



A Truck is not a Cookie: Matching Supply with Demand at Mahindra Truck and Bus Division

“The biggest problem that we are facing right now is the uncertainty. If a supplier is equipped for producing 1000 pieces a month, and we purchase only 500 pieces a month then the fixed cost of the supplier gets absorbed by half of the promised quantity. Supplier would not be profitable. If we have a dealer network to sell 2000 trucks per month but we only sell 1000 trucks per month, the dealer survival becomes the question mark. Mahindra Truck and Bus Division (MTBD) is facing the biggest challenge – the demand uncertainty – as the industry volume has reduced to half, when it was expected to double. We do not know whether to reduce the supplier capacity permanently stating the new norm to save the fixed cost or to wait for good time to come back,” Dr. Pawan Goenka, MD, Mahindra and Mahindra.

Background

At that time, MTBD was rolling out a limited number of trucks per month despite a larger capacity of about 50,000 trucks annually. Instead of catering to relatively smaller players, suppliers would cater to larger orders from market leaders. Together, market leaders Tata Motors and Ashok Leyland occupy 85% of the HCV market share, and challenger brands such as Mahindra, Bharat Benz and Volvo Eicher are left aggressively grappling for bigger portions of the market pie. MTBD, a challenger brand, grappled with its supply chain challenges.

Panicking news arrived in March 2017 when the Supreme Court's decision to discontinue the sales of Bharat Stage (BS) III¹ vehicles saw automotive giants such as Tata Motors and Ashok Leyland resort to discounts in an attempt to liquidate their inventory within the last three days of the fiscal year. The sudden demand for BSIV vehicles shot up, and pre-buying followed as a natural consequence. Components designed according to the latest emission standards were not easily available, and suppliers could not meet production requirements. The announcement of the implementation of Goods and Services Tax, GST, July 2017, amongst other things, also contributed to delays by fleet operators. As a result, the domestic, commercial vehicle market contracted by 9.1% during the first quarter of FY2018. Consequently, medium

¹ Bharat Stage Emission Standards (BSES) are emission standards instituted by the Government of India to regulate the output of air pollutants from internal combustion engines and spark-ignition engine equipment, including motor vehicles. The standards and the timeline for implementation are set by the Central Pollution Control Board under the Ministry of Environment, Forest and Climate Change.

and heavy vehicle sales took a hit and collapsed by 33% and 23%, respectively, during the same quarter.²

Vinod Sahay, the CEO along with the senior management set out to exploit the opportunity. With everyone's focus on the transition that sent original equipment manufacturers (OEMs) and suppliers alike into a frenzy, the management saw it as the perfect time to increase their customer base. BS-III vehicles were leaving the market and making room for customers to "want" a new updated BS-IV truck. There could have been no better time to re-launch Mahindra's BLAZO with BSIV specifications.

The offer onboard for the customer was packaged well, and for a challenger brand to be taken seriously, not even a single truck could return to the manufacturing unit. There was no scope for error, and the management ensured that employees felt the same way. With increased fuel efficiency, air-conditioned cabins, FuelSmart technology and a driver information system (DIS), Mahindra's BLAZO set out to attract buyers with an assurance of definite service and guaranteed mileage. With the promise in place, MTBD needed to work on its supply and service chain. In its earlier days with Navistar the product fulfilled the customer expectations of good engine power, sturdiness and driving comfort but did not score well on mileage expectation of the larger segment. Service had already been a problem, and there was no scope for repeated errors. MTBD had to fulfil its promise, not merely market it. It was ready to strengthen its service network. Marketing the promise would not be enough, living up to every per cent of it would be. The key lay in establishing a connection with not only the customers but also the suppliers. At peak times, the sales were constrained, not by the customer demand but by the suppliers. A strong supply network would ensure high product quality and sharp delivery windows.

COMPANY BACKGROUND

Headquartered in Mumbai at Mahindra Towers, Mahindra & Mahindra is a USD 20.7 billion global federation of companies. It is one of the largest vehicle manufacturers by production in India and the largest manufacturer of tractors in the world. The company has an operational presence in more than 100 countries and employs more than 250,000 people. The group has a presence in aerospace, agribusiness, aftermarket, automotive, components, construction equipment, defence, energy, farm equipment, finance and insurance, industrial equipment, information technology, leisure and hospitality, logistics, real estate, retail and two-wheelers.

The company's truck and bus division produces a full range of HCVs that cater to modern requirements. Formerly called Mahindra Navistar, MTBD has rolled out more than 55,000 HCVs from its Chakan plant in Pune and has more than 18000 HCV customers, out of which 30% are return customers. The Chakan plant's potential production is 50,000 trucks per year. It has a fully automated press line imported from

² <http://businessworld.in/article/-Commercial-Vehicle-Industry-Likely-To-Post-6-8-Growth-In-FY18-/17-07-2017-122282/>

Germany, one of the only three such advanced press lines in the world. Likewise, its paint shop with RoDip technology is one of the most advanced paint lines. The plant rolls out Mahindra's current entire range of medium and heavy commercial vehicles (M&HCVs) along with its sport utility vehicle (SUV) range. It produces other Mahindra products as well. This facility helps the Mahindra group to leverage the benefits of synergies of an integrated manufacturing facility.

In early 2016, MTBD revamped its product line and began production under the name, *Blazo*. These HCVs are available in haulage, tipper and tractor models. The haulage model is manufactured across gross vehicle weights (GVWs) of, 28, 35, 42 and 49 tonnes while the tipper models operate between a GVW of 28 tonnes and 35 tonnes. The tractor models operate across GVWs of 40, 46 and 55 tonnes (see Exhibit 1 for the range of HCV products).

INDUSTRY OVERVIEW

The Indian automobile industry became the fourth largest in the world in FY2017 and is expected to be the world's third largest automotive market in terms of volume by 2026. India holds a strong position in the heavy vehicle segment in the global market. It is the largest tractor manufacturer, second largest bus manufacturer and third largest heavy truck manufacturer in the world.

