

**Master Class** - Unravelling Supply Chain Complexity,  
Global Challenges, Manufacturing Dynamics and  
The Lessons from India

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Chairman | Institute of Supply  
Chain Management



# The Structural Shift

- ▶ The world experienced significant turmoil between 2020 and 2024: supply chain disruptions,
- ▶ Geopolitical tensions, technological advances, Trade wars
- ▶ Changing consumer needs across globe,
- ▶ New sustainability commitments, and more.
- ▶ It's increasingly clear that the resulting shifts in how people live, work, and play are not temporary but structural, beginning a new economic era characterized by volatility, regionalized supply chains, AI dominance, and talent scarcity

# The Global Risk Scenario

1. Pirates of the Red Sea
2. Generational Drought in the Panama Canal
3. Trade distortions
4. Clamping Down on Forced Labor
5. EU Embraces ESG
6. Israel-Hamas war takes the shape of regional cum global conflict
7. New US Administration Shifts Global Policy
8. China Annexes Taiwan
9. China India standoff
10. Port strike in India
11. AI undermines trust in Political institutions.
12. Climate change disrupts global supply chains
13. War in Ukraine turns into a worldwide conflict



We woke up to a new reality, when pagers and radios exploded across Lebanon.

Their supply chain and products were weaponized - this is a wake up call for CEOs and boards worldwide.

The Japanese and Taiwanese companies at the center of it all are now thrust into the the spotlight as a result of their supply chain being infiltrated. This is a risk for all of us.

The products we use are highly connected, incredibly vulnerable, and the components that go into them are sourced from a global network of suppliers hidden by third party relationships.

Most companies have not taken adequate steps to really uncover who is in their supply chain, which parts originate in what countries, and to then protect and secure their supply chains.



# Shipping Lines Avoiding Indian Ports

➤ Biden administration had decided to impose higher tariffs on several Chinese goods, to be implemented in phases from this year until 2026

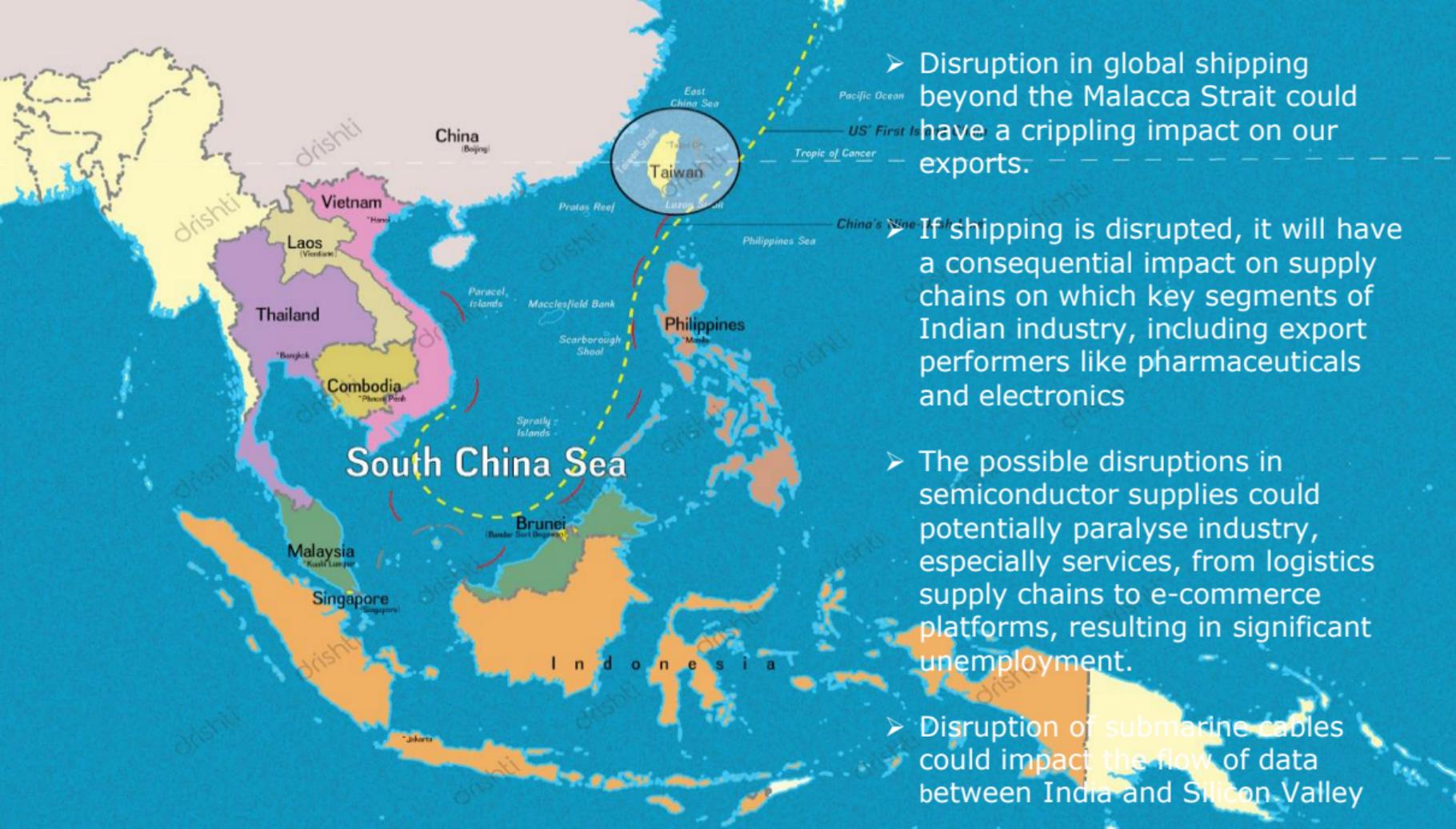
➤ Shipping lines are avoiding several Indian ports due to a longer route

and higher voyage time on account of Red Sea crisis

➤ This was already affecting supply of containers

➤ The worst may be over and container supply may improve in coming months, indicate govt officials





➤ Disruption in global shipping beyond the Malacca Strait could have a crippling impact on our exports.

➤ If shipping is disrupted, it will have a consequential impact on supply chains on which key segments of Indian industry, including export performers like pharmaceuticals and electronics

➤ The possible disruptions in semiconductor supplies could potentially paralyse industry, especially services, from logistics supply chains to e-commerce platforms, resulting in significant unemployment.

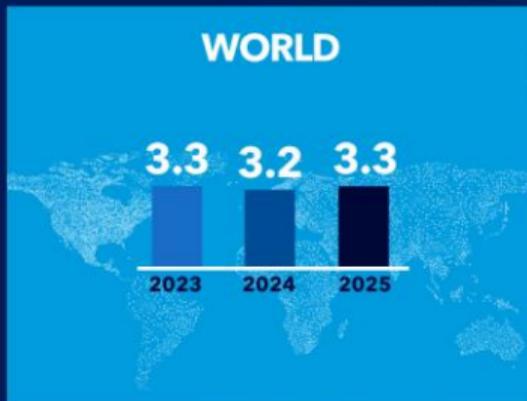
➤ Disruption of submarine cables could impact the flow of data between India and Silicon Valley

An aerial photograph of a complex multi-level highway interchange. The image shows several levels of concrete overpasses and ramps, with numerous cars of various colors (white, silver, black, red, blue) moving through the system. The scene is set in an urban environment with buildings and trees visible in the background. The lighting suggests it's daytime. The overall image has a blue tint, especially on the left side where the text is overlaid.

# Global Economy in a Sticky Spot July 2024

# GROWTH PROJECTIONS BY REGION

(REAL GDP GROWTH, PERCENT CHANGE)



Source: IMF, *World Economic Outlook Update*, July 2024.

Note: Order of bars for each group indicates (left to right): 2023, 2024 projections, and 2025 projections.

# India



2023 | 2024 | 2025

# WORLD

Services inflation is holding up progress on disinflation, which is complicating monetary policy normalization.

Upside risks to inflation have thus increased, raising the prospect of higher for even longer interest rates, in the context of escalating trade tensions and increased policy uncertainty.

In India, the growth has been robust but is set to decline marginally even when India remains to be the fastest-growing economy.

## World Economic Outlook Growth Projections

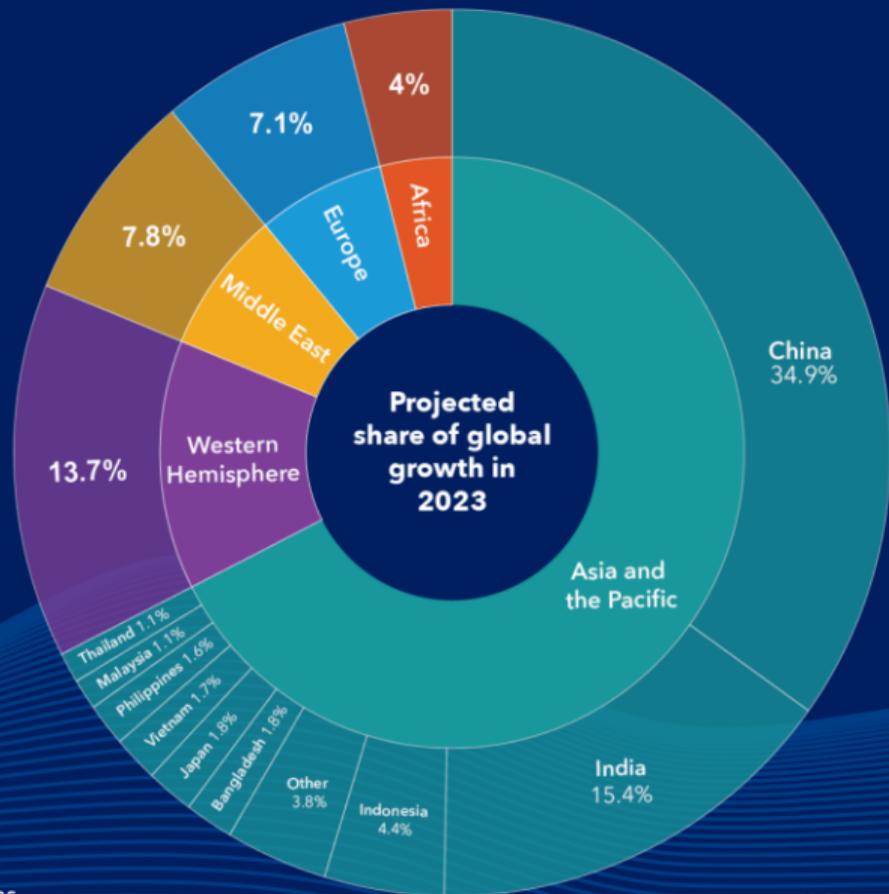
(Real GDP, annual percent change)	PROJECTIONS		
	2023	2024	2025
<b>World Output</b>	<b>3.3</b>	<b>3.2</b>	<b>3.3</b>
<b>Advanced Economies</b>	<b>1.7</b>	<b>1.7</b>	<b>1.8</b>
United States	2.5	2.6	1.9
Euro Area	0.5	0.9	1.5
Germany	-0.2	0.2	1.3
France	1.1	0.9	1.3
Italy	0.9	0.7	0.9
Spain	2.5	2.4	2.1
Japan	1.9	0.7	1.0
United Kingdom	0.1	0.7	1.5
Canada	1.2	1.3	2.4
Other Advanced Economies	1.8	2.0	2.2
<b>Emerging Market and Developing Economies</b>	<b>4.4</b>	<b>4.3</b>	<b>4.3</b>
Emerging and Developing Asia	5.7	5.4	5.1
China	5.2	5.0	4.5
India	8.2	7.0	6.5
Emerging and Developing Europe	3.2	3.2	2.6
Russia	3.6	3.2	1.5
Latin America and the Caribbean	2.3	1.9	2.7
Brazil	2.9	2.1	2.4
Mexico	3.2	2.2	1.6
Middle East and Central Asia	2.0	2.4	4.0
Saudi Arabia	-0.8	1.7	4.7
Sub-Saharan Africa	3.4	3.7	4.1
Nigeria	2.9	3.1	3.0
South Africa	0.7	0.9	1.2
<b>Memorandum</b>			
Emerging Market and Middle-Income Economies	4.4	4.2	4.2
Low-Income Developing Countries	3.9	4.4	5.3

Source: IMF, World Economic Outlook Update, July 2024

Note: For India, data and forecasts are presented on a fiscal year basis, with FY 2023/2024 (starting in April 2023) shown in the 2023 column. India's growth projections are 7.3 percent in 2024 and 6.5 percent in 2025 based on calendar year.

# GROWTH CONTRIBUTIONS

Asia will contribute about 70% of global growth this year.



