveraging supply chain/logistics process is seen as a potential way to create new revenue streams by offering differentiated value to customers, thereby potentially enabling a new business model.

**Extant Knowledge**

Business model can be summarised into three main components - value proposition, cost and revenue structure and finally operational innovation (Osterwalder and Pigneur, 2010). Abdelkafi and Pero (2018) in his paper investigates how supply chain innovation which involves process re-engineering can lead companies to discover new business models through a case study approach of companies like Dell, IKEA that have capitalized on supply chain processes to create value for their customer. Supply chain process innovation which involves finding new or improved ways of delivering value to customers can occur in sourcing, production or in logistics function. Flint et al, (2005) investigated innovation from logistics perspective and they believe that process innovation in terms of logistics process could potentially generate new ways of value creation for customers. The current study aims to build on this research stream by further illuminating the supply chain/process innovation as a source of value generation for the firms especially in the context of industrial markets with commodity like products.

**Research Approach**

The adopted method to address the research problem is split into two stages:

**Phase 1: Developing value proposition**

The phase 1 aims to group customers based on supply chain and in particular logistics service requirements using survey methodology followed by clustering. The survey was divided into 5 sections with an intent to measure attributes related to demographics, logistics service response time, logistics service flexibility, logistics service visibility and logistics service differentiation outcome like customer satisfaction and relationship value. The attributes measured were identified using knowledge from literature and inputs from practitioners. The customer survey culminates with being able to profile customer segments based on sensitivity to supply chain/logistics attributes measured and identifying the time sensitive customer segments.

**Phase 2: Identifying Operational Innovations**

The second phase aims to build a statistical model to predict the likelihood of shipment delay to provide differentiated value targeting the time sensitive customer segments identified in phase 1. The developed predictive model could guide us in ascertaining possible changes in the current supply chain and logistics processes. Company X provided us with historical 2-year shipment data from their SAP system. It was agreed with company X that we would be analysing the top 15 high frequent routes for predicting shipment delay as these were most frequently used by the business units. The list of potential variables affecting shipment delay from the data set provided were Shipment Time (Non Metric), Route Transit Time (Metric), Carriers contracted for the shipment (Non Metric), Shipment Consolidation Type (Non Metric), Type of cargo (Non Metric) and the external variable collected on Route utilization (Metric) from public port websites. The dependent variable in this research is a binary categorical variable of Delay or No Delay. This variable is specified by comparing the planned delivery date provided to the customer and the actual delivery date. ANOVA was performed to ensure there is significant difference in the number of days of delay between the categories of the non-metric variables. Since the dependent variable is categorical, a logistic regression approach was adopted and the final model is validated with the hold out sample to ensure external validity.

**Results**

The meanings of the customer clusters can be interpreted by analysing the pattern of the cluster means plotted in Figure 1. As it can be seen from the figure, the process not only created homogeneous groupings of customers based on their sensitivity to logistics service attributes, but also show that the customers are heterogeneous in nature for Company X. We notice certain segments of customers are more sensitive to time than others. Therefore, the solution provides a basic, but useful, delineation that customers vary in demographic profile and perception towards logistics attributes like delivery time.

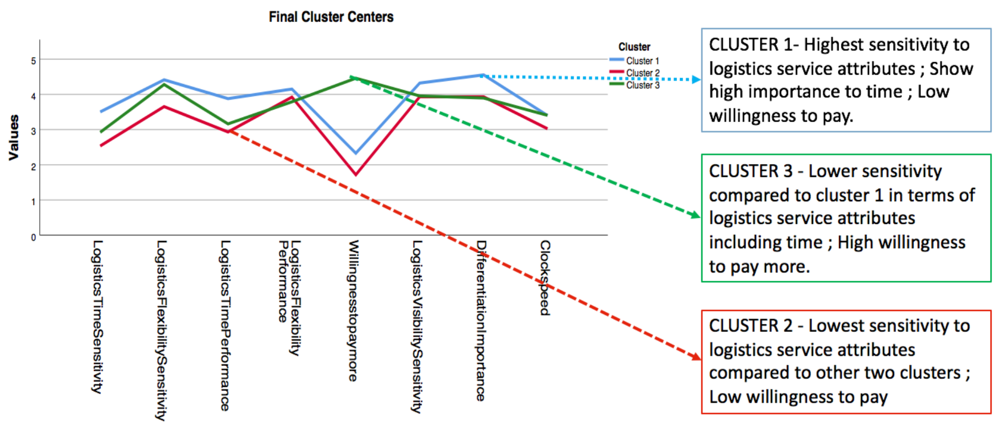


*Figure 1 Cluster Profile Means and Description*

Figure 2 provides the classification matrix of the final logistic regression model to predict shipment delays for 2 port-pairs identified to serve time sensitive customer segments. For example, if we consider Keelung – Shanghai route, the model was able to predict 92.3% of the total shipments correctly. The number of delays incorrectly classified out of the total shipments is only 4.2%. This model can be used to track the process for shipments that have higher likelihood of delay to better service the time sensitive customers. Based on how the input variables are contributing to the likelihood of shipment delay, managers can take key planning decisions in the logistics process to avoid shipment delays to serve customers better.

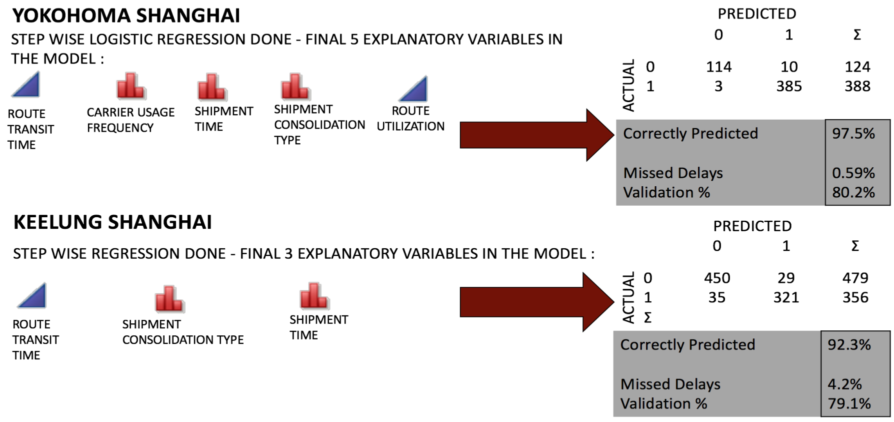


*Figure 2 Classification Matrix of Final Logistic Regression Models for 2 port pairs*

## Conclusion

Our research provides practitioners with a guideline to develop a business model enabled by supply chain process in the context where product differentiation and innovation is saturated. The guiding approach comprises of two phases focussing on defining the value proposition and identifying opportunities of supply chain/ process innovation to provide targeted value to customers. This research was carried out with the import export team of company X that is positioned as a shared service entity. Below are the underlying process steps to be followed by practitioners planning the logistics process for customers. Firstly, the manager needs to confirm if the customer belongs to the segment that is sensitive to time.

**Scenario 1:** If customer is time sensitive - Run the model to predict the likelihood of delay in that route based on set of decided input variables. Perform sensitivity analysis to confirm the variables that are increasing the likelihood of delays. Once the appropriate combination of variables is identified, the managers can go ahead planning the transportation based on the models output and his/her domain knowledge.

**Scenario 2:** If customer is not time sensitive - The manager can go ahead in opting for a more parsimonious shipping option while planning the logistics leg of supply chain without worrying about the likelihood of delay occurring.

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