VECTOR
CONSULTING GROUP

Just-In-Time or Just Not There?

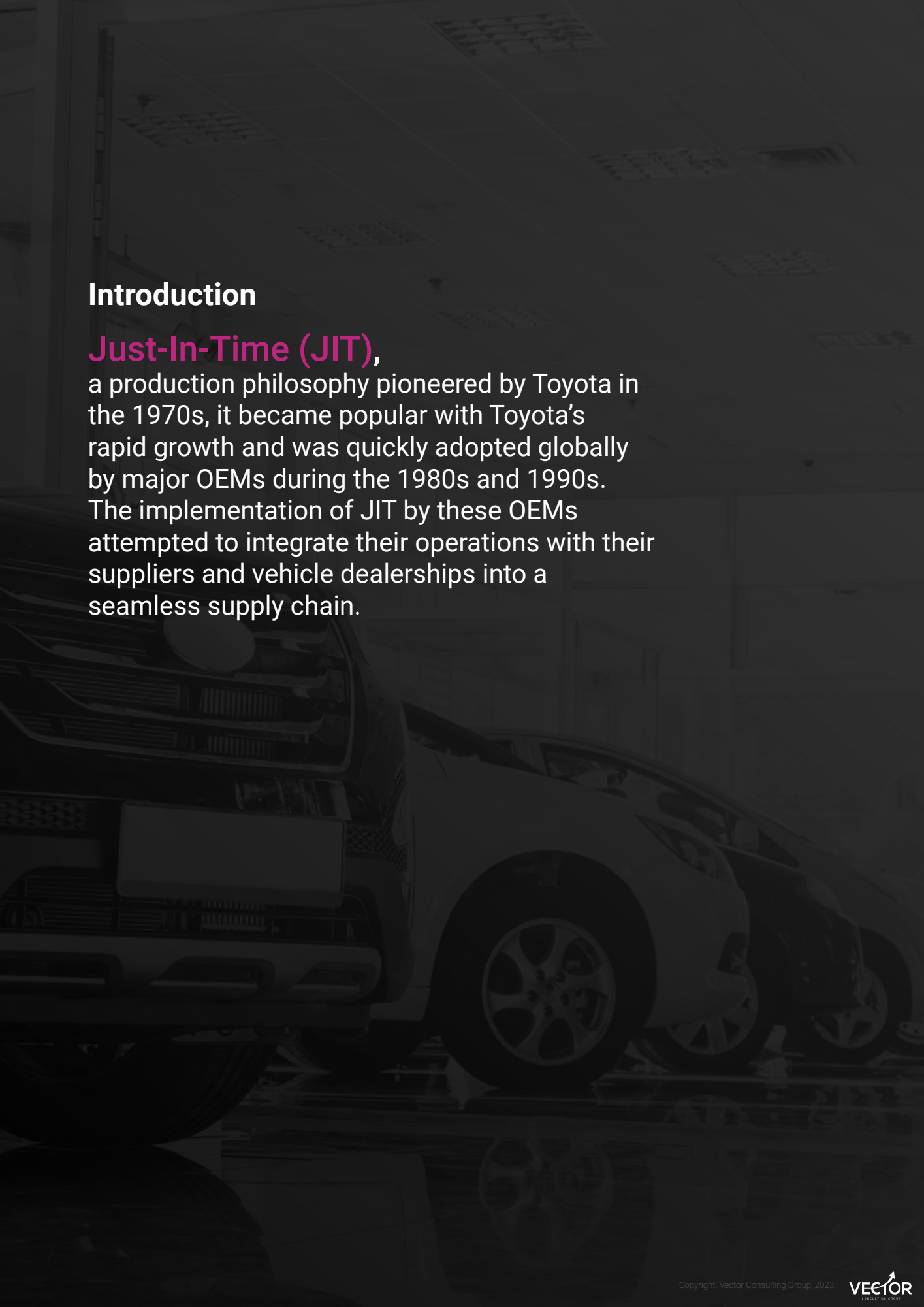
Reevaluating
India's Automotive Supply Chain Dynamics

#DestressToDeliver

By **Nishat Anjum, Achal Saran Pande and Dr. Shelja Jose Kuruvilla**

Introduction

Just-In-Time (JIT),
a production philosophy pioneered by Toyota in the 1970s, it became popular with Toyota's rapid growth and was quickly adopted globally by major OEMs during the 1980s and 1990s. The implementation of JIT by these OEMs attempted to integrate their operations with their suppliers and vehicle dealerships into a seamless supply chain.



