

# Navigating Through Turbulent Times: Suggestions for the Automotive Industry

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## ABSTRACT

The Auto Industry is obstructed by numerous patterns like electric and shared driving, autonomous, electric, resulting in unprecedented innovation and transformation of business model. In the midst of this change, the COVID19 is putting much more stress on the Automotive industry. In this research effort has been made to deal with the disruption, the work is done on strategic plans for overcoming turbulent times and making supply chain more resilient, responsive and efficient. The scenario is driven by the combination of resolutions. To navigate with minimum loss this year we need to minimize cost and improve efficiency in the possible areas. The motive of this research is to find out the combinations of resolutions to overcome turbulent times in automotive industry. In this study, combinations of steps are suggested which can be adopted by an automotive firm for navigating through tough times. PESTLE analysis for automotive industry is done for identifying the threats and opportunities in the industry, Standard MRP process and Actual MRP process of one of the auto ancillary plant is compared and gaps in the actual process are identified, benefits of automation of Purchase Order processing is explained with steps which can be implemented and Finally, Factor analysis is done for identifying major factors which can be considered for efficient work from home employee. For this Primary data is collected from 72 respondents (employees working from home) and respondents were from more than 15 companies. 4 Major components describing the maximum variance (around 70%) were identified out of 8 variables – Positivity for work in hand, Communication skills, Workplace Agility, Researcher of market trends, MS Office knowledge, Analytical skills, Knowledge of financial terms, Time management skills. SPSS software is used for the analysis of the data obtained from the respondents.

## Keywords

Navigating, Turbulent Times, Automotive, PESTLE, MRP process, Automation, Work from Home

## Introduction

As we all know that the Auto Industry is obstructed by numerous patterns like electric and shared driving, autonomous, electric, resulting in unprecedented innovation and transformation of business model. In the midst of this change, the COVID19 is putting much more stress on the Automotive industry. Now, industry is also encountering a demand shock with unknown timeline to recover. With less space to reduce fixed expenses (costs), a couple of OEMs have low liquidity and it is very tough for them to navigate through a long period of turbulent times of missing revenues. Some players are at risk of leaving business. Also, changes in employees and customer/consumer behaviour, like increasingly working from home, online shopping expectations, social distancing, different mobility

preferences, caseless payments, reluctant to deal in public places might remain after the crisis.

In order to make supply chain more resilient, efficient and responsive, problems should be identified. For example, if there is revenue drop by 50% this year as compared to last year for any automotive company. Say last year revenue was 250 crores and this year it is 125 crores, assuming profit to be 5% last year (i.e. 5% of 250 crores = 12.5 crores), so to keep profit in same line this year also, we need to have profit percentage around 10% this year (i.e. 12.5 = 10% of 125 crores). So, given the scenario, to navigate with minimum loss this year we need to minimize cost and improve the efficiency in possible areas. Various areas that we can work on is downsizing or layoff or cost cutting by allotting work from home, Automation of purchase order processing to save time and unnecessary race run, paper, excel and spreadsheet use etc., gaps in the MRP

(Materials required planning) can be identified so that it can be improved, process improvement (scheduling suppliers) etc. can be done.

The aim of this study is to find out combinations of resolutions which can be followed by automotive industry to navigate through this difficult time. A few areas that can be worked on are – PESTLE analysis of automotive industry for identifying threats and opportunities, Study of actual MRP process in existing system as compared to Standard MRP system so that the gaps can be identified in the existing Actual MRP system, Automation of Purchase order processing and identifying the work from home efficiency of individual and who can work from home efficiently because there are many intangible savings like reducing expenses on infrastructure, electricity, canteen, transportation, fuel allowances to the organizations and on the other hand lots of time can be saved like travelling time, meeting joining time etc.

PESTLE analysis gives wide perspective of the overall environment from a wide range of points than one needs to check and monitor while considering on a specific thought/plan. This idea is utilized as a device by organizations to follow the environment they're working in or when they are intending to launch another item/service/product and so on. It is an essential instrument for understanding business sector development or decline, business position, potential and heading for tasks.

MRP assists companies to keep up low stock levels (inventory). It is utilized to design and plan manufacturing, buying and delivering. "Manufacturing companies, whatever their items or products, face the similar daily practical issues - that customers need items to be accessible in a shorter time than it takes to make them. This implies that some degree of planning is required. In any case, manufacturing organizations hoping to decrease production costs may find the best chance of cost savings by distinguishing gaps all the while and dealing with it. Organizations need to control the types and amounts of materials they buy, plan which items are to be produced and in what amounts and guarantee that they can meet current and future customer demand, all at the least conceivable cost. Settling on an awful choice in any of these territories will make the organization lose cash.