The automotive industry contributes to the Indian economy in a highly significant way. In FY2019, the Indian automotive industry's contribution was 7.5% of the total gross domestic product (GDP) and a whopping 49% of the manufacturing GDP with a large economic multiplier impact. A total of 30.92 million automobiles were produced in FY2019 across four major segments of the auto industry – passenger vehicles, commercial vehicles, three-wheelers and two-wheelers. In terms of share in the total production volume, two-wheelers (80%) dominate the industry. Passenger vehicles, commercial vehicles and three-wheelers constituted 13%, 4% and 3%, respectively, of the total production volume in FY2019. The total production volume grew at a compound annual growth rate (CAGR) of 6.96% between FY2013 and FY2019.

As per the Society of Indian Automobile Manufacturers (SIAM) report, the overall commercial vehicle segment registered a growth of 17.55 % in domestic sales in April–March 2019 compared to that in the same period in 2018. Within the commercial vehicle segment, the domestic sales of M&HCVs increased by 14.66%, while that of light commercial vehicles (LCVs) grew by 19.46% in April–March 2019 compared to that in the same period in 2018. The major players in the M&HCV category of commercial vehicles in India are Tata Motors Ltd., Ashok Leyland Ltd., VE Commercial Vehicles Ltd. and MTBD, with shares of 51.19%, 32.51%, 11.85% and 2.94% in the total sales of M&HCV, respectively. Exhibit 2 shows the company-wise total sales (domestic sales and export) of trucks under M&HCV from FY-15 to FY-19.

THE TRUCK SUPPLY CHAIN: PULL OR PUSH?

Optimising its supply chain is challenging for an automaker because a typical vehicle comprises 20,000 components and hundreds of subassemblies and modules. Managing the supply chain performance includes sourcing high-quality components

from a large pool of suppliers, manufacturing the trucks based on the production plan and delivering the trucks on time through a large dealer network.

The truck supply chain has a tiered supplier network that supplies components to the OEM assembly. A strategic supplier unit that is responsible for establishing a supply base for delivering high-quality parts at the desired flow supports the procurement. The sales team and the Commercial Vehicle financiers in the truck sales support the downstream dealers. The fleet operators are the final users of the truck.

The truck purchase signals from the fleet operators are often quite volatile. With no fleet retirement and scrappage policy in place, estimating the replacement demand becomes difficult. The retirement age of a truck could be between 10 and 15 years. Demand estimate, a vital input to plan inventories, ultimately affects the profits. Having a higher safety stock would lead to excess inventory, whereas a lack of safety stock would lead to a delay in sales or the loss of sales revenue. Maintaining an optimal stock level in such a volatile market is often a challenge. The downstream demand uncertainties affect the upstream suppliers more, who are farther from the customer. Exhibit 3 shows the entities present in the HCV supply chain.

The demand forecast for a new entrant, based on the sales leads, is of the *pull* kind. Unlike that of the major stakeholders, the demand must be generated through appropriate information channels that educate truck owners and fleet owners about the benefits of opting for a challenger brand truck. A large order is generally placed to the suppliers based on the expected number of sales. However, between the time of inquiry and actual sales event, several factors may affect the purchase. Financiers may not approve loans for new entrants, who are considered unknown. Fleet owners also change their minds about the decision to opt for the challenger brand based on their dealer service network, driver preference, spare-part availability, no price difference and technology unawareness. Other fleet owners in their network may also influence the order decision of the buyer. As a result, the actual sales of the challenger product may deviate significantly from the original estimate.

In a push market, where the product is already well-established, the demand is usually high. Based on the demand forecast, the OEM places an order with its supplier for the parts. The trucks are manufactured and *pushed* to the dealers through an extensive network.

DOWNSTREAM DEMAND CHALLENGES

Fleet Operators

In the HCV segment of the automotive industry, the fleet owners and the individual truckers are the end customers. One of the major factors responsible for market demand volatility is the price-sensitive characteristic of the end customers. Cost is the performance criterion that mostly drives the behaviour of the trucking stakeholders. The fleet owner experience low asset utilisation, low entry barrier and unhealthy competition on cost. Furthermore, the absence of automation and technology at loading and unloading points and coordination delays with the customers add to high operational costs. Fleet owners adopt low-cost criteria to drive the truck purchase decision. Exhibit 4 shows the survey report of 60 fleet owners, highlighting the

deciding factors for the buying decisions of fleet owners for a new HCV. Other factors they consider are fuel efficiency, after-sales service and spare-part availability.

To save on the truck acquisition cost, the operators buy the truck without the cabin and prefer to build the cabin at a local body shop. Often, the driver-comfort features are absent in the truck. After operating a truck with poor cabin features, the truck driver experiences fatigue sooner and stops more frequently during the trip. These stoppages are more frequent than the prescribed stoppages based on the standard hour of service rules (halt for a half-hour after driving for four hours). To make up for the lost productive hours, drivers choose unsafe routes, incurring high transportation risk and high transportation costs.

Fleet operators have high brand stickiness, much higher than the customers of a sport utility vehicle (SUV) or a car. While an SUV or car customer is willing to experiment with new brands and new vehicles, an HCV customer is highly conservative in this regard. HCV players create an ecosystem of workshops, body shops, and spare part plazas, for a specific brand; and exhibit high resistance in including a new brand to the existing fleet.

Another challenge for the fleet owner is driver retention. In the HCV segment, the attrition rate of drivers has increased over the years. There is a decline in the availability of drivers from 1310 drivers for every 1000 trucks in 1982 to 750 truck drivers in 2012, which is estimated to further decline by 50% in 2022. Drivers now prefer to drive taxi cabs, which have better incentives and less or flexible hours of working. In India, hours of service rules for truck drivers are mostly followed for bulk hazardous material (HAZMAT) transportation. Driving for long hours (also during nights) raises driver fatigue and safety concerns. Retaining skilled drivers and providing them with a safe and healthy environment is a challenge for the fleet owners. The drivers should be both safe and productive on the roads. Hence, fleet operators should focus on improving driver cabin features and using technology to monitor real-time driving behaviour.