Implementing JIT

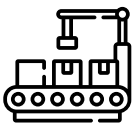
Once JIT is implemented, a supply chain management system is expected to showcase the following characteristics/benefits:

‘Pull-based’ inventory movement

Inventory movement will be ‘just in time’ in the entire supply chain and is based on pull from the previous node or “bin availability”. For instance, when a bin[i] signals that it needs replenishment, it initiates the movement of materials from the supplier or storage area to the production line. This movement is typically rapid and aligned with the production schedule. Forecasts will be used only for high level planning. E.g. for raw material planning but not for actual RM procurement or for planning production. The idea is that any movement of inventory before the actual need for it can generate excess inventory, and any movement later will create shortages.

Frequent Deliveries

Suppliers, OEMs, and dealerships would practice frequent and small deliveries. For e.g., raw materials will be received just-in-time for production at the production line.



Smooth and stable production flow

A smooth and continuous production flow is expected to be seen at suppliers and OEMs without frequent stoppages or disruptions.

Reduced/Stable Inventory Levels

Suppliers, OEMs, and dealerships will have very limited stock of raw materials, work-in-progress, and finished goods. These levels will stay stable – no large variability across the supply chain.

Lean Manufacturing

Lean manufacturing principles, actively identifying and eliminating waste, focusing on value-adding activities, and optimizing processes is followed by the OEM and all suppliers.

Continuous Improvement

Companies/entities will have a culture of Kaizen (continuous improvement) and encourage employee involvement in identifying and implementing process enhancements. Actions such as standardization, quality initiatives, set-up time reduction, etc., are taken to reduce variability in the system and improve synchronization.

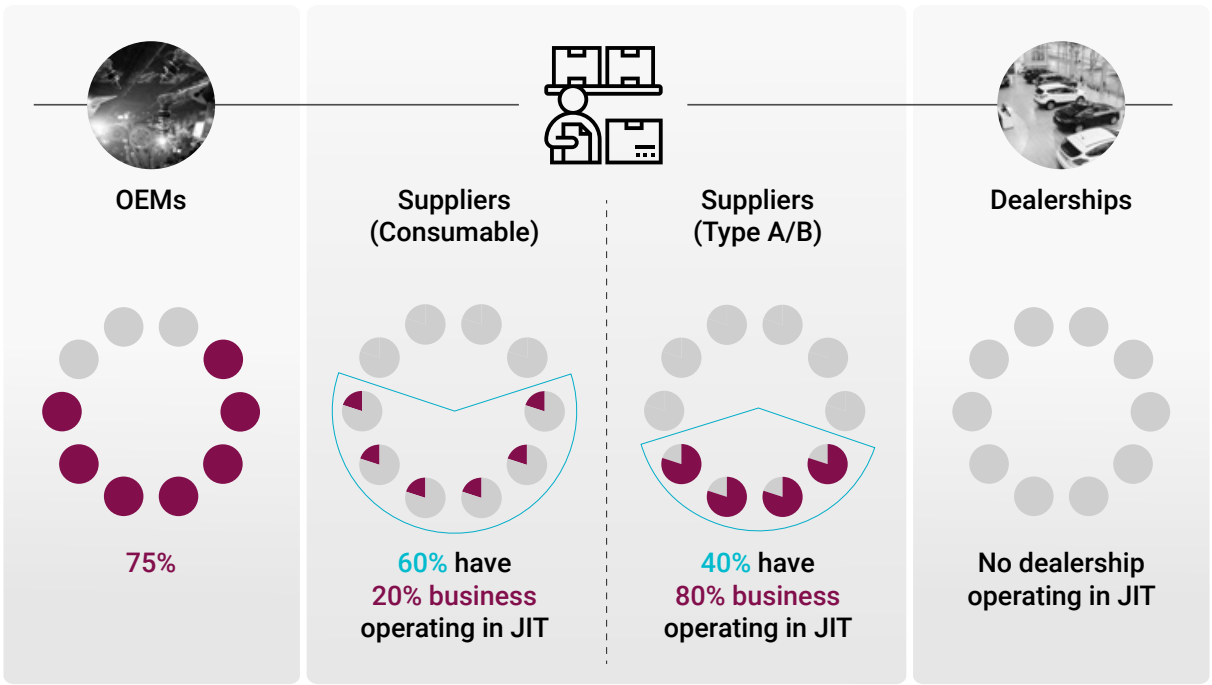
To sum up, by emphasizing precise production and timely delivery of goods without excess inventory, JIT's pull mode of operations promises efficiency and reduced costs for suppliers, OEMs and Dealerships. The reports of benefits experienced by many international vehicle manufacturers in their operations attracted many large Indian OEMs to adopt JIT as well.