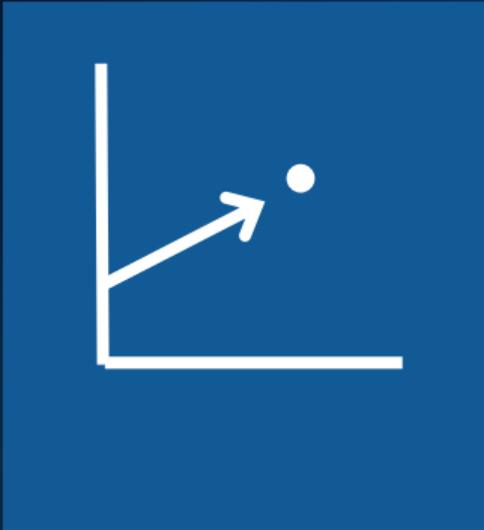
**INTERNATIONAL MONETARY FUND**

Note: Groupings based on IMF Regional Economic Outlook classifications.

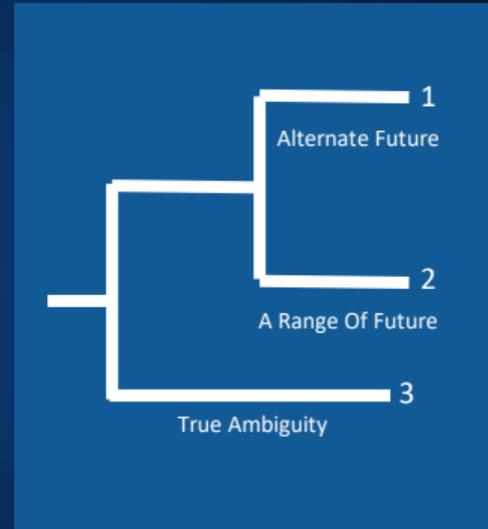
# SCENARIO PLANNING

## STRESS TEST

# How to Use 4 Levels of Uncertainty



A Clear-Enough Future



Alternate Future

What can be Known?

- A single forecast precise enough for determining strategy

- A few discrete outcomes that define the future

# THREE APPROACHES TO SCENARIO PLANNING

## STAGE 1

### Technique 1

- Identify issues, key driving forces and important factors for uncertainty
- Sketch out basic scenarios
- Flesh out scenarios

### Technique 2

- Evaluate policies and strategies within each scenario to see how they hold up
- Modify the strategies
- Iterate and reevaluate as many times

### Technique 3

- Identify leading indicators and assign people to monitor changes in the environment to detect in advance which scenario or combination of scenarios is unfolding

## STAGE 2

- List key factors influencing success or failure of the decision
- List driving forces in the macro-environment that influence those factors
- Identify two or three factors or trends that are most important and most uncertain

- In each scenario, determine the implication of decisions being considered

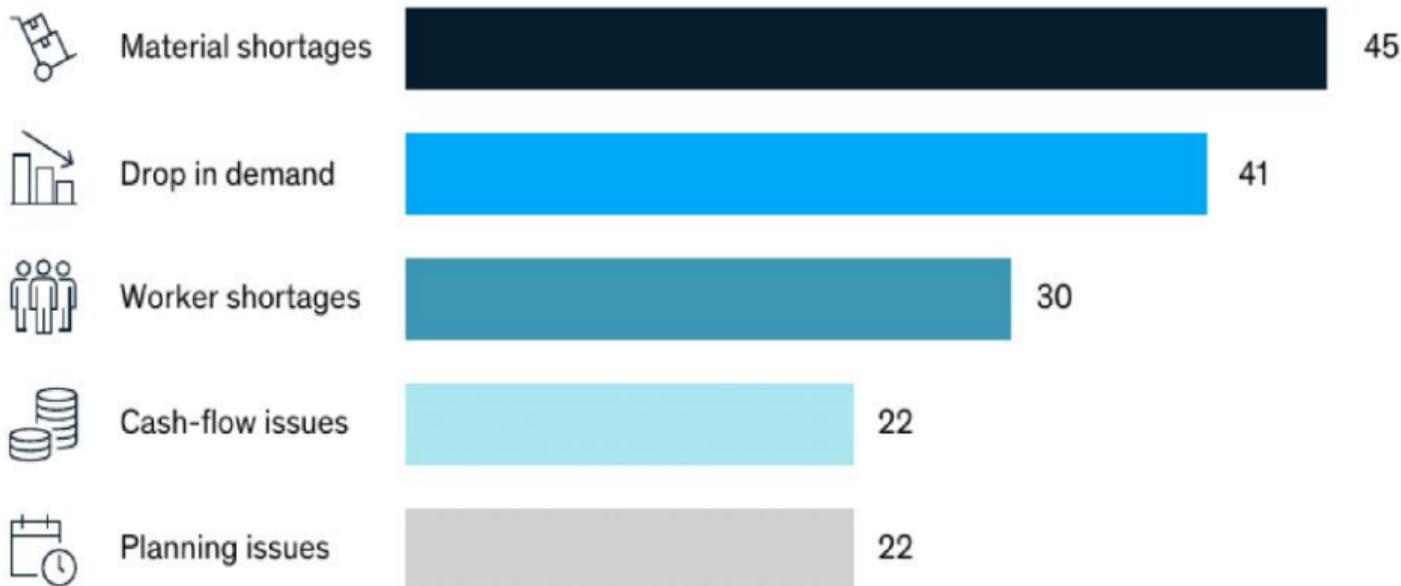
- Select leading indicators and signposts to detect which scenario (or combination of scenarios) is unfolding

## STAGE 3

- Define scope of strategy formulation
- Identify major stakeholders (those affected and those able to influence)
- Identify current trends
- Identify key uncertainties
- Construct extreme scenarios
- Assess scenarios' internal consistency and plausibility
- Create representative scenarios —internally consistent scenarios covering a wide range of outcomes adjusted to reflect stakeholder behavior
- Identify research needs for each scenario
- Develop and apply quantitative models (for forecasting and optimizing decisions when the future is uncertain; these activities will likely lead to scenario refinement)
- Describe decisions for different scenarios, combining managerial judgment with results from the previous step

## COVID-19 has disrupted businesses worldwide, resulting in a range of operational challenges.

Challenges faced due to the effect of COVID-19 disruption<sup>1</sup>, %



<sup>1</sup>Multi-select question – respondents selected multiple options.

Source: McKinsey COVID-19: Global Manufacturing & Supply Chain Pulse Survey (2020)

## Focus area: moderate supply shock

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How do we **mitigate the supply shock** and effectively manage supply risk?

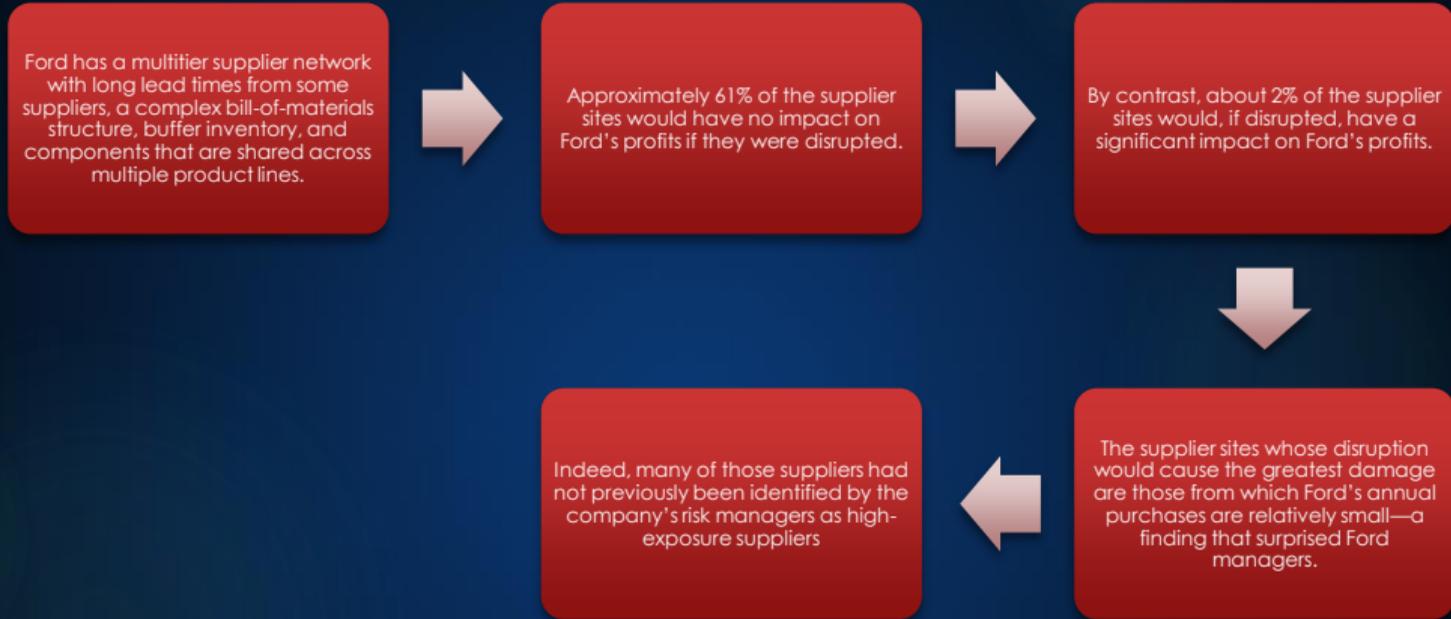
How can we **identify which of our suppliers are the most vulnerable** and develop resiliency to mitigate potential supply issues?



How can **supply base impact** be determined in order to better predict **volatile procurement and production amounts**?

# Stress test

- ▶ One is time to recover (TTR), the time it would take for a particular node in the supply chain — a supplier facility, a distribution center, or a transportation hub — to be restored to full functionality after a disruption.
- ▶ The second is time to survive (TTS), the maximum duration that the supply chain can match supply with demand after a facility disruption. By quantifying each measure under different scenarios, a business can identify its ability to recover from a disaster
- ▶ If the TTR for a given facility is greater than the TTS, the supply chain will not be able to match supply with demand unless a backup plan exists. This approach provides companies with a way to financially quantify the cost of disruptions and prepare mitigation plans for the most critical parts of the supply chain that could be applied in different scenarios.



## Ford Case study

# Managing Supply chain organization and the implied uncertainty

FROM VALUE CHAIN PERSPECTIVE

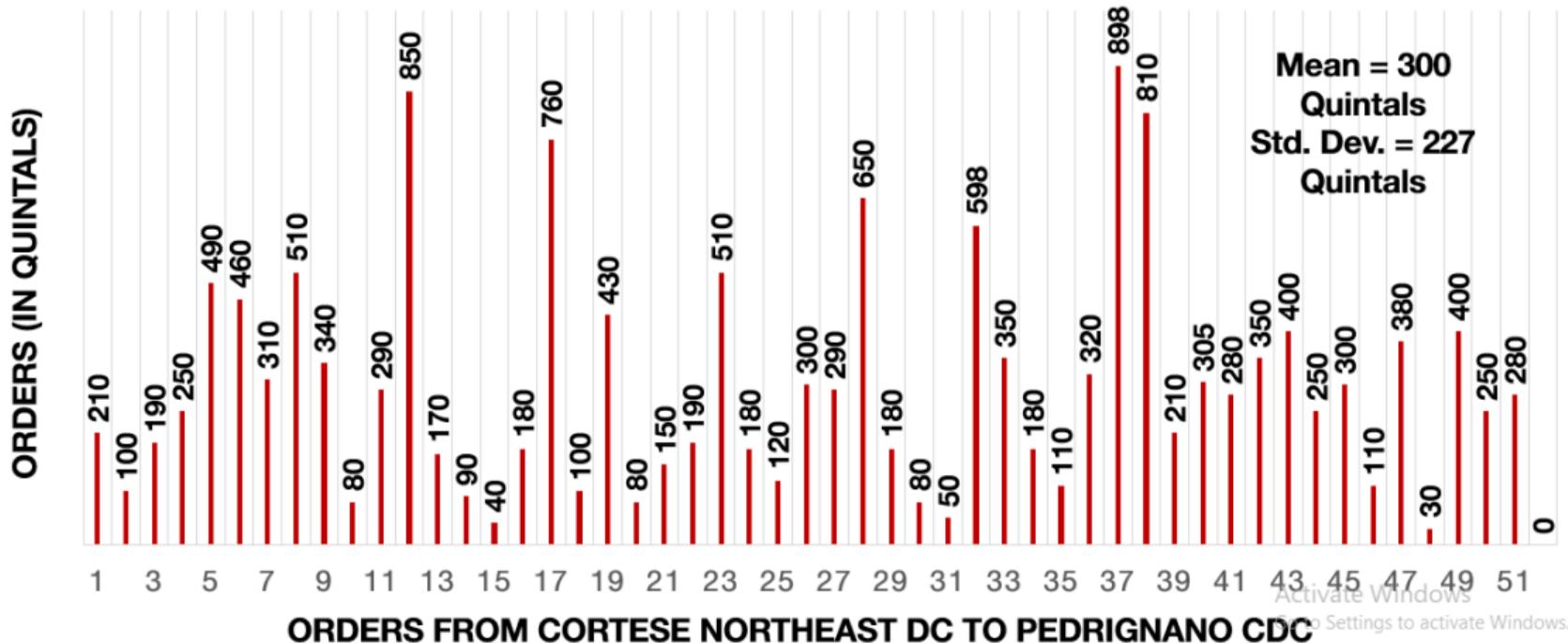
# The Globalization of Supply Chains

*To understand why this pandemic, Japanese quake, and tsunami had global effects and how other kinds of distant disruptions can affect companies and economies, it helps to understand something about supply chains.*