The fleet operators also have unique truck-buying behaviour. While some operators add trucks to the fleet in a planned growth strategy, others buy trucks on either winning a new contract or wait to purchase trucks during festive occasions. Some truckers also cooperate with other operators to make bulk purchases. Dealers offer additional purchase discounts on bulk purchases. Occasionally, the fleet owner deliberately overstates the demand to obtain appropriate discounts from the dealer. Sometimes, overstating demand also helps the fleet owners to seek loans from a financier. Typically, truck sales are not impulsive sales. There are long transaction lead times of four to six weeks from lead generation to the final purchase of the trucks. In this period, the fleet owner may cancel purchase orders due to other events. For example, the financier may not approve the loan for the purchase. Also, fleet owners might change the decision by considering various factors such as the absence of a dense dealer service network, driver deterrence for a new brand and the lack of spare-part availability. These buying behaviours also add to the distortion of the demand signals and affect OEM demand forecasts.

Dealers and Financiers

Financiers can also influence the purchase decision of a fleet owner. MTBD had the strong financial support of banks like HDFC, ICICI, Kotak Mahindra, Axis Bank, Sundaram Finance, Chola Finance, SBI and Yes Bank. Dealers are the customer touch points. They understand the market demand and communicate the anticipated customer demand to OEMs for production. Their efforts towards sales and customer service are critical for the entire supply chain. Additionally, due to large model variations, often the customer tonnage requirements change during the transaction lead time, or customer orders get cancelled if the competing brand offers a steep discount. This volatility in demand creates a gap between the supply from the OEM and market demand. A customer can cancel an order at the end moment if the competitor offers better price and specifications. A skilled sales team is critical to score the deal against the competition. A company needs a thorough knowledge of its own as well as the competitor's product to realise the sales. Exhibit 5 shows the volatility of sales at a dealer month-wise over the year 2017.

A dealer provides a monthly projection to OEM with the help of its sales executive team that get leads through customer service agents, previous-month nonexecutable orders, existing customers or competitor product users who are searching for new products. These leads constitute the forecast demand for the month, and the actual demand varies, depending on the customer's actual needs and the time of purchase. The demand volatility at the dealer also makes it difficult for the dealer to manage the inventory.

The dealer provides a forecast sale figure to OEM, based on which the OEM manufactures or places the order to the suppliers for the resources. Under the price competition, the dealers have a thin profit margin on the sales, which limits the dealer's profits. Also, dealers own workshops, repair the vehicles in-house and provide the aftermarket sales support. They also make the annual maintenance cost (AMC) contracts of the fleet owners.

Dealer had its own share of challenges. For a dealer to be viable, it is a chicken and egg situation. Fleet operators would not be comfortable unless one has widespread contact points. Dealers cannot be viable unless they have a certain throughput every month. "Let us assume, each dealer needs to sell 10 trucks in a month to become viable and assume we need 300 dealers across India for reaching out to potential customers. In sum, we need to sell 3000 trucks in a month. That is the minimum scale required to make the dealers viable. How do we get this flow? If you are a new entrant, then you do not attract dealers, if there are no dealers then you do not attract customers. How would an OEM grow?," remarked Dr. Goenka.

At Your Service

Challenger player like MTBD have rapidly expanded their after-sales service and spare network, which now includes 153 3S dealerships (sales, service and repair, and spare parts), 200 authorised service centres, strategically located 34 M-Parts Plaza outlets, and spare network of 2069 retail outlets to further improve the reach of

support for customers on important trucking routes. There are more than 200,000 LCVs on the road along with 55,000 HCVs.

In terms of the number of dealers across India, MTBD has 153 dealerships, as opposed to Bharat Benz's 111 outlets. Although Volvo Eicher has 160 dealers, it remains behind Bharat Benz in terms of market share. Tata Motors and Ashok Leyland have 376 and 310 dealer outlets, respectively. MTBD has 200 service outlets, as opposed to 114 outlets of Bharat Benz. Ashok Leyland has the maximum number of service centres, with 1262 outlets spread across India with an emphasis on South India. Tata Motors has 973 service centres across the country.

The traditional players, who have been in the business for decades, have a very widespread infrastructure of parts and workshops, service stations, all over India. Therefore, the vehicle gets fixed everywhere. And a new player coming in will take some time to come up to that level of the service station and network. This leads to stickiness to a brand because for these customers a truck out of load is the earning lost. This is the first resistance and difficulty faced, no matter how your product is; you face the resistance from customers to switch the brand.

A truck out of load is fleet operator's earning lost. In 2015, Rajeev Malik (Vice-President, Marketing) pitched the idea of offering a guarantee to the customers that MTBD would take back the trucks that did not provide the claimed fuel efficiency. MTBD offers two main guarantees on service and mileage, besides providing a spare-parts guarantee as well. The service guarantee promises to reach within two hours of on-road breakdown, failing which INR 500 is given to the customer for every hour of waiting. If the truck is unable to get back on the road within 48 hours due to poor service, INR 1000 a day is paid to the customer. The mileage guarantee allows customers to return the vehicle if it does not provide the higher mileage. The spare-parts guarantee promises the availability of 250 fast-moving maintenance parts at Mahindra's MPARTS Plaza, which is an exclusive spare outlet for MTBD customers. In the event of part unavailability, the customer receives them free of cost. The availability of spare parts is a critical customer requirement.

UPSTREAM SUPPLY CHALLENGES

Supplier

The biggest challenge for the suppliers is to fulfil the highly variable demand from an OEM. During the downturn, a high risk of investment is involved, which is also not a shared risk. As per some surveys, tier-1 suppliers stated that the projection from OEMs is nowhere close to the actuals during any month with multiple revisions in demand. Hence, planning supplier capacities to meet OEM's volatile demand is a challenge. Also, maintaining additional buffer stock incurs high holding costs.