However, even a small dipstick survey can indicate that all is not as expected.

The challenges

While most OEMs (75%) have implemented JIT practices in their processes, their supply chain partners have not been roped in JIT. This means the JIT implementation is not end to end in any Indian OEM's supply chain. One exception seen is of an MNC OEM in India who has done a zero inventory model at dealer level, with real demand from end consumer demand triggering inventory movement. Some have also done a demand-pull replenishment for only spare parts from their OEM warehouse to dealers. However, most follow a hybrid push-pull system – i.e. of monthly/weekly forecast based ordering from dealers, scheduling monthly production requirements from suppliers with daily inventory movement to OEM plants as per demand.

JIT implementation is not end-to-end in the OEM's supply chain



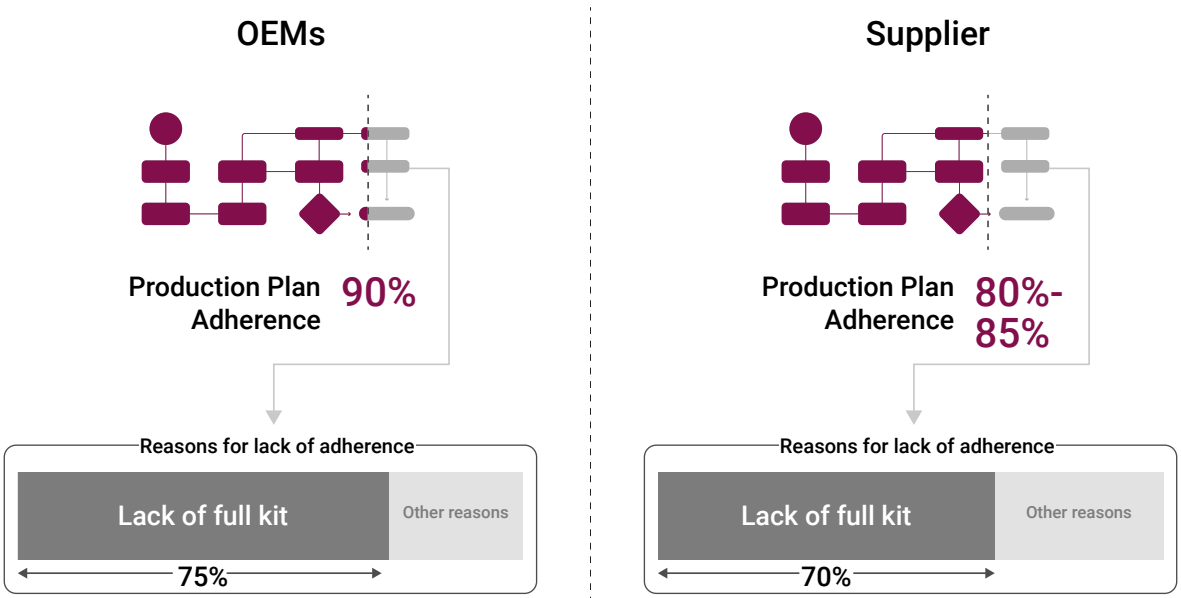
Source: Research@Vector; Survey Sample Size=40 (OEMs);
Personal Interview =15 respondents (OEM+Suppliers)

Poor stability in the supply chain – expediting and firefighting

Moreover, the stability that a JIT supply chain is expected to offer is not realized. As per 90% of respondents in this survey, JIT is partially and ineffectively implemented by their firms. The lack of stability can also be seen in two parameters - the level of expediting and the variability of the inventory profile.

With significant expediting and firefighting (75% of the respondents of this research indicated that JIT system involves a lot of firefighting), attempt is made to ensure 1-2 days of full kit at OEMs and suppliers but time to time kits are incomplete for production. The availability of full kits is found to be only 75% at OEMs and 70% at suppliers for assembly. Even if one item is not available, the plan has to be changed. Consequently, the production plan adherence is poor especially at suppliers (only 80-85%).