*From the point of view of a single company, a supply chain—which is actually a network of suppliers, sub suppliers, and service providers can be thought of as having five different aspects:*

- A. The parts that go into the company's products,
- B. The identities of the network of suppliers who make those parts,
- C. The locations where parts and products are made, assembled, and distributed,
- D. The flows of parts and products (including the transportation links that move materials along the chain), as well as the flow of information and cash, and
- E. The inventories of materials, parts, and finished goods stored or being handled in various stages of the chain

# WEEKLY DEMAND FOR BARILLA DRY PRODUCTS FROM CORTESE'S NORTHEAST DISTRIBUTION CENTER TO THE PEDRIGNANO CDC, 1989



# Four Pillars of Supply Chain

- ▶ Modelling the forecast
- ▶ Measuring the performance of the forecast
- ▶ Managing the Forecast within and outside supply chain
- ▶ Technology 4.0



Suchanarest

Enter Address/ Location



Reset shkek

Select Map Layers



- State Wise Corona Cases **1471877**
- District Wise Corona Cases
- Treatment Centres **1445**
- Testing Lab **2570**
- Sample Collection Centres **6901**
- Quarantine Centres **5487**
- Containment Zones
- Corona Lockdown Issues
- Hunger Relief Centres | Source:

Total Cases | India

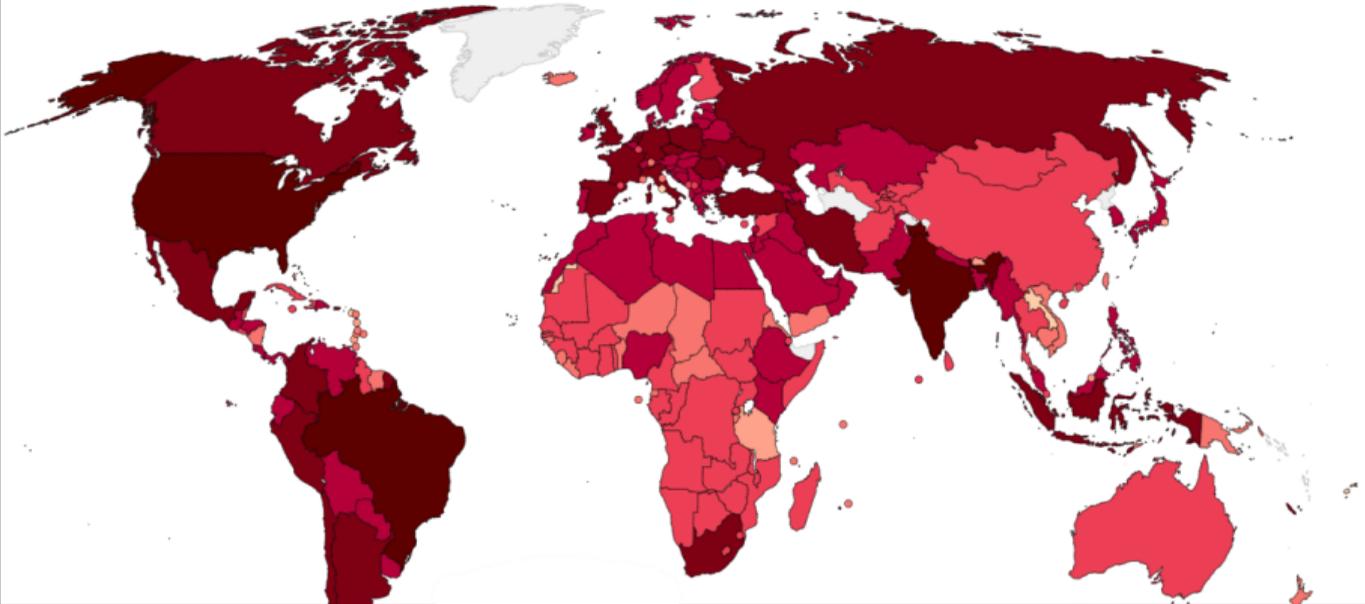
**1,40,74,565**

In sync with [MoHFW](#) website, last updated 8 hrs, 52 min ago

Active Cases	Vaccinated	Recovered	Deceased
<b>14,71,877</b>	<b>11,44,93,238</b>	<b>1,24,29,564</b>	<b>1,73,123</b>

Jurisdictions with cases confirmed as of April 15, 2021, 5:50 PM GMT+5:30

1-99 100-999 1,000-9,999 10,000-99,999 100,000-999,999 1,000,000-9,999,999 10 million or more



# A Look at Retail Supply Chain

Immediate action across the supply chain can help retailers meet consumer demand during the COVID-19 pandemic.

## Retail-supply-chain changes

● Nondiscretionary categories ● Discretionary categories



### Suppliers

- Establish daily meetings with strategic suppliers
- Reduce product variety
- Reduce on-time, in-full requirements, as well as payment terms for key suppliers
- Mitigate risk for existing orders, in collaboration with suppliers



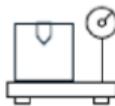
### Merchandising

- Revise buy plans and reallocate staff toward high-demand categories
- Override algorithms to redirect inventory to high-density areas
- Dial down near-term buy plans to preserve cash
- Anticipate future increases in sales and adjust buy plans accordingly



### Distribution

- Retrain employees and redeploy them to distribution centers in high-demand areas
- Raise wages and make temporary hires
- Maintain good workplace hygiene
- Cross-train store and back-office personnel to assist with e-commerce



### Logistics

- Allocate more transport capacity to high-demand items
- Have suppliers deliver directly to stores
- Stage products at strategic hub stores to feed smaller stores
- Explore alternative and supplemental delivery options
- Offer transportation capacity if private fleet is available to support movement of critical goods

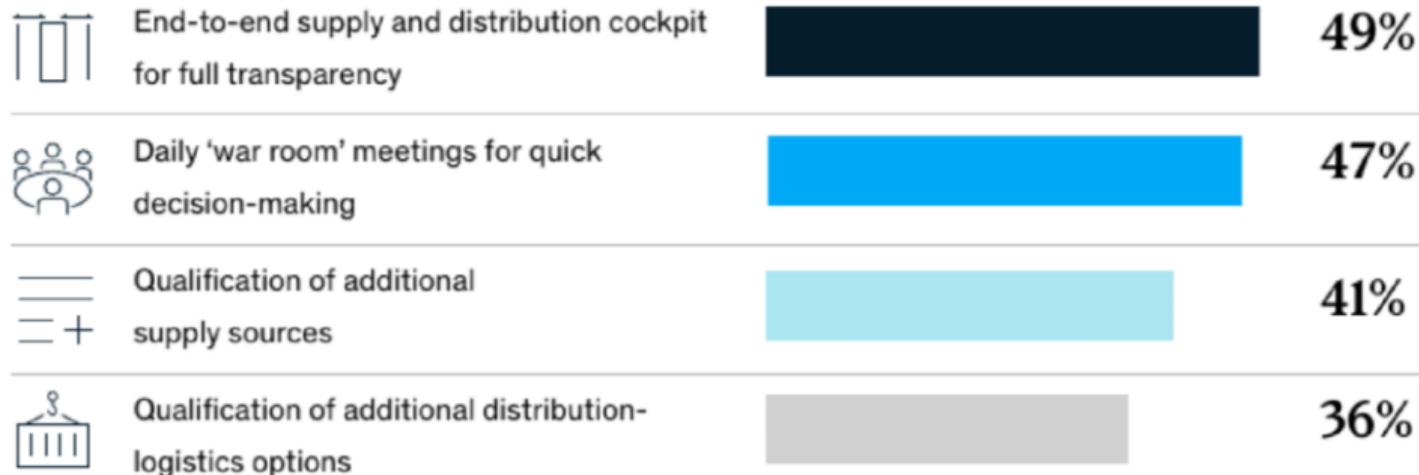


### Fulfillment

- Relax same-day/next-day delivery requirements
- Optimize routing and accommodate more delivery slots
- Enforce order maximums
- Expand fulfillment and return options to give customers flexibility

# Transparency and nerve centers help mitigate potential long-term risks

## Measures to minimize materials shortages<sup>1</sup>, %



<sup>1</sup>Multi-select question—respondents selected multiple options.

Source: McKinsey COVID-19: Global Manufacturing & Supply Chain Pulse Survey (2020)

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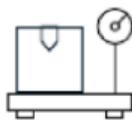
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# Modelling the Forecast

# AA to manage Product and Consumer preferences influencing factors

Demand forecast categories	Influence factors	Descriptive (DAA)	Predictive (PDAA)	Prescriptive (PSAA)
Products	Quality	Assess product quality based upon reviews, customer feedback, warranty claims etc.	Predict influence from quality factors upon demand for a product	Optimize assortment with the best price quality attributes
	Competitors, substitutes, complements	Build a products network to understand their interrelations	Predict cross price elasticity	Optimize the price structure of products
	Prices	Structure the development of prices	Predict price elasticity	Not applicable
Consumer preferences	Fashion and trends	Detect social media trends that can influence demand, discover where trends start and how they spread, detect trend reversals	Include social media trends in forecast models or test their influence on sales	Simulate different product trend scenarios
	Buying behavior	Segment customers according to their demand, detect purchase behaviors with association rules, create a comprehensive view of customers from different data sources	Predictive models based upon individual customers or customer segments, create forecast models with diverse input variables, predict customer visitor traffic	Optimize demand forecast models with cost factors
	Brand awareness and perception	Describe brand awareness and perceptions	Predict brand influence on product demand	Not applicable

# Creating a Strategic Fit

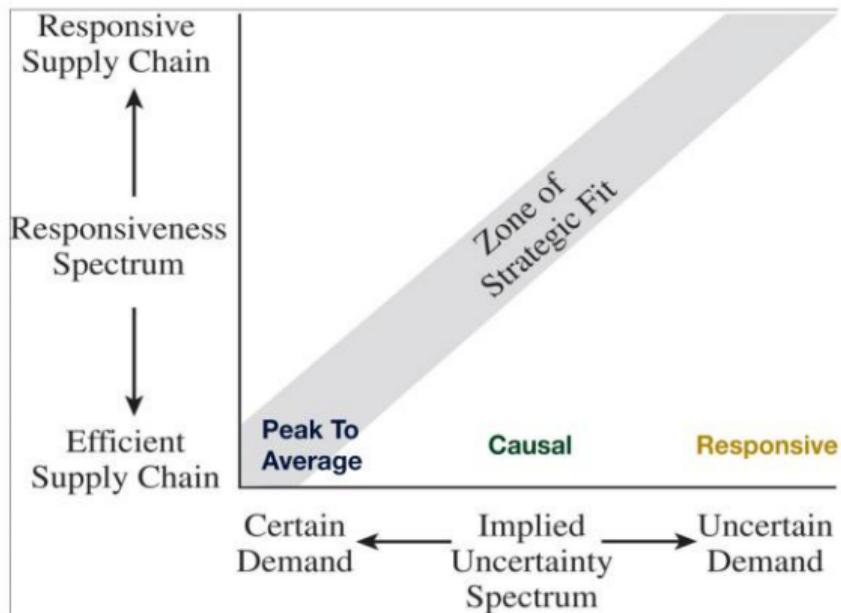
# Customer Needs and Implied Demand Uncertainty

Customer Need	Causes Implied Demand Uncertainty to ...
Range of quantity required increases	Increase because a wider range of the quantity required implies greater variance in demand
Lead time decreases	Increase because there is less time in which to react to orders
Variety of products required increases	Increase because demand per product becomes more disaggregate
Number of channels through which product may be acquired increases	Increase because the total customer demand is now disaggregated over more channels
Rate of innovation increases	Increase because new products tend to have more uncertain demand
Required service level increases	Increase because the firm now has to handle unusual surges in demand

# Implied Uncertainty and Other Attributes

	Low Implied Uncertainty	High Implied Uncertainty
Product margin	Low	High
Average forecast error	10%	40% to 100%
Average stockout rate	1% to 2%	10% to 40%
Average forced season-end markdown	0%	10% to 25%

## Zone of Strategic Fit for Asian Paints



# Measuring the Performance of the Forecast

PVBs	Forecast	Demand	Mean Error	MAPE
12-720	5,677	6,235	(558)	8.9%
34-720	13,444	28,020	(14,576)	52.0%
1-720	23,620	11,163	12,457	111.6%
34-420	6,427	384	6,043	1573.8%
1-420	4,392	2,357	2,035	86.3%
<b>Total</b>	<b>53,560</b>	<b>48,159</b>	<b>5,401</b>	<b>11.2%</b>