Exhibit 6 presents a supplier delivery chart where the dispatch quantity of the front axle machine deviates from the scheduled quantity. Heavy fluctuations in OEM demand and the lack of flexible capacity are potential factors leading to the gap. The vehicle customisation choices available to the end customers also pose a challenge to

the suppliers in matching the supply with the demand. For example, no regulation for a fleet operator to buy the truck with the cabin (the coach built around the chassis of the vehicle) exists. In many cases, they purchase the vehicle without the cabin, and the cabin is later manufactured at a local body shop to minimise the acquisition cost. In such cases, the demand for a truck does not translate to an equivalent demand for a cabin supplier. A similar supply-demand gap can occur for a tyre supplier as well. The fleet operator may want to buy tyres from its preferred vendor and may not want to purchase the trucks with OEM-fitted tyres. Another variation in demand for a supplier can generate from the OEM's side. An OEM may procure a component from multiple suppliers; hence, if one supplier fails to perform, it can switch to another. Hence, suppliers may face supply-demand mismatches due to any decision made by the OEMs during their planning process.

OEM

OEMs can suffer from supply-demand mismatches because of uncertain market demand and supplier capacity. In general, forecasting the replacement demand is difficult due to the lack of a firm scrappage policy. Suppliers are generally shared among competing OEMs. If the market grows, the large OEMs have the upper hand on the supplier capacity. In such a scenario where the supplier allocates higher capacity to a larger OEM, the smaller OEM does not have a flexible supply to handle demand uncertainties, and hence, fluctuations in demand can cause a higher supply-demand mismatch for smaller OEMs.

Furthermore, government regulations can significantly impact the OEM demand. In October 2018, the Supreme Court of India announced that the Indian automotive industry would transit from the BSIV emission norms to the BSVI emission norms on April 1, 2020. The apex court has ruled that OEMs would not be allowed to sell BSIV stock after this deadline, meaning that the OEMs would have to exhaust their BSIV inventories before the deadline.

Demand in a month itself varies significantly. At the beginning of the month, the demand projected is usually higher, and the actual sales figure may decline at the end of the month. The sales figures are quite dynamic. The reason for downfall in sales could be due to low production by the supplier, any sudden government regulation such as demonetisation or BSVI norms, loss of orders to competitors, lack of strong prospects, sales team inefficiency or lack of financiers. For example, according to research firm Investment Information and Credit Rating Agency (ICRA), the demand for cargo trucks saw volume contraction post the implementation of revised axle norms. The axle norm increased the freight-carrying capacity of M&HCVs by 20%, which led to lower demand for new trucks. Another example of such an effect of regulations on market demand is the enforcement of overloading restrictions, which prompted the large fleet operators to replace older vehicles with modern multi-axle trucks. The demand may increase due to festive season sales; special promotions on surplus inventory, leading to sales; and changes in government norms, necessitating fleet operators to procure new trucks. Understanding the market and sales pattern from previous months and years is crucial to forecast OEM's production. Exhibit 7

represents the variation in the OEM planned vs actual production for FY15 and FY16. The fluctuation in planned vs actual production is between 10 and 100%.

Multiple Revisions of the Monthly Production Plan of OEM

Repeated revisions in the monthly production planning by OEM reduce the confidence of the supplier to have the inventory ready as per the proposed demand (Exhibit 8). Based on previous-month unbilled orders, backorders and forecast provided by the dealer's sales team, the initially quoted figures are very high. Demand is usually higher in the first week of the month and is updated subsequently based on the field inputs.

Smart Truck with FuelSmart Technology and DIS

Sahay stated that India needs trucks with superior mileages, higher payloads, higher speeds, comfortable and safe cabins, and no breakdowns. The industry requires more efficient and modern trucks to create a new transport era. Mahindra BLAZO came with a FuelSmart engine with a 7.2 Litre displacement. Mahindra designed this engine compatible with multimode functions that deliver fuel efficiency and performance following the terrain conditions.

Dr. Venkat Srinivas, Head, Research & Development says "We had internally done a lot of testing, over 200,000 km, to establish the superiority of the BLAZO series of models vs the competition. Further, we engaged a third party, Ernst and Young, to independently verify that our BLAZO vehicles with our 7.2 litre engine were indeed more fuel efficient than competitor vehicles fitted with 5.7 litre to 6.5 litre engines." The FuelSmart technology in these vehicles provides the driver with three multimode switches. Light mode is used for the load-free truck, heavy-mode for the loaded truck and turbo mode for the truck carrying heavy loads in mountainous regions or on roads with high inclination. The driver can switch between these modes and save up to 5%-8% on fuel, according to the company's claim. Implementation of real-time DIS helps the driver to have a safe and comfortable drive. This feature presents the driver with information related to truck performance and fuel efficiency on the vehicle dashboard. These trucks are also equipped with iMAXX telematics technology that comes with smart features such as accurate refills, theft alerts, fuel consumption, AdBlue monitoring, driver behavior monitoring and a range of automated operation reports. With the help of these features, fleet owners can keep a track on their bus and business 24/7. In 2019, Mahindra BLAZO was recognised as "India's most admired truck brand" for innovation, sustainability, growth and trust.

Intermediate Commercial Vehicle (ICV) with FuelSmart Technology

With a new range of the intermediate commercial vehicle (ICV), FURIO, MTBD entered a brand-new market. This step secured Mahindra's place with a full range of commercial vehicles in the goods-carrier segment. FURIO is a midrange product starting from INR 1.745 million. This development was done with a capital investment of INR 60 million. This new range is manufactured in the Chakan plant, Pune. The new ICV from Mahindra also included the first time of 5 years/5 lakh km free-

maintenance guarantee (free AMC) and 5 years/5 lakh km transferrable warranty.³ It was the right time to fill the midrange product gap. ICVs have tonnage between 8 and 17 tonnes GVW.