Poor stability in the supply chain - expediting



Source: Research@Vector; Survey Sample Size=40 respondents (OEMs); Personal Interview =15 respondents (OEM+Suppliers)

Poor stability in the supply chain - inventory variability

At the same time, even though suppliers (Tier 1) are included by most of the OEMs in a JIT partnership, there are clear signs that the inventory benefits are skewed towards the OEMs. Thus, while the OEM may have only one day or one shift worth of inventory, the suppliers hold 10-12 days of inventory for OEMs, even when they are only a few hours away from the assembly plants of the auto OEM. Similarly, dealerships maintain 1-3 months sales worth of stocks depending upon the season.

Poor stability in the supply chain - inventory variability

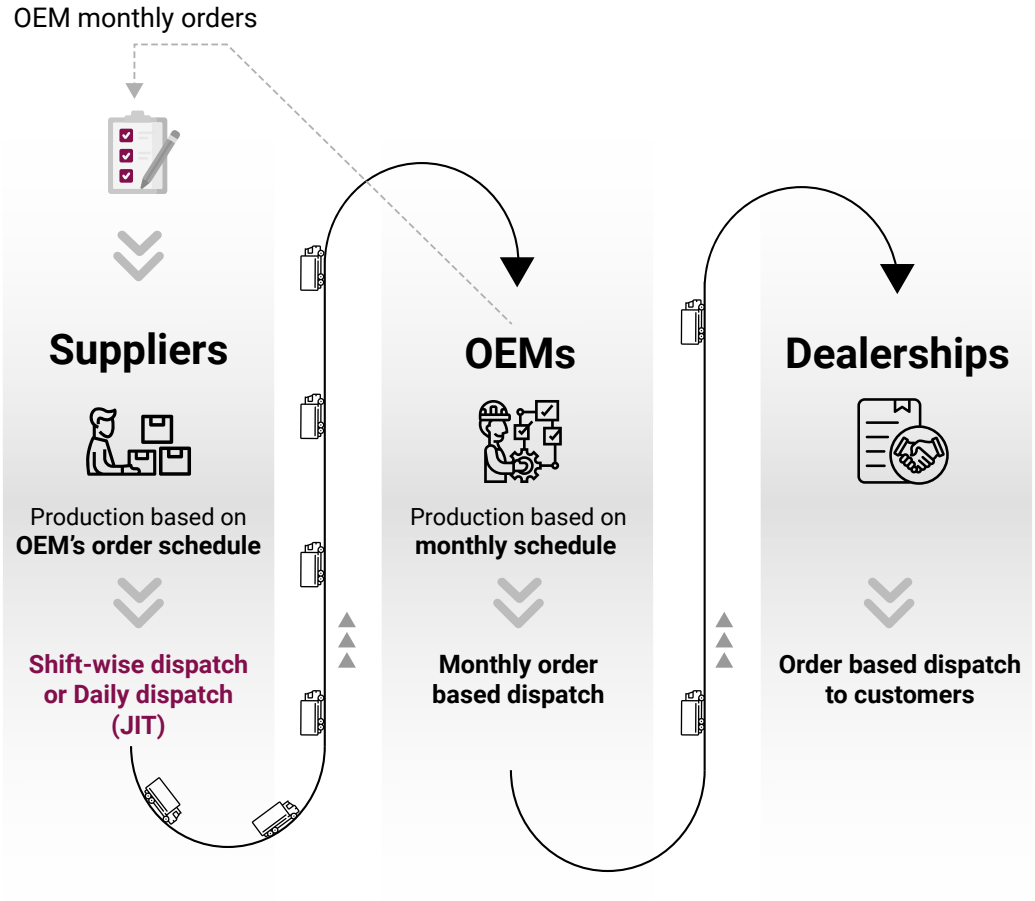
Source: Research@Vector; Survey Sample Size=40 respondents (OEMs); Personal Interview =15 respondents (OEM+Suppliers)

90% of the survey respondents also reported that in the current practice, the inventory stays in the supplier's books till it is inwarded in the OEM's facility while it moves to the dealership account on a factory exit basis from the OEM. The trend is common across all OEMs surveyed and 90% of the suppliers affirmed this practice. Similarly, 85% of the Tier 1 suppliers tend to follow the same practice of inwarding with their suppliers.