Fire Valves	Forecast	Demand	Mean Error	MAPE
Z2105	119	85	34	39.4%
Z3000	217	199	18	9.0%
Z3000IL	66	140	(74)	52.9%
Z3004SS	46	66	(20)	30.5%
Z3004ILSS	112	90	22	24.2%
<b>Total</b>	<b>559</b>	<b>580</b>	<b>(21)</b>	<b>3.6%</b>

$$\text{Mean Error} = \frac{\sum_t (\text{Forecast} - \text{Demand})}{n}$$

$$\text{MAPE} = \frac{\sum_t |\text{Error}_t| / \text{Demand}_t}{n}$$

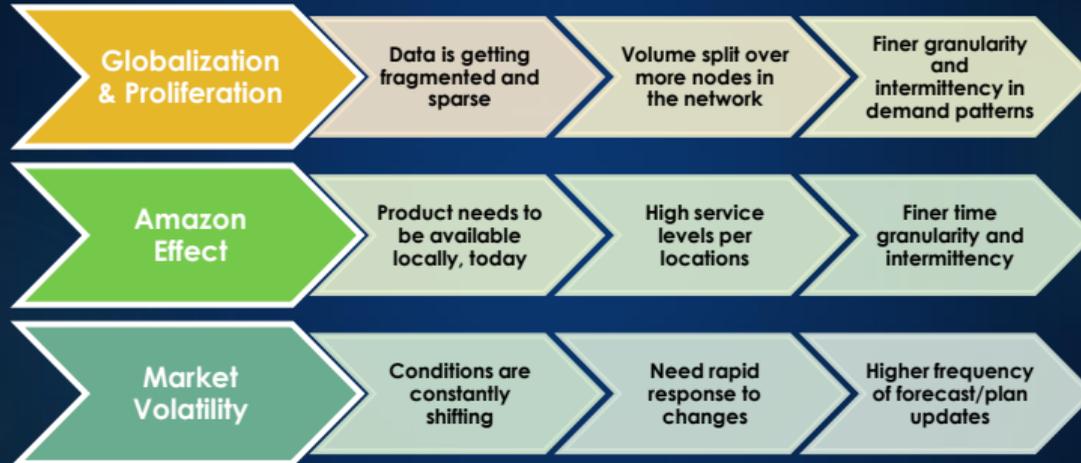
Where  $t$  is the time period, the first quarter of 2005, and  $n$  represents the total number of observed time periods, which is 1.

Dr. Rakesh Singh Chairman-ISCM

How do you move from  
Deterministic to Resilient  
Forecasting?

- ▶ **Forecasting** is the use of algorithms of some variety to attempt to extrapolate history into the future.
- ▶ There are solutions which attempt to overcome this by the use of increasingly complex and obscure statistical algorithms to try to project complex (and often random) historic patterns into the future. I believe with respect to forecasting sales, particularly in FMCG, this is doomed to failure.
- ▶ At best forecasting will be able to accurately project an overall pattern of steady state, growth or decline coupled with some broad repeating seasonality.

# The World Is Changing



- **Product proliferation:** Most companies have more products and product variants than 30 years ago. More products means splitting the demand between more buckets. When the percentage increase in the number of SKUs is larger than the percentage increase in sales, sales per SKU decrease. So product proliferation translates into more intermittent demand and higher variability at the individual SKU level.
- **More frequent replenishment causing more granular forecasting:** While more frequent deliveries allow companies to react more quickly to changes in demand, they also mean that both replenishment and demand should be modeled and managed in shorter time buckets, typically daily. This shorter time bucket means higher demand variability. If demand behavior is observed in monthly buckets an SKU may look like a stable "fast mover". But if observed in weekly buckets it will look more like a lumpy "slow mover" and at the daily level will likely to be intermittent.
- **Extended supply chain planning:** Increased collaboration between vendors, distributors and retailers and vendor-managed inventory (VMI) provide vendors with downstream demand visibility closer to the end-customer. It allows manufacturers who used to focus on planning their big regional distribution warehouses to obtain a more reliable demand signal, often at final customer facing demand. As the focus shifts from the "Ship-From" vendor DCs to "Ship-To" retailer DCs and even to retail shelves, demand is increasingly disaggregated into smaller demand streams. As a result, demand variability increases and slow-moving behavior becomes more common.



# It Starts With a Forecast

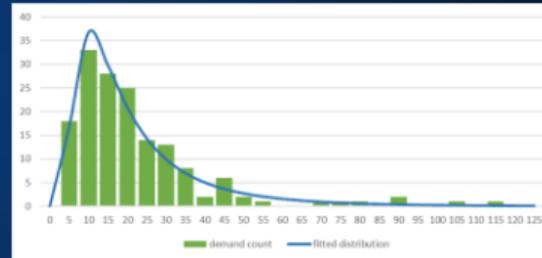
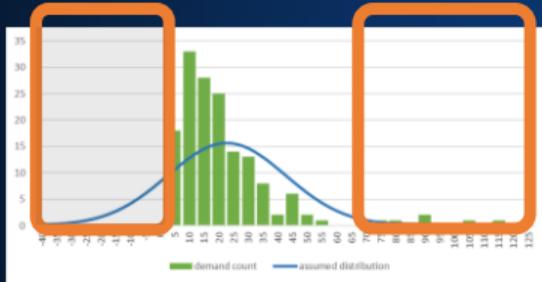
Statistical

vs

Probabilistic

Negative Demand?  
Variability is Biased...

Under-Estimation of High Demand  
Service Level Targets will Never be  
Achieved....



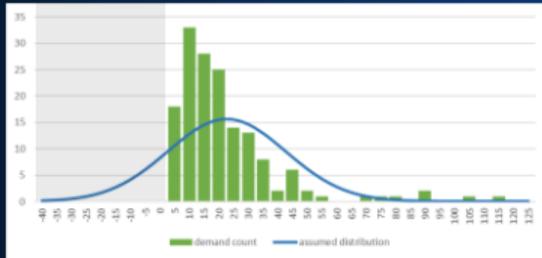
Forecast the Best Average

Forecast the Best Extremes

THE ASSUMED NORMAL DISTRIBUTION IS WRONG

# It Starts With a Forecast

Statistical



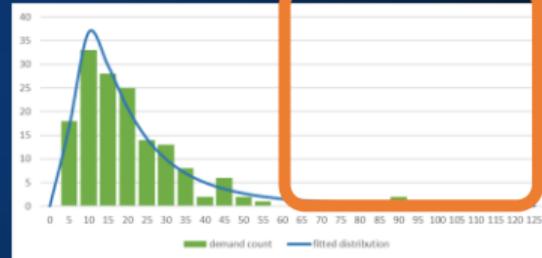
Forecast the Best Average

vs

Probabilistic

Uncommon occurrences

The long tail captures them



Forecast the Best Extremes

RESILIENCY OCCURS WHEN YOU PLAN FOR THE TAIL

## TRADITIONAL SOLUTIONS STOP WORKING

THE OLD WAY	THE NEW WAY
<b>COARSE</b> month, item, country	<b>FINE</b> day, item, location
<b>FIT CURVES</b> requires smooth data	<b>FIT DISTRIBUTIONS</b> any data, including intermittent
<b>TOP DOWN</b> ambiguous split using rules	<b>BOTTOM UP</b> unambiguous sum
<b>PRECISE</b> exact numbers that are always wrong	<b>ACCURATE</b> ranges with distributions that are right

# Probabilistic Forecasting

**Averages are bad, distributions are good**

**Distributions must not be naïve / normal**

**Distributions throughout, also resulting from human input**

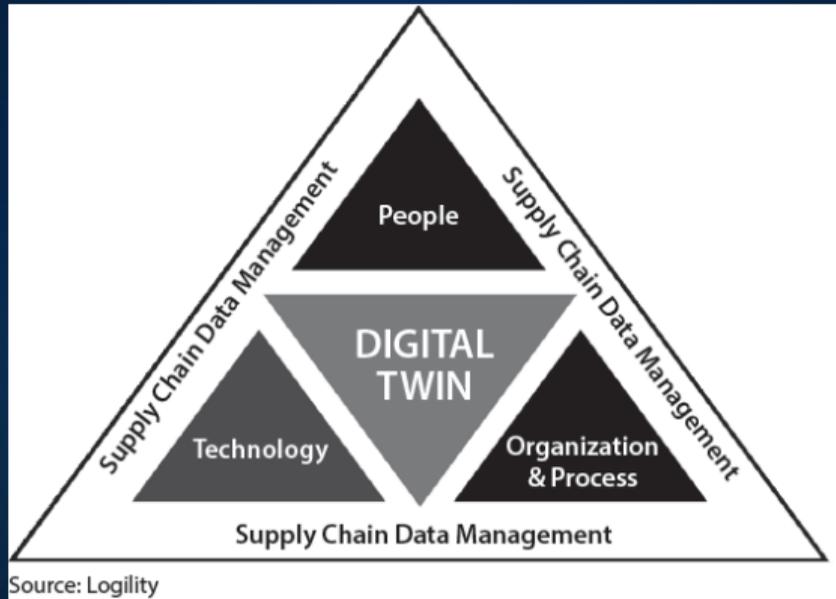
**Accurate tails of the distributions bring resilience**

**It is impossible to be resilient against everything**

# 5 Proven Strategies to Improve Planning During Good Times & Bad

Strategy One:  
STRENGTHEN SUPPLY CHAIN DATA  
MANAGEMENT CAPABILITIES

## The Four Key Dimensions of Transformational Projects



Strategy Two:  
USE DIGITAL DATA TO GAIN VISIBILITY  
AND ACCELERATE DECISION  
MAKING

# DATA

- ▶ Supply chain operations thrive on digital data. However, in many cases, the data dimension has been overlooked and underfunded. According to a recent study, more than 40% of supply chain leaders report that their data is complex to analyse because it is split between multiple reporting systems, is incomplete, or is simply inaccurate.
- ▶ To develop insights and make timely decisions, supply chain data on customers, products, locations, lanes, vendors, suppliers, and orders must be clean, complete, consistent, current, controlled, and convenient.
- ▶ Only the supply chain organisation understands this data, and therefore, the supply chain organisation needs to be responsible for it.



Employee safety

Workplace safety

### Plan better for employees rejoining from COVID hotspots

Identify employees that are travelling to work from high-risk areas like containment zones and red zones. You can then use this data to plan for a more comprehensive screening of these employees and also ensure the safety of the rest of your workforce.

Get started



Business operations

### Don't know which business locations are safe to reopen?

Overlay offices, factories, retail stores, and other business locations on our live COVID maps to see whether they fall in the lesser infected, green and orange zones. This will help you decide which locations are safer to reopen.

Get started



Delivery operations

Supply chain

### Identify distribution points that are safe to deliver goods to

If a distribution network is central to your business operations, then it's imperative to know which retailers, dealers, and distributors are safe to deliver goods to. Mark your distribution outlets on a map and cross-layer them with our COVID data to find this out.

Get started

Chat with us, we're online!