MRP is a tool to manage these issues. It gives answers to many questions like: What things are required? What number of items are required? When are they required? MRP can be applied both to items that are bought from outside providers and to sub-assemblies, manufactured internally, that are parts of more complex items.

Numerous organisations are as yet stuck in using Excel spreadsheets and email for routine cycle. Without Automation – they are investing part of energy and time in paper work, don't have the opportunity to think greater picture. Procurement is a cycle which incorporate all the means a business requires to get the products and services that it needs, (for example, Identifying the most Vendors/merchants, agreeing with suppliers, requesting, paying, accepting goods and services, archiving etc.). So, Automation of procurement process will streamline and accelerate everyday workflows.

The purchase order is a common workflow that routes from an internal employee to his/her manager to authorize a purchase, often additional approval is needed on a conditional basis. PO (Purchase Order) automation is the way toward using centralized software to make a purchase order process that automatically sends a buy order to the appropriate staff for endorsement, at that point once affirmed, consequently sends the PO report to the vendor. It replaces the requirement for conventional paper purchase orders and streamlines the process.

The work-from-home employment force just got a major push from the current worldwide Covid pandemic. However, even before COVID-19 turned into a factor, increasing no. of individuals have been bidding goodbye to their difficult commute to work. The ongoing health emergency is additionally forcing organisations to re-look at the HR measures. Guaranteeing workforce productivity while working distantly is a worry territory. In this study, attempt has been made to distinguishing the significant components out of 8 factors (Positivity for work in hand, Communication skills, Workplace Agility, Researcher of market trends, MS Office knowledge, Analytical skills, Knowledge of financial terms, Time management skills) that are affecting work from home productivity/efficiency (workforce productivity) using Factor analysis. SPSS software is used for the analysis of the data

obtained from the respondents. In this study I will represent a small review of literature which is then according to the research methodology and the findings followed by suggesting for future research.

### Literature Review

According to research study title "Sustainability in supply chain Management: Suggestions for the automotive industry", a new supply chain technique & Strategy answer for the North American auto industry proposed. This article intended to assess the troubles of supply chain management & to propose a triple-C (cease-control-join) answer for the North American automobile industry's supply chain management. The authors applied administration hypotheses, assembled information from managers at various levels of the auto business' supply chain management, and developed a novel hypothetical model of sustainability in supply chain management for the vehicle business (auto industry). It is fought that moving to negligible exertion countries – the current supply chain strategy – isn't just unsustainable yet in addition irresponsible for the automobile business and society. A triple-C (cease-control-consolidate) fix is proposed for the auto industry's supply chain management. The proposed triple-C framework will set aside the car business cash in R&D adventure, lessen quality cost and stock waste, help the business go through the unstable economy, and achieve doable new development. With comfortable associations and strong support from suppliers, the business can accelerate innovation headway, present new gas efficiency models rapidly, and become less dependent on gas cost. Finally, the triple-C procedure will help the business keep occupations and jobs and create new openings in the USA. These exercises lead to public help and reestablished corporate image. (Yu Xia and Thomas Li-Ping Tang)

Anja Schulze, John Paul MacDuffie and Florian A. Taube in their assessment study named "Introduction: knowledge generation and innovation diffusion in the global automotive industry-change and stability during turbulent occasions sets up the setting inside which car industry adjust to aggravation achieved by globalization, new authoritative rules, and

advances in devices, correspondence, and drive train advances. While exploring change, the papers in the special segment also report on stability, for instance in the central role of Original Equipment Manufacturers in system integration and their resulting predominance over product engineering and supply chain dynamics. We apply the point of convergence of progress and security to two phases of the headway lifecycle: (I) Knowledge generation; and (ii) the dispersion of advancements. The papers, facilitated along these measurements, help us with perceiving how and why auto firms are changing their techniques for improving, yet furthermore why past instances of imaginative direct persevere. We close with a demeanor toward future investigation focuses to supplement this special section. (Anja Schulze, John Paul MacDuffie and Florian A. Taube)