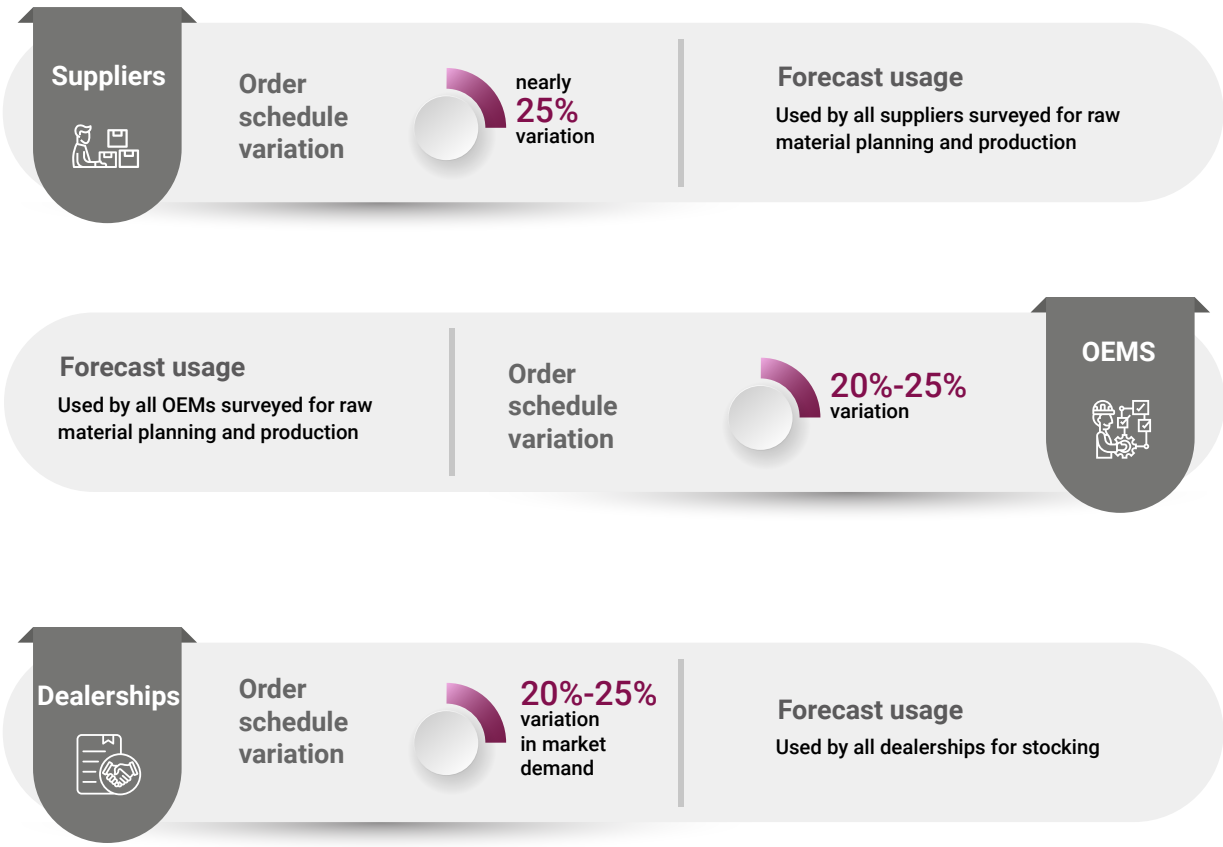
Further, the inventory of the entire supply chain goes haywire from time to time. For example, after COVID-19, the dealer inventory of the OEMs ballooned, and the reaction of OEMs for production correction had a significant lag (about 6-7 months of lag). After COVID, the glut in the market was followed by shortages since OEMs could also not ramp up when demand picked up. This infamous 'bull-whip' effect is part of every economic downturn.