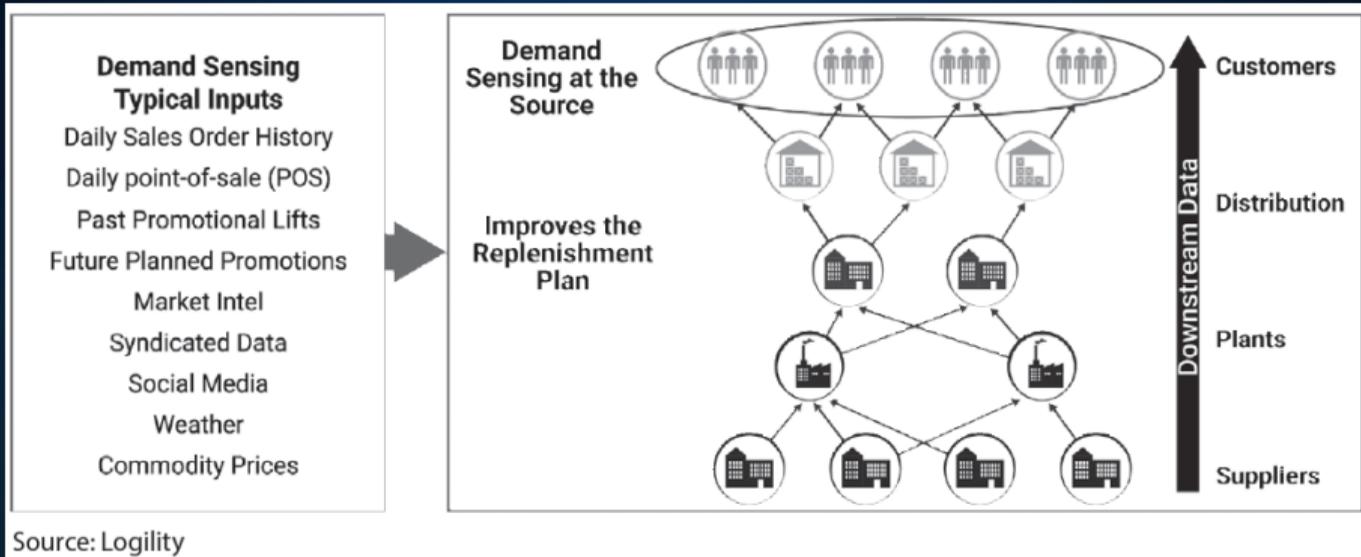
<https://www.mapmyindia.com/corona/>

# Numeric and Graphical Digital Demand Data Dashboard Including a Supply Chain Digital Twin



Strategy Three:  
IMPROVE SHORTER-TERM DEMAND  
PREDICTION ABILITIES

# Demand Sensing Defined

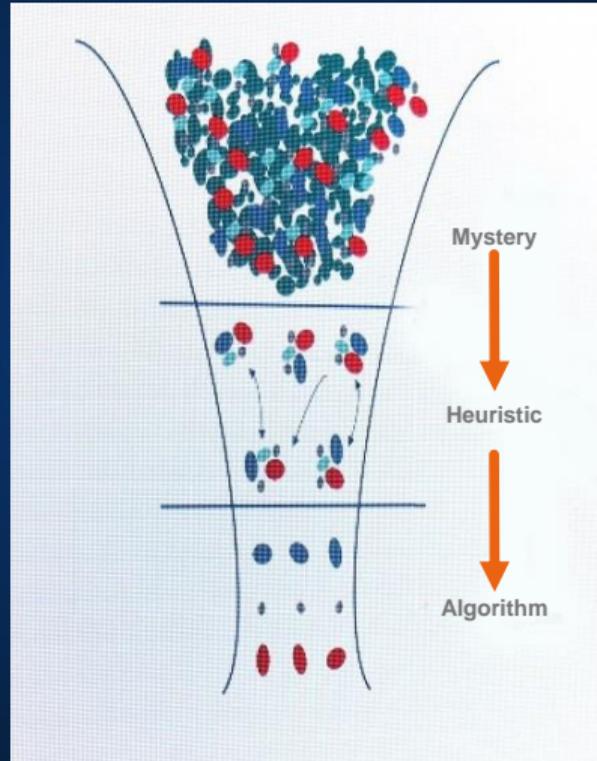


Source: Logility

# Using Big Data to drive supply Chain

- Big Data without analytics is just a massive amount of data.
- **Analytics without big data is simply tools.**
- The availability of **big data and machine intelligence** have made things different
- Unprecedented opportunity of enquiry helped rapid digitization
- The nature of inquiry has changed in the past we collected data to **test predetermined hypothesis**. As machine intelligence get continuously fed by **data hypothesis to be tested are conceived by the machines.**
- The ability of massive experimentation has changed the manner in which it can be conducted and the insights can be gained
- Big Data is unique because of the **volume variety and velocity** of the data and is one of the most significant tech disruption in history..

*Source:*  
*“The Design of  
Business – Why  
Design Thinking  
is the Next  
Competitive  
Advantage” by  
Roger Martin*



# Key factors that influence demand in retail Supply Chains

Demand forecast categories	Influence factors
Products	Quality
	Competitors, substitutes, complements
	Prices
Consumer preferences	Fashion and trends
	Buying behavior
	Brand awareness and perception
External factors	Weather
	Special events
	Seasonality
	Income level, economic outlook
	Local development
	Mega trends (Demographics, technology, climate etc.)
Marketing factors	Promotions
	Advertisement
Retail factors	Local competition
	Shop attractiveness
	Shop assortment and layout
Supply Factors	Available products at point of sale
	Expiring products

## An overview of commonly used forecasting methods

Forecasting Method	Data Points	Challenges
<b>Grassroot Forecasting</b> (Sales force composite)	Customer's intention to buy in the near future, Understanding of and relationship with the customer	Laborious in retail situations and vague results
<b>Market Research</b>	Customer's preferences and insights data	Diverse data required to further improve results, need for identifying trends earlier and quantifying the value of marketing measures
<b>Expert forecast estimation</b>	Domain knowledge, data foundation for decomposed decisions, quantitative analogies	Difficult to test the expert's hypothesis, pure data-based decisions not possible
<b>Time series forecast</b>	Historic sales figures, Influence of different seasons, Understanding of the development of a trend	Requires more recent data, needs to be interrupted when special events occur
<b>Causal demand forecast</b>	Knowledge about the distinct factors influencing demand, Large datasets, Theoretical background, Knowledge of causal relationships, Segmentation strategies	Only a few causal relationships are known with certainty and testing new ones are challenging, requires recent data and relatively expensive to produce forecast

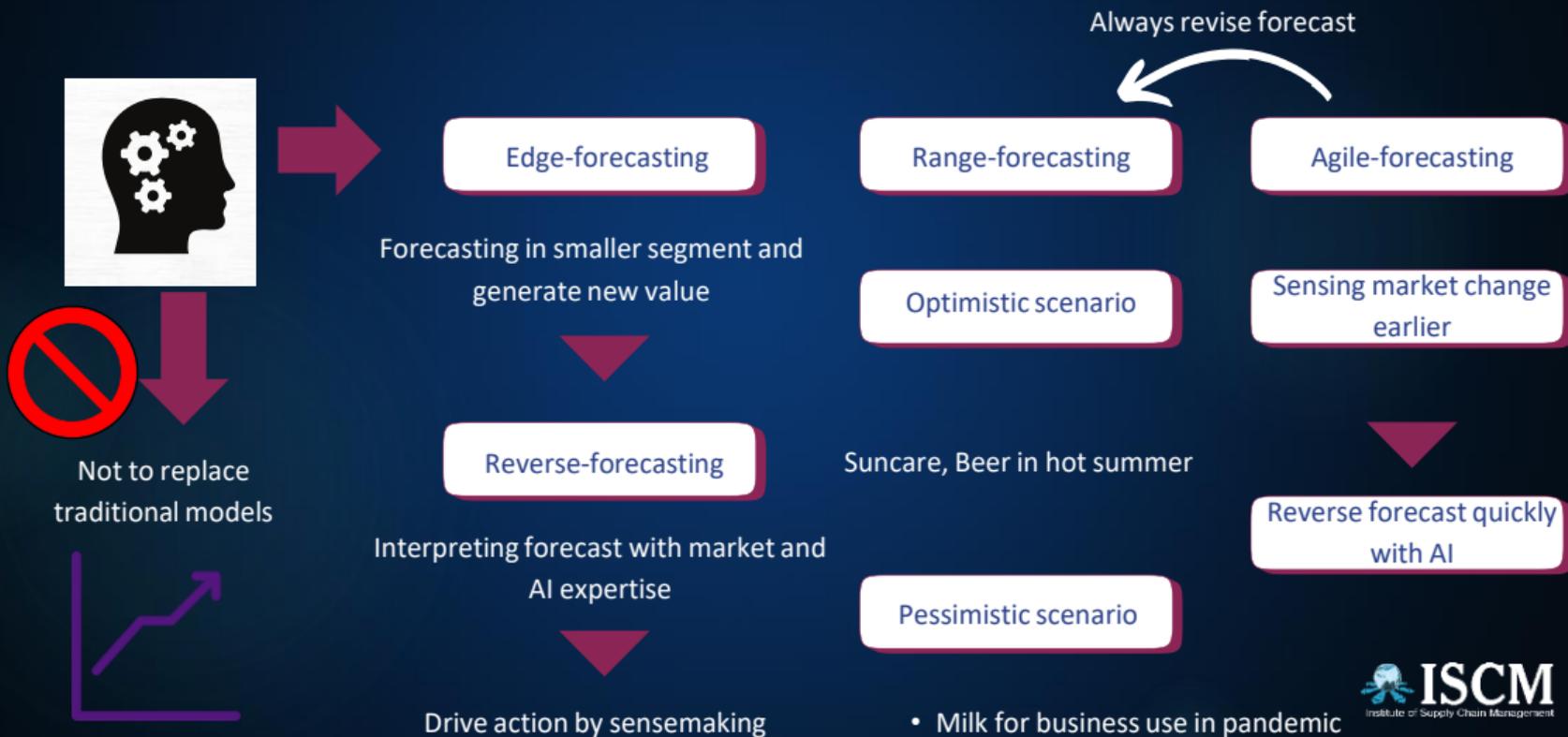
# AA to manage external factors influencing factors

Demand forecast categories	Influence factors	Descriptive (DAA)	Predictive (PDAA)	Prescriptive (PSAA)
External factors	Weather	Categorize weather forecast data	Predict how weather influences demand, integrate categorized weather data into the models	Optimize assortment according to weather
	Special events	Categorize events based on certain criteria	Predict how event type influences local demand	Optimize assortment depending on event type
	Seasonality	Categorize products according to their seasonal demand	Predict the influence of seasonality on demand	Optimize assortment depending on season
	Income level, economic outlook	Categorize economic predictions, understand how experts correlate different indicators of economic development	Predict the influence of economy on demand	Optimize assortment depending on economic factors
	Local development	Discover drivers of demand that arise from local development, understand where customers come from	Predict how much local and regional drivers influence demand	Find interesting new shop locations using location analytics
	Mega trends (Demographics, technology, climate etc.)	Build a knowledge graph of related long term trends and related technologies to make future development more accessible	Not applicable	Simulate influence of trends on customer demand

## AA to manage marketing, retail and supply influencing factors

Demand forecast categories	Influence factors	Descriptive (DAA)	Predictive (PDAA)	Prescriptive (PSAA)
Marketing factors	Promotions	Categorize promotion types	Predict influence of promotions and discounts	Optimize the timing of promotions, prescribe the amount of additional products needed
	Advertisement	Categorize marketing campaigns, analyze social media reaction to campaigns	Predict demand influence of marketing campaigns	Prescribe how many more products shall be stocked
Retail factors	Local competition	Create a network of local competitors, categorize new entrants and departures	Adjust models according to change in the categorization of competitors	Simulate influence of new entrants on demand, find locations to expand
	Shop attractiveness	Rate the attractiveness of retail locations	Integrate shop ratings into model estimations	Calculate optimal time to invest in shop attractiveness
	Shop assortment and layout	Categorize products depending on their location in the shop, discover how much time customers spend in the shops	Change models according to shop assortments, determine influence of product location on demand	Optimize shop layout
Supply Factors	Available products at point of sale	Not applicable	Use prepared data about forecast error to improve models, adjust "short time supplies"	Optimize Supply function based upon cost of product scarcity and excess stock
	Expiring products	Not applicable	Find drivers for wasted products	Not applicable

# 4 DIFFERENT TYPES OF AI FORECASTING



• Milk for business use in pandemic

Strategy Four:  
EVOLVE FROM FRAGMENTED PLANNING TO  
INTEGRATED BUSINESS PLANNING

	SALES	FINANCE	SUPPLY CHAIN
DATA DEFINITION	Pipeline opportunity for future sales: the contract value of sales account teams.	Currency view at a high-level aggregation of a demand hierarchy.	Volume view of market potential at the most granular level of shipping.
PLANNING LEVEL	Customer/location data to enable the modeling of a ship-to-model definition.	Category or brand level forecasting at a currency level.	An item at a shipping location. The modeling is a ship from model.
FOCUS	A focus on customer opportunity and pipeline management.	Controlling costs and managing profitability.	Maximizing customer service through the production of a feasible plan.