THE WAY FORWARD

Energy is Synergy

Sahay believes synergies, both forward and backward, play an important role in their supply chain. On the backward synergies, Mahindra has a well-established vendor base, given its prior presence in the automobile industry. While Mahindra has a small scale in HCV, 80% of suppliers are the same. Therefore, to the suppliers, Mahindra is a large customer, may not be large in MTB but large in Mahindra & Mahindra. Hence Mahindra does not face any constraint on suppliers not giving importance or priority to their requirement for MTB, though MTB requirement is small as compared to the overall requirement. However, for a new player, who has only truck business, part supply could be a hardship.

Also, it has a joint venture with the CIE group of Spain by the name Mahindra CIE, which serves MTBD and its LCV business. Mahindra CIE is a multitechnology automotive and nonautomotive component supplier for LCVs, M&HCVs and agricultural and off-road vehicles. Mahindra CIE manufactures and supplies components for transmission/driveline, gears, suspension and steering, and engines. The company has taken many initiatives on insurance and the service level, providing a 6-year or 6-lakh Kms transferable warranty, which is a cost-effective AMC to make a new benchmark in the industry.

While MTBD gets the benefit of the Mahindra scale, in their inbound supply chain, they do not have benefit for the scale of Mahindra & Mahindra in their outbound. Trucking is altogether a different business afterall. The customers, the dealers, and the transporters are different. A truck is not loaded on another heavy vehicle for transportation as is the case with light vehicles.

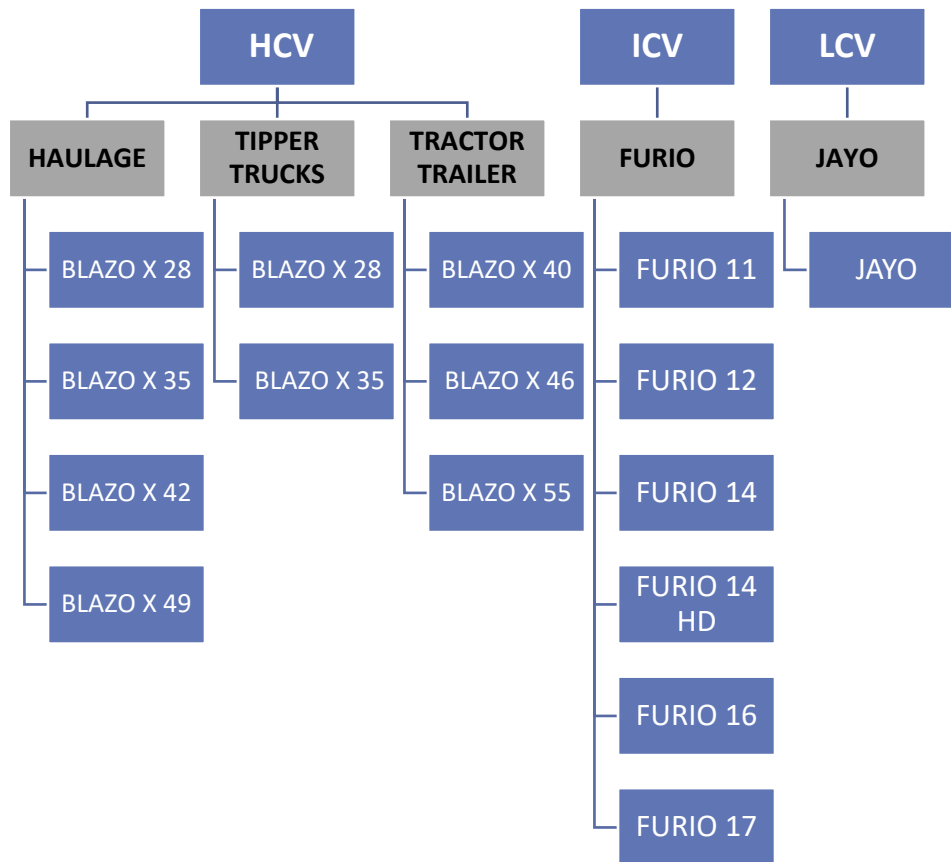
Several supply chain management questions still need thinking: Should the service network be expanded, or should the sales follow first? New technology vehicles such as MTB vehicles have better technology, hence expect less of maintenance. Today, for example for an engine, a life of 300,000 kilometres has become the norm, which was not the case 10 years ago. Therefore, the expectations of customers based on technology and improvement in quality has changed. OEM provides high reliability on the vehicle. Does MTBD need the same traditional service network with advancements in truck features?

³ <https://www.mahindratruckandbus.com/>

How should MTBD ensure capacity from the suppliers, particularly when the market is on the expansion mode? What can MTBD do to reduce the variability in the sales projections?