Combination of push-pull inventory movement

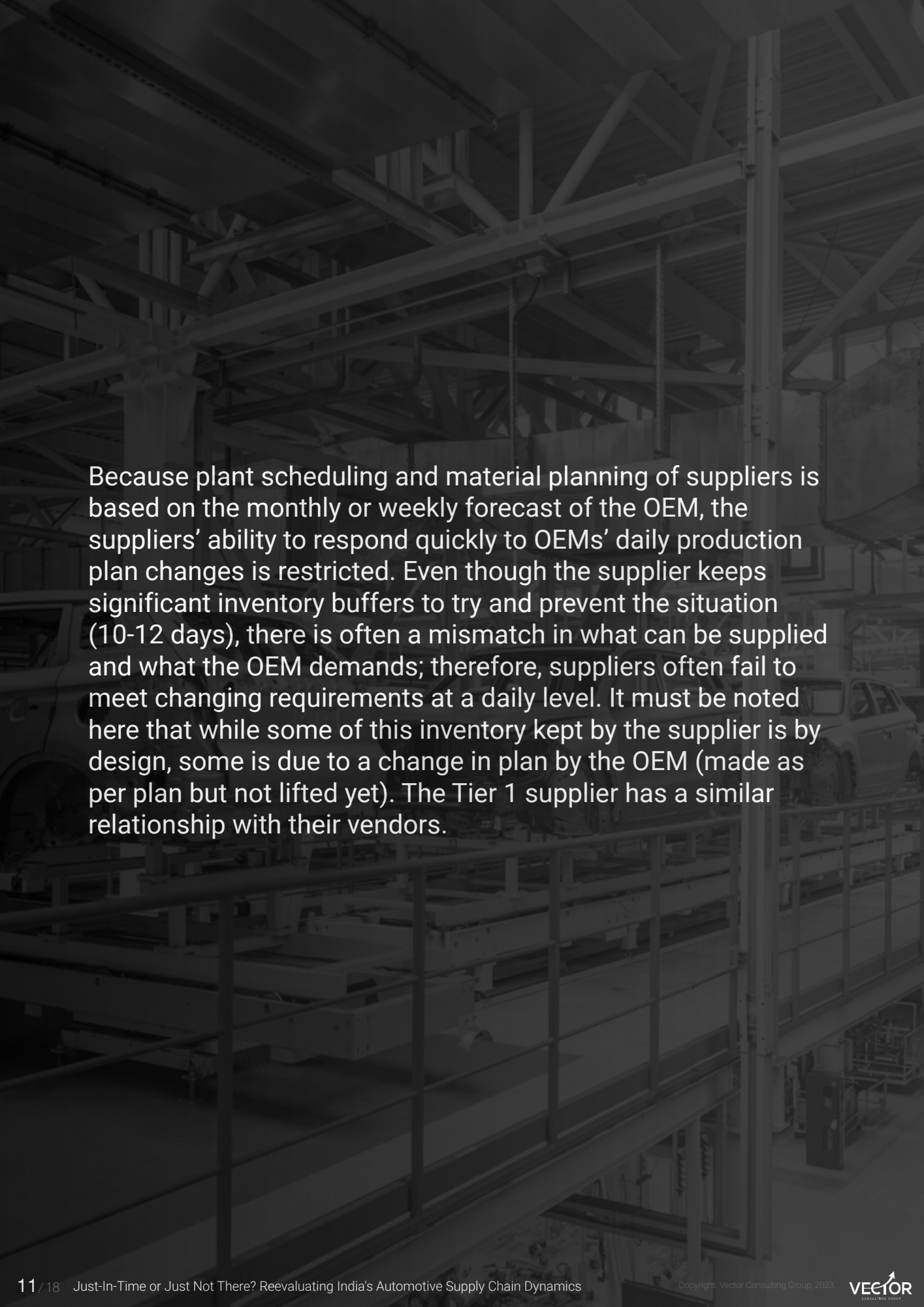
A closer look at the supply chain can show other indicators to show that inventory movement is not fully ‘pull-based’. Many OEMs get inventory from suppliers in JIT. However, production in the entire supply chain (according to 100% of suppliers and OEMs surveyed) is based on forecasts rather than actual consumption or demand.



However, market demand fluctuates, and these forecasts don't match reality (accuracy is 60%-80%). Consequently, issues such as rescheduling, searching for missing components and daily expediting ensues. It is not uncommon for 15%-25% of the full kits needed for the day to be incomplete at many OEMs in spite of regular full kit meetings. Expediting by the OEMs leads to a change in what is demanded daily from the supplier vis-a-vis the order schedule. There is up to 25% variation experienced by suppliers with OEM schedules.