**TABLE 1.** Commonalities and Differences Between Sales, Finance and Supply Chain Planning

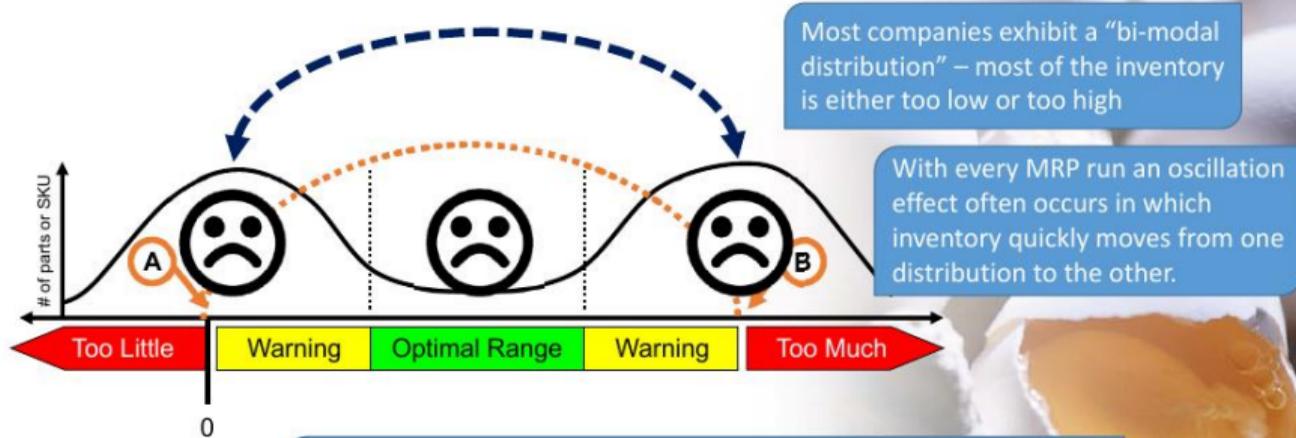
## MATURITY MODEL

	STAGE 1	STAGE 2: SALES DRIVEN	STAGE 3: IBP	STAGE 4: DEMAND DRIVEN	STAGE 5: MARKET DRIVEN
ALIGNMENT	Functional focus.	Functional: A "S" and/or "OP" focus. Lack of alignment between the "S" and the "OP".	Pieces of the organization start to align, but there is a lack of connection of the process to strategy.	Understanding of trade-offs and agreement to the plan based on strategy.	Adapting the business market-to-market with trading partners (demand and supply) through S&P.
GOAL	Functional metrics.	Balance demand and supply.	Most cost-efficient plan.	Maximize opportunity by balancing customer service growth and inventory.	Maximize opportunity and minimize risk balancing growth, customer service, Return on Invested Capital, and inventory.
CAPABILITY	Recognition of the need for an S&OP process is just not sure what to do.	Confusion on what is demand management.	A clear understanding of demand flows and constraints.  Functional plans, but no clear strategy.	Ability to model a feasible plan in different units of measure—dollars, units, equivalent units.  Clear definition of strategy.	What if capabilities Mix modeling Visibility of unit of measure, volume and currency impacts.  Alignment on "playbooks" in the market.
MEASUREMENT	A focus on functional metrics with no clear organizational metrics.	Organizational metrics emerge to tie action to strategy, but there is tension between functional and corporate metrics.	Functional metrics start to shift to reliability and the corporation starts to align cross-functional metrics tied to strategy.	Balance of metric performance, risk mitigation, and opportunity assessment through what-if modeling.	Connection of the balanced scorecard across the organization with a functional focus to the minimization of waste and improvement or reliability.
EXECUTION	The focus is on the urgent. Planning is poorly understood and may not be valued.	Planning capabilities start to emerge but they operate in a silo not connected to execution.	What-if capabilities emerge, but they are not connected to execution.	Playbooks based on what-if analysis with a close connection to execution.	The tactical S&OP plan is closely tied to execution in a closed loop.
REPORTING	Functional reporting in either sales or operations.	Reporting to the CFO or the chief strategy officer.	Reporting through a business unit center of excellence to a senior business leader.	Reporting through a business unit center of excellence to a senior business leader.	Reports to a profit center manager.

TABLE 3. Sales and Operations Maturity Model

Strategy Five:  
OPTIMIZE INVENTORY  
TYPE, LEVELS, AND PLACEMENT

# Conventional Inventory Management Effects

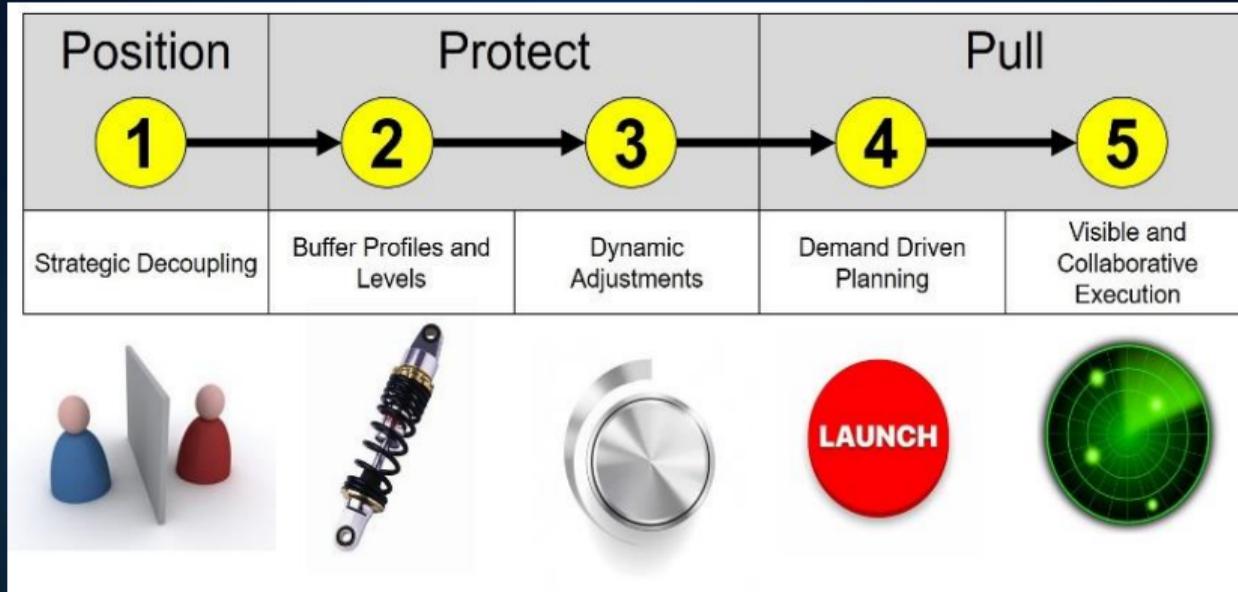


90% of companies report this issue!

DDMRP has five components designed to work together. Figure depicts these five components. The absence of any of these components will dramatically diminish the effectiveness of and results from DDRMP. Below are the five components (Strategic Inventory Positioning, Buffer Profiles and Levels, Dynamic Buffers, Demand Driven Planning, Demand Driven Execution)

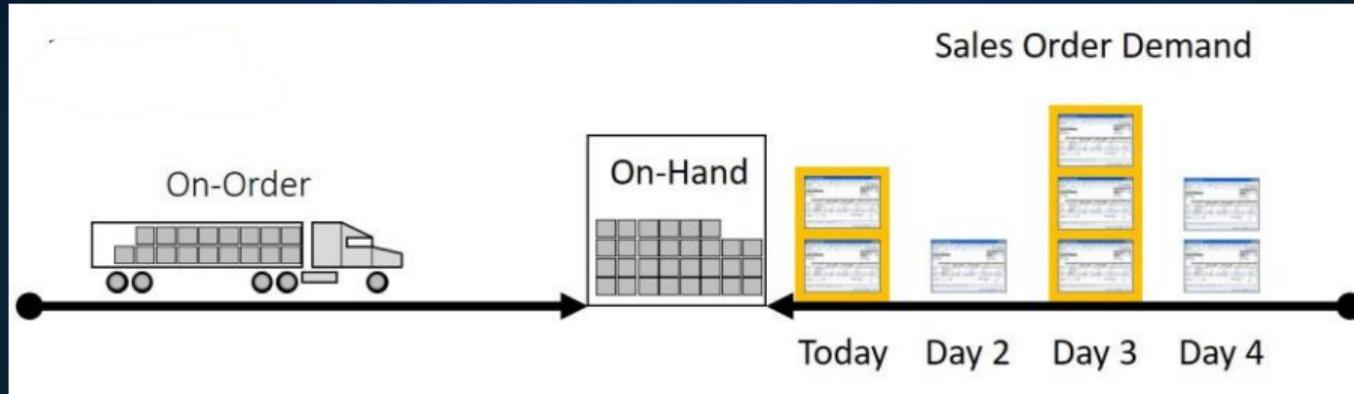


# Innovation #2: The Net Flow Equation

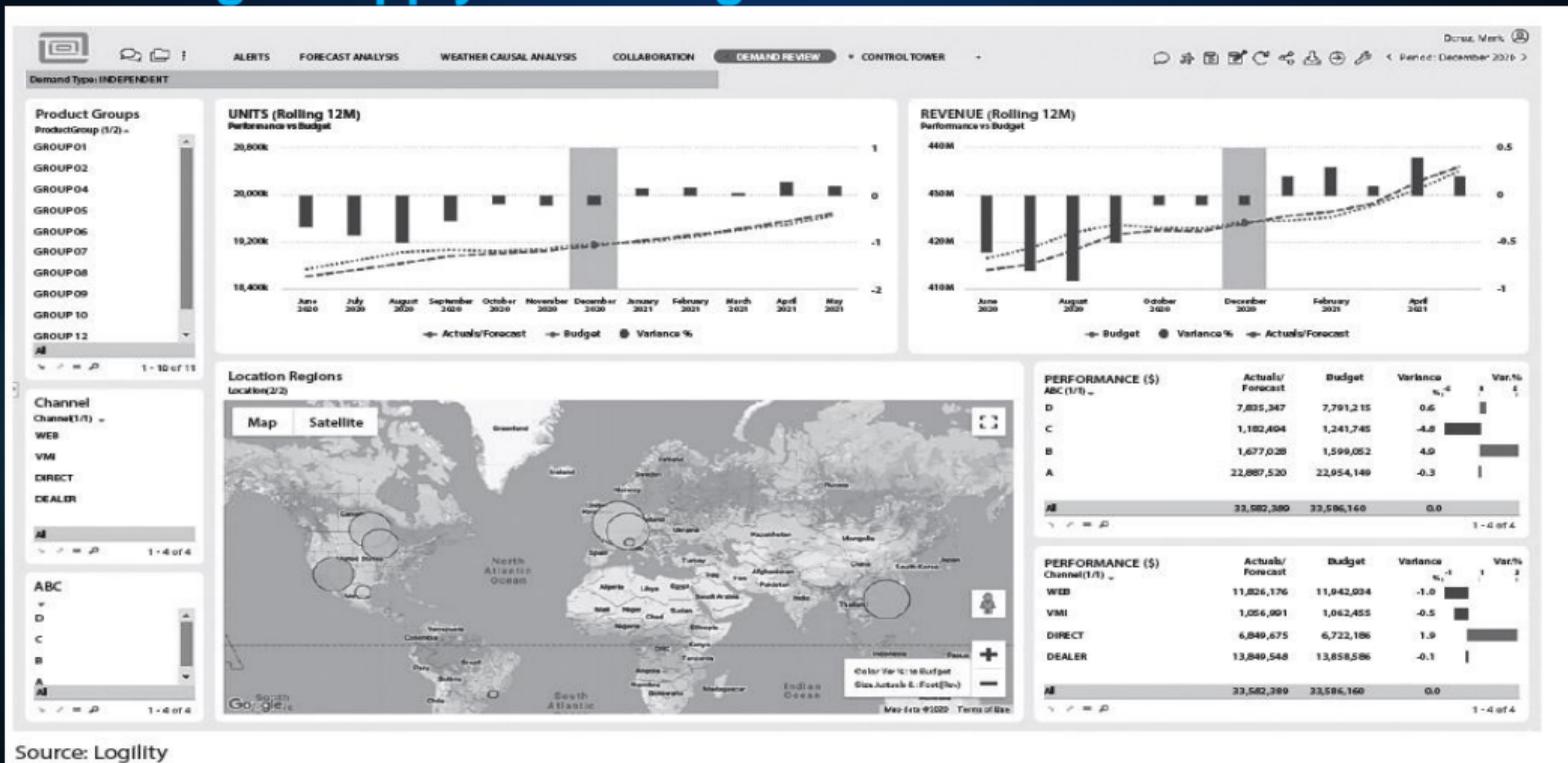


# The Net Flow Equation

- ▶ The net flow equation is simple:
- ▶  $\text{On-Hand} + \text{On-Order} - \text{Qualified Sales Order Demand} = \text{Net Flow Position}.$



# Numeric and Graphical Digital Demand Data Dashboard Including a Supply Chain Digital



Source: Logility

# Managing Lower-Tier Supplier Sustainability

## DIRECT:

- Evaluate first-tier suppliers by using sustainability performance indicators that capture their requirements for lower-tier suppliers\
- Survey suppliers on their environmental, health, safety, and labor practices and on their procurement practices.
- Work with major first-tier suppliers to map the firm's supply network.

## INDIRECT:

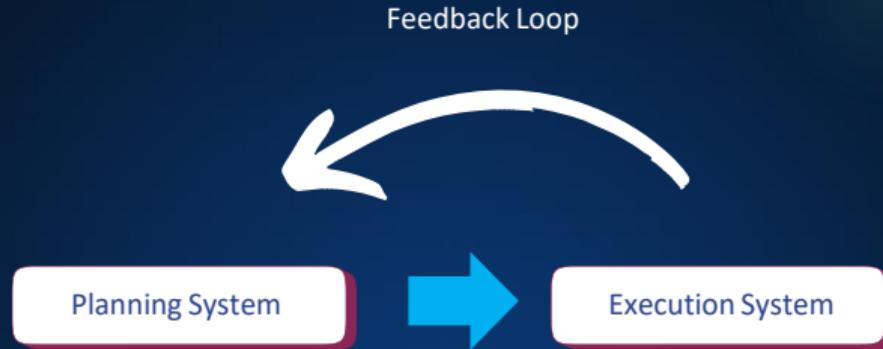
- Provide training and foster peer learning among first-tier suppliers to help them improve their procurement practices with lower-tier suppliers.
- Select high-performing suppliers to pilot new sustainability initiatives.
- Reward suppliers for cascading sustainability requirements to lower-tier suppliers.