Exhibit 1

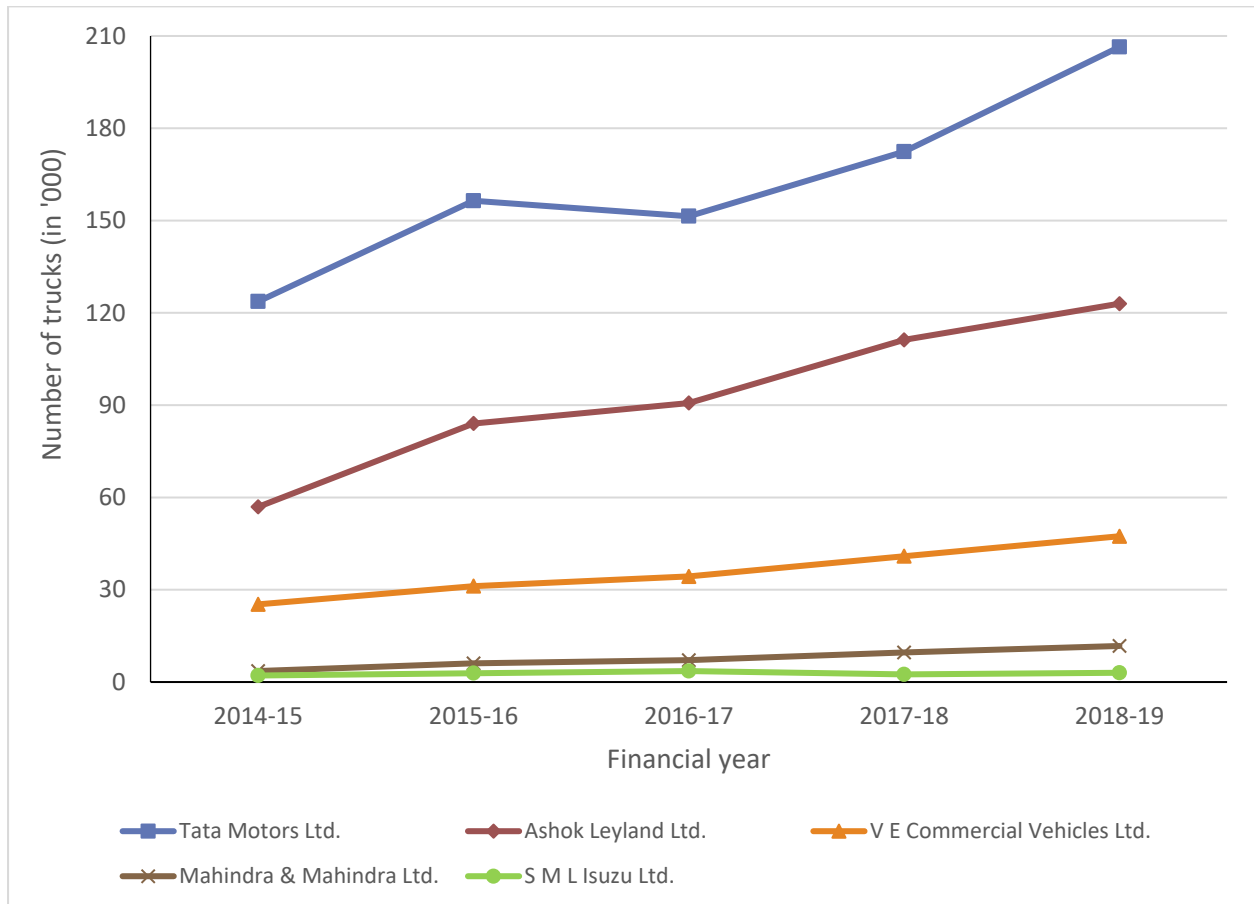
MTBD Product Line



Source: Company Records

Exhibit 2

Company-Wise Total Sales of Trucks Under M&HCV FY15–FY 19

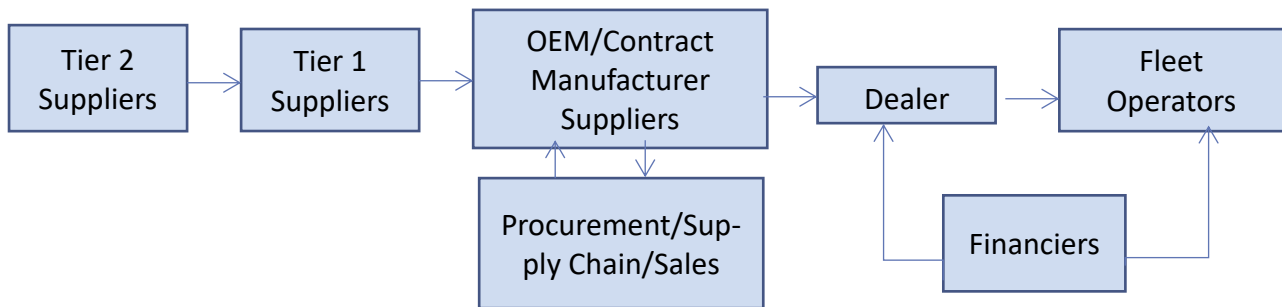


Source: Society of Indian Automobile Manufacturers (SIAM) Data,
<http://www.siam.in/>

Exhibit 3

HCV Supply Chain, the flow of order information originates from the operators to the suppliers (from right to left) whereas the product flows from suppliers to the operators (from left to right)

Transfer of Information



Support functions

3PLs

Repair workshops Bodyshops SpareParts (Original and grey markets)