Source: Research@Vector; Survey Sample Size=40 respondents (OEMs); Personal Interview =15 respondents (OEM+Suppliers)



Because plant scheduling and material planning of suppliers is based on the monthly or weekly forecast of the OEM, the suppliers' ability to respond quickly to OEMs' daily production plan changes is restricted. Even though the supplier keeps significant inventory buffers to try and prevent the situation (10-12 days), there is often a mismatch in what can be supplied and what the OEM demands; therefore, suppliers often fail to meet changing requirements at a daily level. It must be noted here that while some of this inventory kept by the supplier is by design, some is due to a change in plan by the OEM (made as per plan but not lifted yet). The Tier 1 supplier has a similar relationship with their vendors.

Real problem

These findings from this research point to

1

Limitations of JIT in **the way** it's currently implemented in India

2

The possibility that the **boundary conditions** wherein JIT can work well can easily be breached in the current auto industry environment (increasingly VUCA[ii])

As can be seen in the study, in spite of JIT (or because of it), a majority of Indian Auto OEMs are struggling to effectively manage demand - especially at the SKU level, across various time horizons. Shorter product cycles, changes in regulations, and an accelerated introduction of new components into the market are aggravating demand fluctuations. In this environment of high demand variability across products, companies do not have the ability to do demand levelling, i.e. having a cadence of SKUs across time periods (Heijunka). Without this levelling, adhering strictly to a JIT-based approach (bin availability-based inventory movement) throughout the supply chain becomes difficult. Any attempt to do so is detrimental since small disturbances will have a cascading effect on the operations of all entities in the supply chain.

Hence, a system has been established in India where JIT/bins are used within OEM's operations and for moving inventory from suppliers to OEMs. So, large auto OEMs maintain little or no inventory (1 shift or day's inventory inside their premises). However, they require suppliers to keep an adequate stock of supplies at warehouses near OEM assembly lines. Moreover, since production at the supplier is not based on JIT but on forecasts (inevitably inaccurate), this also leads to the accumulation of inventory. Wherever suppliers are larger than their own vendors, a similar situation ensues.

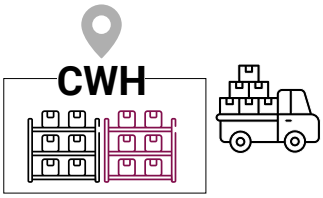
Direction of Solution

How, then, can the automotive supply chain be improved?
It is well accepted that a pull system is superior to a forecast-based approach because it minimizes waste, reduces excess inventory, and ensures production or ordering aligns precisely with real customer demand. So, any Direction of Solution proposed should protect these advantages and offer a practical and effective end-to-end pull system in this industry that offers a win-win-win (win for all partners).

In an environment of inherently high variability, trying to eliminate it altogether, as attempted by the Heijunka, is impractical. However, variability can be dampened considerably with the help of buffers. For such a buffered system to be implemented and to make sure that this system responds to market demand with agility and also, the following steps have to be taken:

1

Build buffers at key locations (CWH and supplier buffers) and supply to replenish buffers



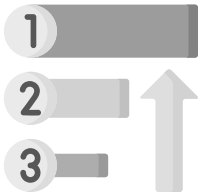
The most effective starting point to implement a system of 'buffers replenishing buffers' will be on the demand side of the auto OEM. We can mitigate demand spikes at the dealer level by transferring inventory from the OEM to the dealer based solely on consumption rather than adhering to fixed sales targets/forecasts.

This will involve the OEM creating a central warehouse to maintain FG inventory that can absorb fluctuations in demand from dealerships during the supply lead time. Production at the OEM should be driven by actual consumption from the warehouse (a fall in buffer level or norm), rather than on sales forecasts. This will improve load balancing and operational flow at the plant.

Component suppliers can also maintain an FG inventory from which they supply the OEM's RM inventory based on daily consumption. The suppliers should transition to pull-based production, producing based on actual off-take from their FG warehouse rather than using monthly schedules. This will decouple them from any fluctuations in the OEM’s manufacturing plans as well. A similar system, which helps reduce supply lead-time and ensures adequate availability of feeding components from Tier II vendors, can be established.