## COLLECTIVE:

- Commit to developing and complying with industry wide sustainability standards, and help suppliers become full members of industry organizations.
- Via industry organizations, share resources with competitors and major suppliers to achieve sustainability goals.
- Encourage first- and lower-tier suppliers to take advantage of sustainability training programs offered by industry organizations.

## GLOBAL:

- Work closely with relevant NGOs and international institutions interested in involving supply chain sustainability. Use tools and data that those organizations provide for suppliers (contract and scorecards).
- Recognize suppliers that excel in programs sponsored by NGOs and International institutions.



- The planning system needs to improve to reduce the control variance of the process.
- The execution system needs sufficient agility to absorb fluctuations and adapt to changing business needs
- The feedback loop is the mechanism binds how the plan came together and how the execution happened.

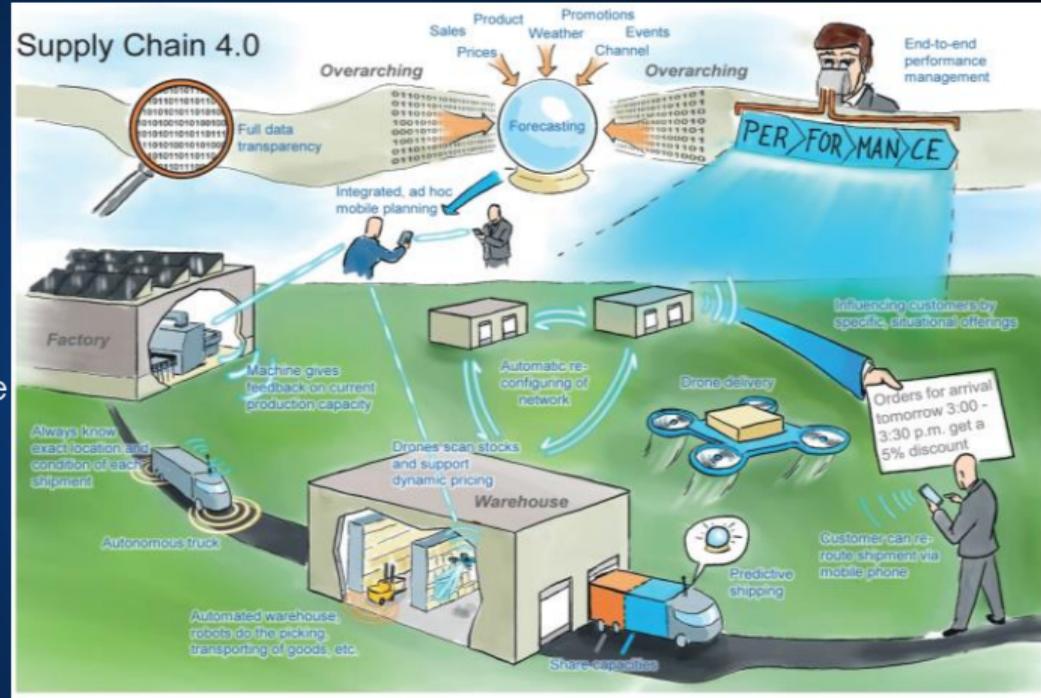
# WHAT IS RESILIENCE?

Resilience is the ability to not only recover quickly from a crisis but to bounce back better-and even thrive.



# Supply chain 4.0- the next generation digital supply chain

- ▶ Place sensor everywhere
- ▶ Create networks everywhere
- ▶ Automate everything
- ▶ Analyse everything to improve performance



# THE ELEMENTS OF TECH INTENSITY

TO ENABLE TRANSFORMATION, COMPANIES MUST CREATE SYNERGY IN THREE KEY AREAS:

## CAPABILITIES

- Organizational culture
- Training and development
- Low-code/ no-code tools
- Agile teams
- Organizational architecture
- Citizen developers
- Product management

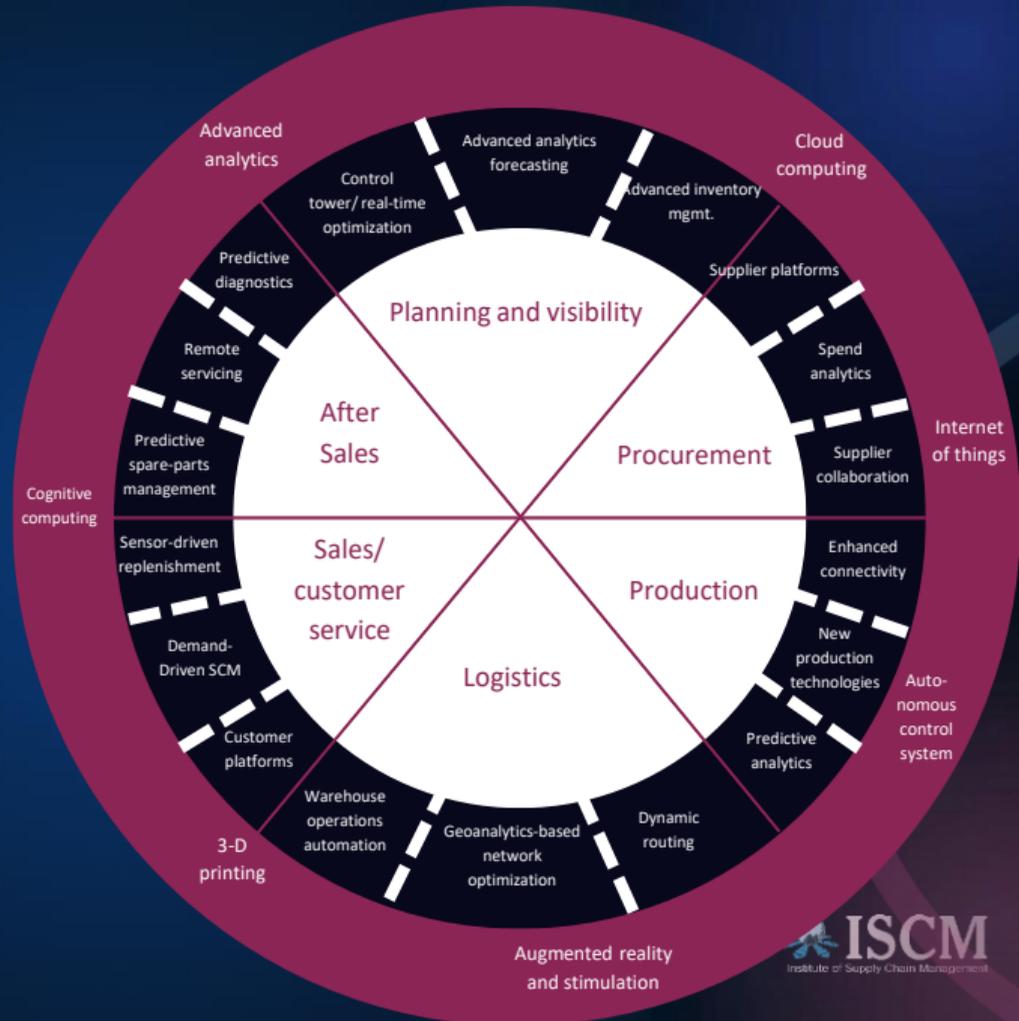
## TECHNOLOGY

- Machine learning
- Deep learning
- DevOps pipelines
- Data encryption
- Real-time analytics

## ARCHITECTURE

- Data platform
- Horizontal integration and normalization
- Data documentation
- API strategy
- Experimentation and risk
- Data governance

# THE LANDSCAPE OF Digital Supply Chain Management

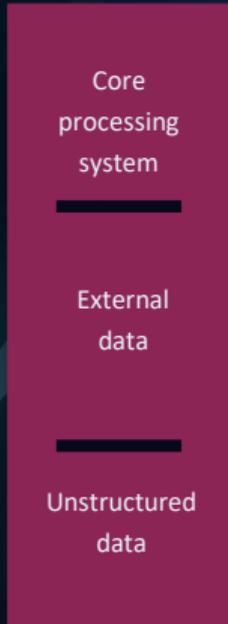


# TRADITIONAL DATA CONSUMPTION VERSUS THE DATA PRODUCT MODEL

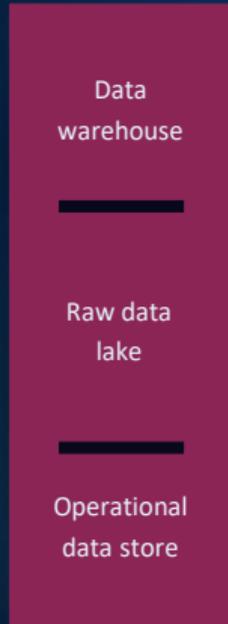
Traditional approach to using data

FLOW OF DATA →

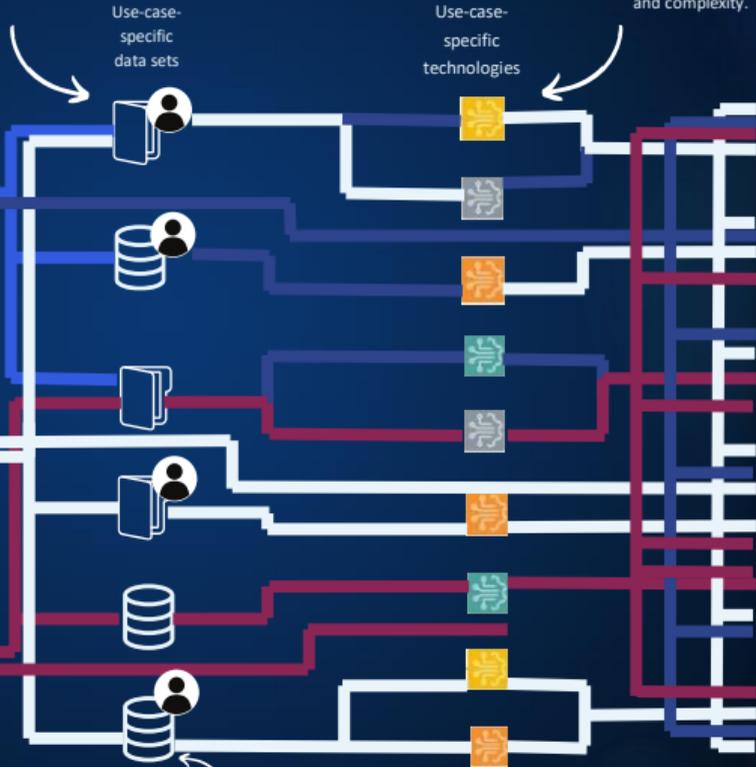
System of record



Data platform

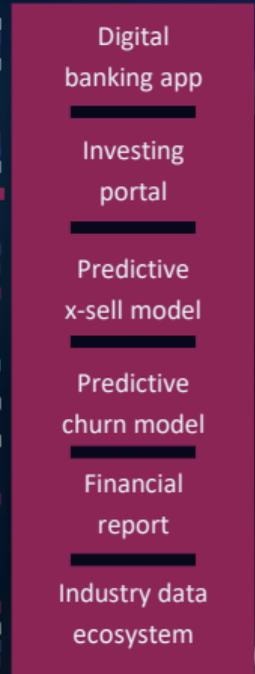


Data pipelines designed for batch and real-time delivery are fragmented and duplicative.



Different technologies are employed for each other use case, adding expense and complexity.

Use cases



Data for each domain, such as the customer, is inefficiently reworked for every use case, and quality, definitions, and formats vary.

## SALES

## FINANCE

## SUPPLY CHAIN

DATA DEFINATION	Pipeline opportunity for future sales: the contract value of sales account teams.	Currency view at a high-level aggregation of a demand hierarchy	Volume view of market potential at the most granular level of shipping.
PLANNING LEVEL	Customer/ location data to enable the modeling of a ship to-model definition.	Category or brand level forecasting at a currency level.	An item at a shipping location. The modeling isa ship from model.
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Commonalities and Differences Between Sales, Finance and Supply Chain Planning.

# Some supply chain glimpses from India

# Rise of other India

- The contours of urban India are changing and moving beyond metros to Tier II to Tier IV cities.
- The birth of these new cities will result in around 500 million Indians will be in cities by 2025.
- 26 tier two cities, 33 tier 3 cities and about 5000 tier 4 cities
- And 6,38000 villages



# Geographical Segmentation of Indian Retail

Tier1	\$205 Bn
Tier2 and 3	\$195 Bn
Rural	\$530 Billion

The total market size is \$930 Billion and is projected to grow to 1035USD Billion

Tier II and III cities and rural areas are emerging to be a key growth catalyst

How do we plan for the transition to harness internal growth.