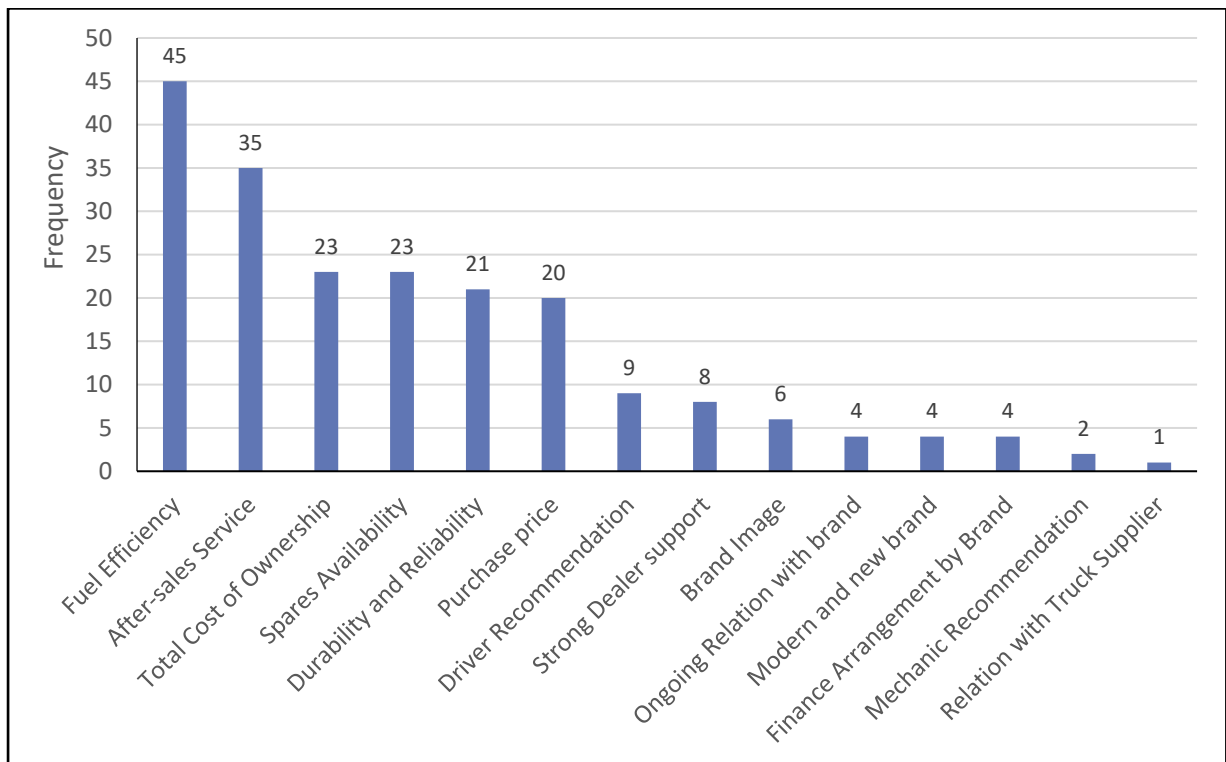


Transfer of finished goods + services

Source: Author's Analysis

Exhibit 4

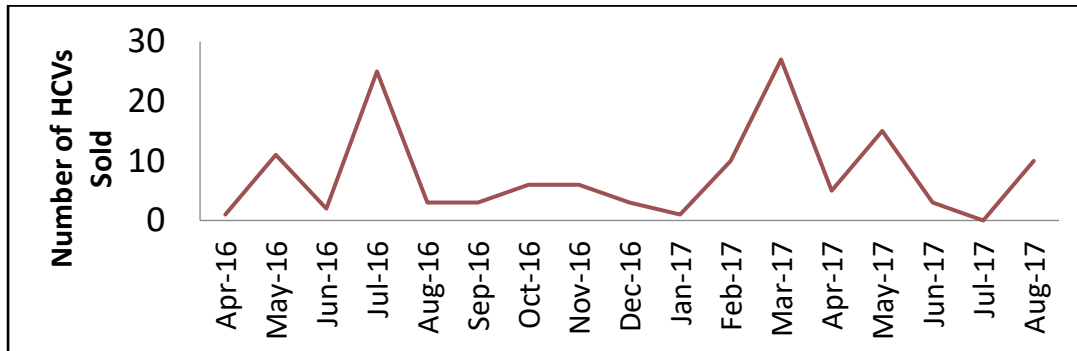
Determinant of Purchase



Source: Author's Analysis

Exhibit 5

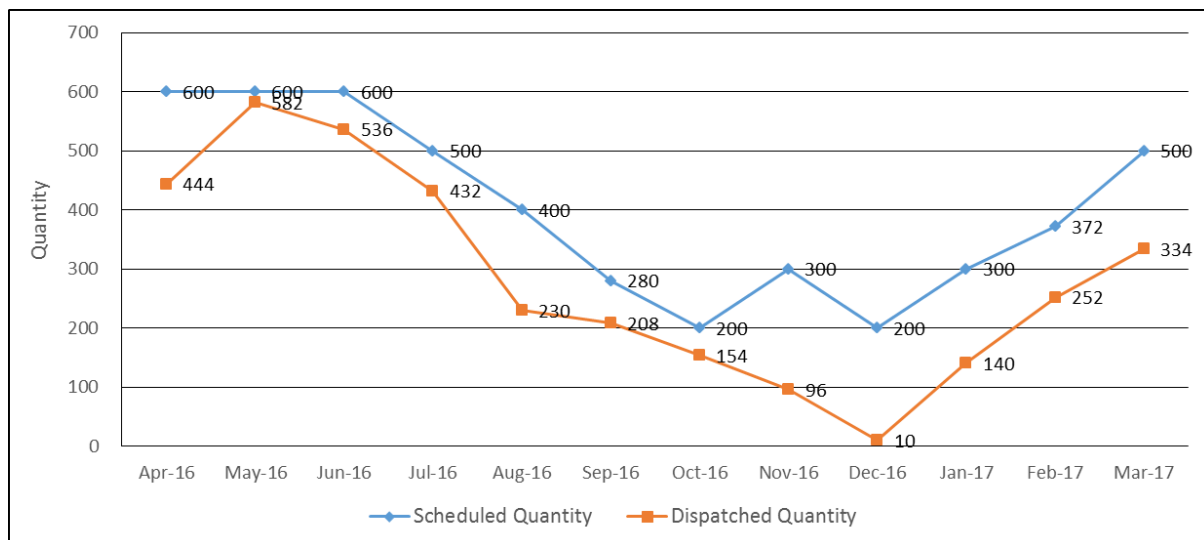
Demand Volatility of a Dealer Monthly Sales Report FY17