2

Implement an execution-based priority method to deal with variability in demand and capacity so that the system gets clear signals on what to focus upon when total demand across products exceeds capacity



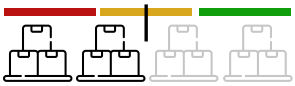
Procurement and production based on daily consumption rather than forecasts will allow for better responsiveness to changing demand patterns. However, since demand is not levelled, it is possible that total daily demand across products exceeds capacity at an entity (which is not a problem in an environment where demand is levelled). So, in this situation, a priority system is needed to identify which products to produce/dispatch, etc. For every item, a target inventory can be set based on 'paranoid' consumption during replenishment time (the maximum forecasted demand during the replenishment time factored by the fluctuations in the replenishment time). The prevailing level of stock, as compared to this target level of various products/buffer levels, can be used to signal priority using simple colour codes. For example, on a daily basis, some FG SKUs will have lower stock compared to the target level while others may have higher stock. A color-based priority system will, in this situation, signal the following:

Red

Stocks have fallen very low and now, only expediting will help

(Expediting time is excluded from the total lead time)

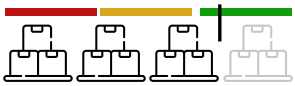
Yellow



Normal lead time out of the total lead time available

(Stocks are full enough to manage during typical lead times)

Green



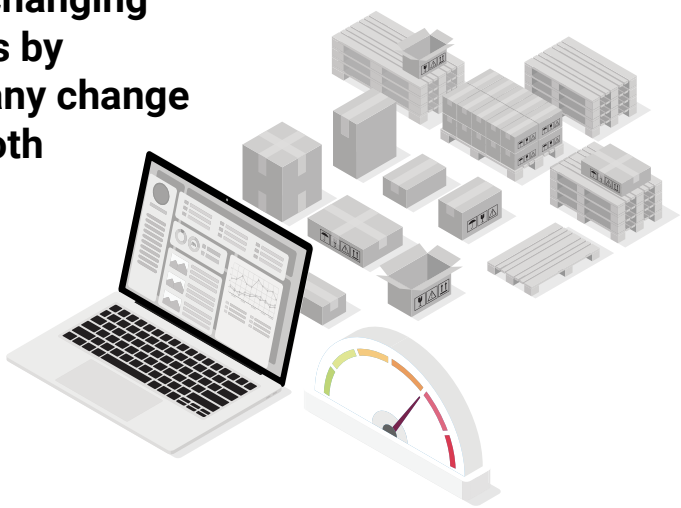
Safety levels of stocks available

(Target stock levels include safety factors in the lead time or are set to meet MOQ needs)

Naturally, Red SKUs should be prioritized over Yellow and Green. This system is important as reacting to small quantity consumption is clearly inefficient. Thus, the colour system provides the necessary flexibility for these decisions.

3

A method of periodic changing of norms of the buffers by intelligent sensing of any change in demand patterns both in near future and recent past.



The colour-based system can also trigger adjustments in inventory norms. For instance, if sales rates consistently exceed supply rates or supply, the norm can be increased. A mechanism can also be put in place to adjust the norm in preparation for known jumps or drops in sales (e.g. major promotional events by the OEM). This method of tracking priority zones of SKUs and periodic changing of norms of the buffers by forward and backward sensing of demand needs can be put in place (giving very high transparency in the system) with the help of end-to-end IT infrastructure.

Conclusion

The study highlights the limitations of JIT (Just-In-Time) manufacturing. Clearly, implementing JIT is not advisable in the current automobile industry environment, as demand variability is high across products, and companies are unable to level demand as Toyota once could. Attempts by OEMs to avail themselves of the inventory benefits of JIT have resulted in the creation of two separate worlds within the supply chain: a JIT world at the OEMs and a non-JIT world at partner organizations. This has led to stock pileups with partners in the supply chain, resulting in increased costs and low capital turnover for suppliers and dealers, often leading to friction in relationships.

To implement a pull system that can benefit the entire supply chain, a solution is proposed involving buffering and intelligent decoupling to absorb variability in the system. This approach ensures seamless flow, provides flexibility, and aligns the supply chain with market movements without increasing inventory levels in the supply chain.

End notes

[i] Bins are storage locations or containers used to hold a specific quantity of components or materials

[ii] VUCA stands for Volatility, Uncertainty, Complexity, and Ambiguity, describing the unpredictable and challenging nature of modern business environments

VECTOR
CONSULTING GROUP

www.vectorconsulting.in

vcg@vectorconsulting.in