# ONDC

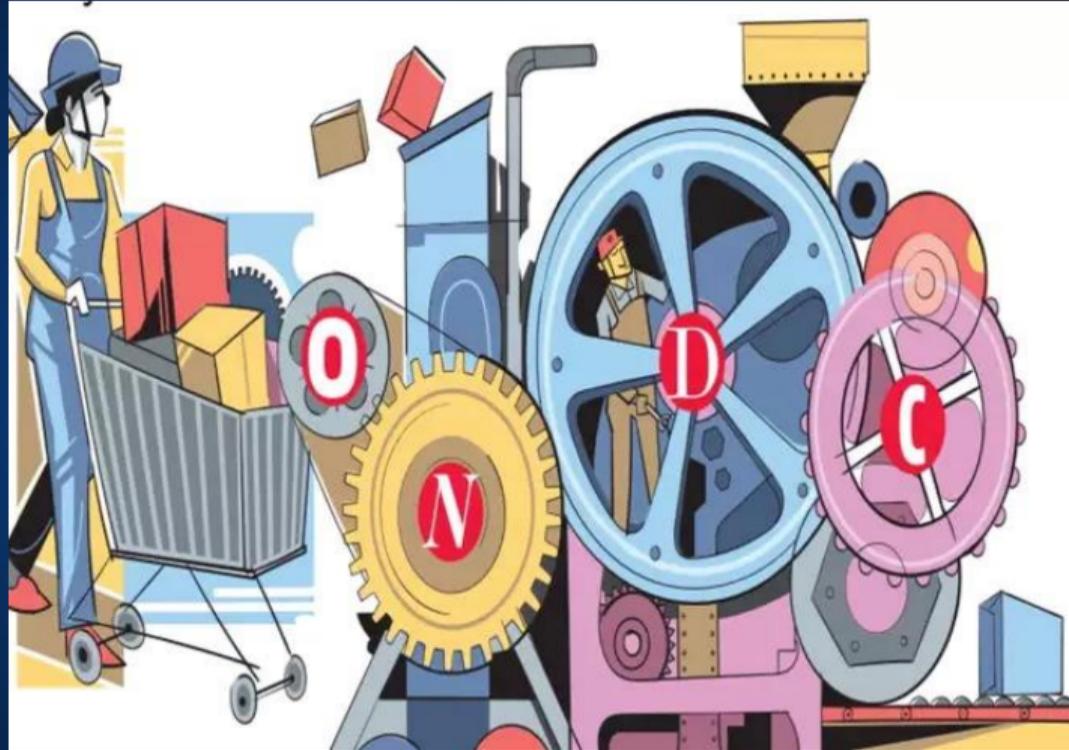
Open network for digital commerce was started to break the stranglehold of e-commerce giants— Amazon, Flipkart, Zomato Swiggy and peers.

Total transactions this year have reached 41.2 million as against the forecasted transactions of 5.63 million.

This is an all-encompassing platform. It helps cheap and easy integration of all the players

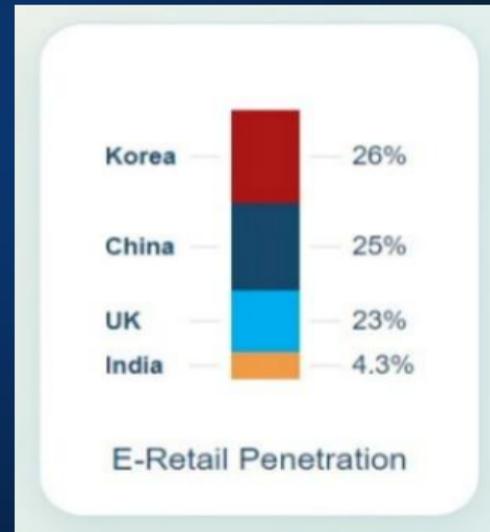
## Cons

1. Currently, the platform is not suited for high-value items.
2. Orders are often underserved
3. Customer experience and grievance redressal are far from the desired
4. Most companies on other platforms are not on these platforms.



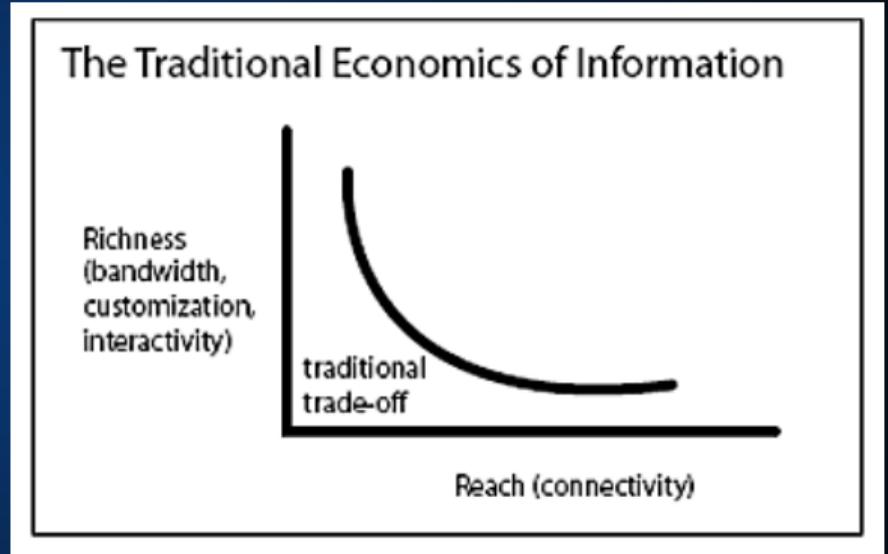
# India's e-commerce landscape

Despite the high internet speeds and widespread smartphone usage, the majority of participants in the e-commerce are unable to reap the benefits of this digital revolution.



# Richness Vs Reach

- ▶ Richness means the quality of information as defined by the user.
- ▶ Bandwidth
- ▶ Customization
- ▶ Interactivity
- ▶ Reliability
- ▶ Security and
- ▶ Currency
- ▶ Reach means the number of people at home or office exchanging information



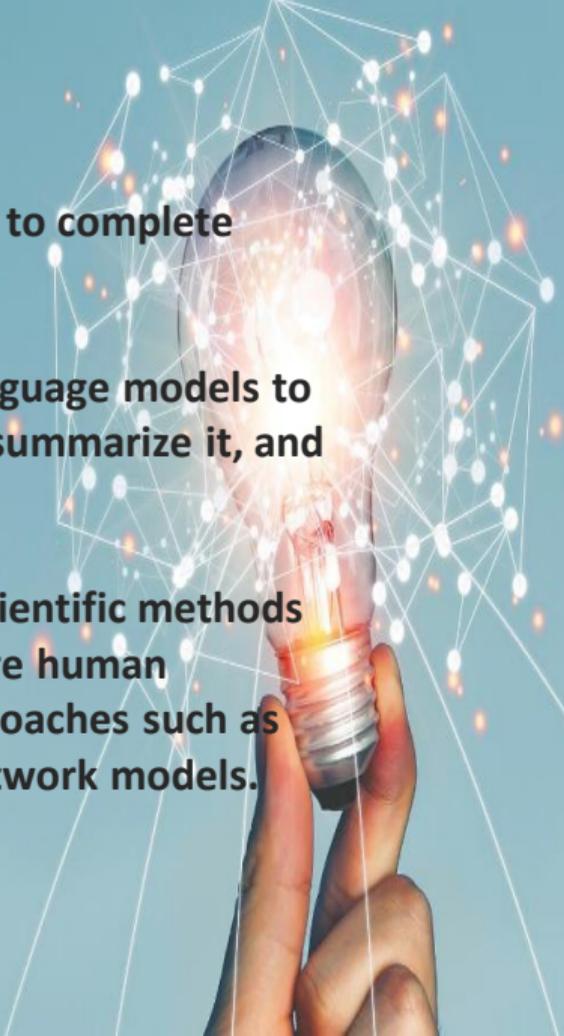
# STRUCTURAL OPTIONS

- Mahindra Sublabh
- Tata Kisan Kendra
- ITC E-Chaupalpal
- Hariyali Kisan Bazar

	Direct distributor	Van Operations	Super stockist - Substockist
How it Works	Appoint direct stockists in the towns where direct reach is planned and serviced through company depot/C&FA	Use current stockists in larger towns to run van operations which cover the smaller markets (small towns and rural Markets)	Instead of servicing small town stockist directly, service through a superstockist . Superstockist buys from company and resells to sub-stockist.
Costs	<ul style="list-style-type: none"> <li>* Standard trade margins</li> <li>* Credit (typically higher than the larger towns)</li> <li>* Freight (typically higher since remote locations)</li> </ul>	<ul style="list-style-type: none"> <li>* Standard trade margins</li> <li>* Van subsidies (to cover the higher cost of distributor coverage)</li> </ul>	<ul style="list-style-type: none"> <li>* Additional trade margins to super stockist.</li> <li>* Freight reimbursement (if additional margins not enough to cover for expenses)</li> </ul>
Pros	Trade loads (margin structure) remains unchanged therefore controls are better.	Does not require substantial change in terms of the distribution system.	<ul style="list-style-type: none"> <li>* Company exposure limited to fewer large parties (credit)</li> <li>* High service levels to substockist (more frequent despatches, credit etc.)</li> <li>* Can employ lower cost salesforce through superstockists</li> </ul>



- Traditional AI
- Generative AI and
- Operation research



**Traditional AI analyses data to complete specific tasks.**

**Generative AI uses large language models to take something in context, summarize it, and generate new content.**

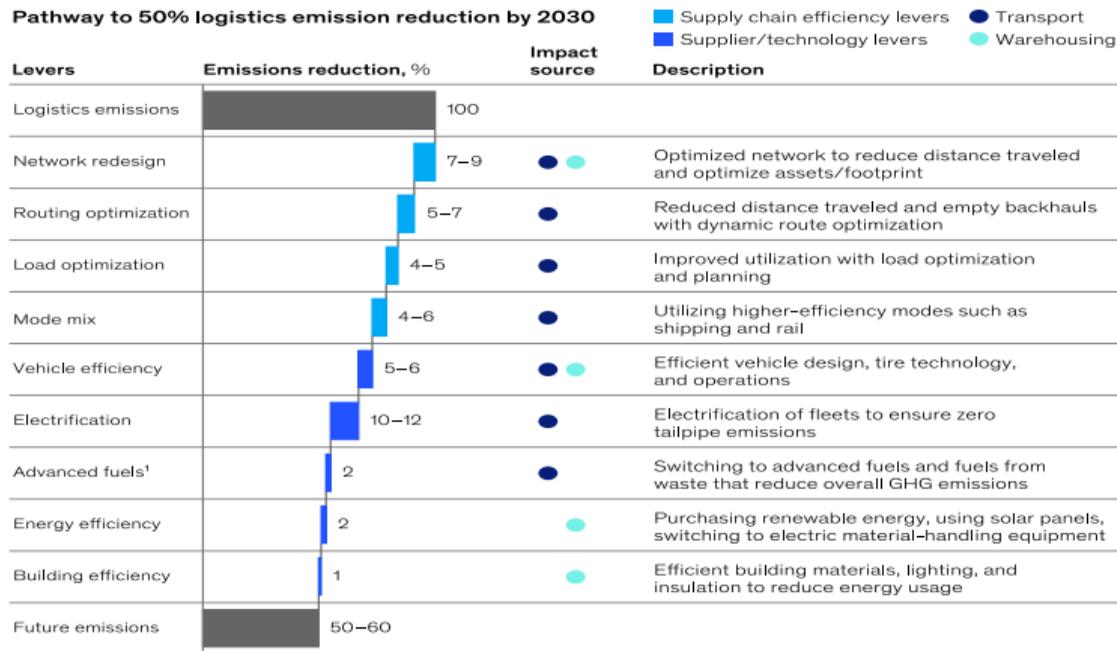
**Operations research uses scientific methods to study systems that require human decision-making, using approaches such as linear programming and network models.**

AI technologies are poised to solve many challenges faced in logistics. These include:

- Fragmented supply chains and the need to connect networks to optimize and drive better outcomes.
- Market volatility, particularly changes in pricing and disruptions in services.
- Safety concerns, including those related to driver safety, and digital fraud.
- The impact that trucking and freight have on climate change.

## Companies can achieve an average 40 to 50 percent reduction in logistics emissions using solutions available today.

### Pathway to 50% logistics emission reduction by 2030



<sup>1</sup>Estimate based on existing advanced fuel technology. With emerging technologies, a significant portion of the future emissions estimate of 50-60% could be further reduced.

Source: McKinsey findings from previous client engagements

**THANK YOU**