Source: Author's Analysis

Exhibit 6

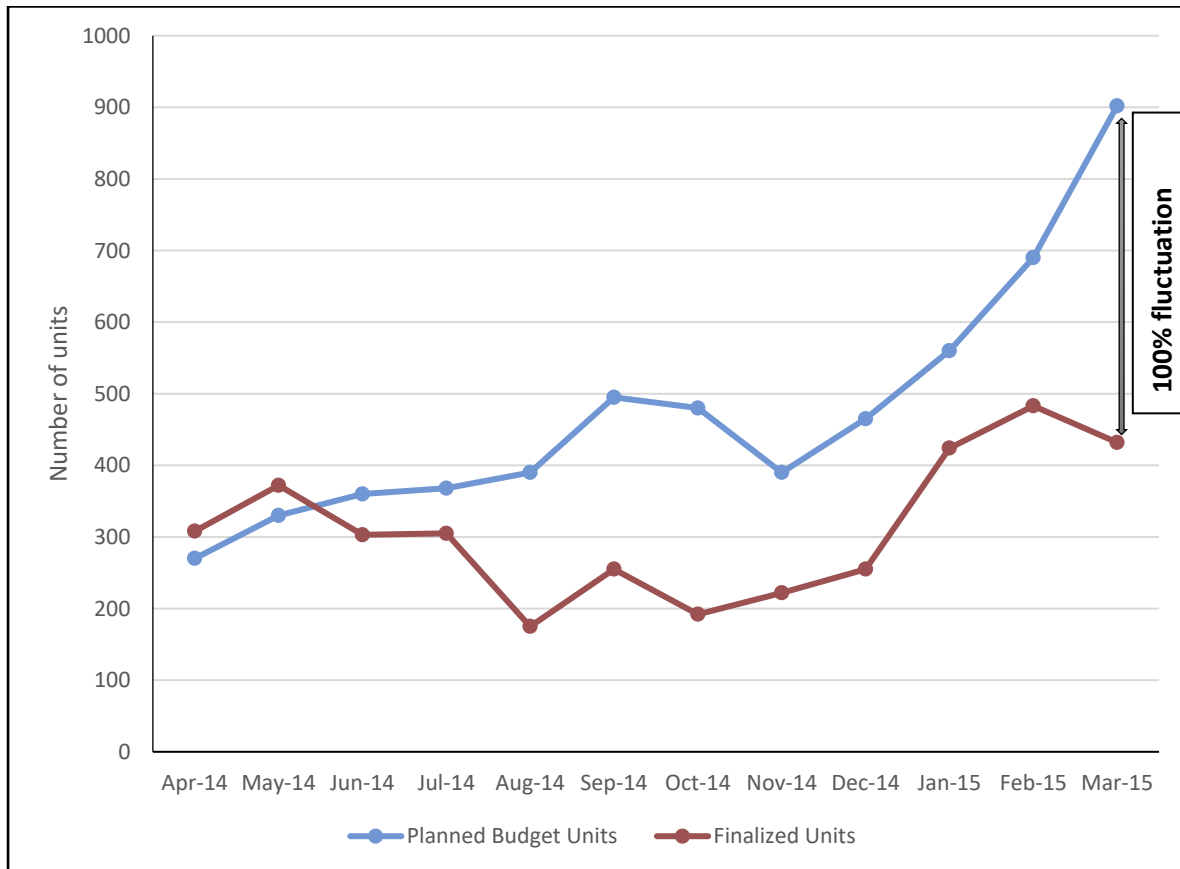
Scheduled vs. Dispatched Quantity for Front Axle Machining (FY 2016–17)



Source: Author's Analysis

Exhibit 7

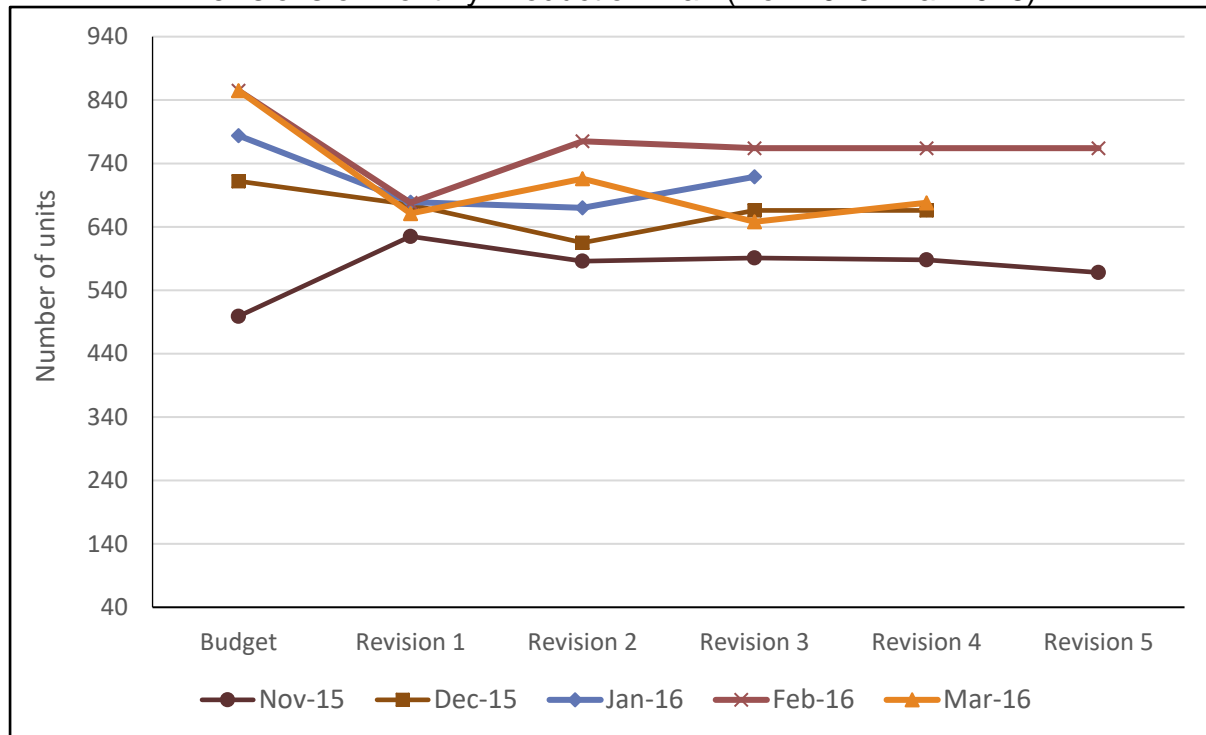
OEM Planned vs Finalised Production Plan for FY 2015–16



Source: Author's Analysis

Exhibit 8

Revisions of Monthly Production Plan (Nov 2015–Mar 2016)



Source: Author's Analysis