Christina Galitsky and Ernst Worrell in their research study title "Energy Efficiency Improvement and Cost Saving Opportunities for the Vehicle Assembly Industry" presented a summary the engine vehicle assembly cycle and energy use. This is trailed by a conversation of energy effectiveness openings accessible for assembly plants. Where accessible, we give explicit essential energy reserve funds to every energy productivity measure dependent on case studies, just as references to specialized writing. On the off chance that accessible, we have recorded expenses and regular compensation periods. We incorporate encounters of assembly plants worldwide with energy effectiveness estimates checked on in the report. Our discoveries recommend that although most engine vehicle organizations in the U.S. have energy management teams or projects, there are still opportunities available at individual plants to reduce energy utilization cost viably. Further exploration on the financial aspects of the measures for individual assembly plants, as a feature of an energy management program, is expected to evaluate the likely effect of selected technologies at these plants. (Christina Galitsky and Ernst Worrell)

Glenn Parry and Jens Roehrich in their research title "Towards the strategic outsourcing of core competencies in the automotive industry: Threat or opportunity?" explained that Confronted with

more limited product lifecycles and expanded cost of capital, organizations can at this point don't bear the cost of the capital cost for new facilities which may become underutilized as processes improve over the first few years of operation. Outsourcing production capacity can eliminate this vulnerability. Nonetheless, in the fastmoving automotive organizations, confronted with an inexorably demanding customer, need to send the resources and expertise of the best in class provider. To accomplish this they have additionally decreased their capacities to a small bunch of core activities. Reevaluating core activities can achieve benefits under particular conditions, yet in addition have the danger that organizations may become 'empty', without a core deliverable. Inside the following couple of years, organizations in the automotive sector will further outsource activities to let free up investment capital. The patterns and zones of reevaluating have been investigated and a controlling system has been developed for practitioners. (Glenn Parry and Jens Roehrich).

Nicholas Bloom, James Liang, John Roberts, Zhichun Jenny Ying in their research title "DOES WORKING FROM HOME WORK? EVIDENCE FROM A CHINESE EXPERIMENT" explained that A rising portion of employess presently consistently take part in working from home (WFH), yet there are concerns this can lead to "shrinking from home." We report the results of a WFH experiment at Ctrip, a 16,000-worker, NASDAQ-recorded Chinese travel agency. Call centre representatives who volunteered to WFH were arbitrarily assigned either to work from home or in the workplace for 9 months. Home working prompted a 13% performance increase, of which 9% was from working more minutes per move (fewer breaks and sick days) and 4% from more calls per minute (attributed to a quieter and more convenient working environment). Home workers also revealed improved work satisfaction, and their attrition rate halved, however their promotion rate conditional on performance fell. Because of the success of the experiment, Ctrip rolled out the choice to WFH to the entire firm and permitted the experimental employees to reselect between the home and office. Interestingly, over half of them exchanged, which prompted the additions from WFH nearly doubling to 22%. This highlights the advantages

of learning and determination impacts while embracing present day the board rehearses like WFH. (Stanford Research)

## Research Methodology & Experimentation

### 3.1 "Research Objectives":

- To study how to deal with the disruption in automotive industries by developing combination of resolutions
- PESTLE analysis of Automotive industry for identifying opportunities and threat in the industry
- To navigate with minimum loss during this year (COVID 19 pressure also) by reducing cost and improving efficiency in possible areas
- Identifying methods to make supply chain more resilient, responsive and efficient

### 3.2 "Research Questions"

- What are Opportunities and Threat in Automotive industry?
- What are the key components that can be considered for work from home effectiveness?
- Does there is gap between actual MRP (Materials Requirement planning) process than standard MRP process? (for understanding problem with purchasing team). If so, what are those gaps?
- How automation can be done for Purchase order to avoid waste of time and money occurring due to multiple follow ups in traditional purchase order steps?

### 3.3 "Methodology"

This report deals with both the qualitative as well as quantitative data. Quantitative data has been collected from survey and Qualitative data has been collected from journals, articles, books and discussing with industry professionals. For work from home productivity survey (identifying key components) google forms were rotated on open platform in which participants from 15 leading companies participated, in which total 71 employees responded (77 % male and 23 % female)

### 3.4 "Research Design"



In this research effort has been made to deal with the disruption, the work is done on strategic plans for overcoming turbulent times and making supply chain more resilient, responsive and efficient. The scenario is driven by the combination of resolutions. This report will help in identifying the areas, parameters and suggestions which we can consider for increasing efficiency by reducing unnecessary time and costs.

#### **A. PESTLE Analysis: Automotive industry**

PESTLE analysis of Automotive industry is done, where qualitative data has been collected from various journals, articles, books & discussing with a few industry leaders. This is done firstly to understand the opportunities and threat in Automotive industry.

#### **B. Actual MRP process Vs Standard MRP process:**

After PESTLE Analysis, I targeted the Purchasing and Procurement department of a leading Auto-Ancillary company, so that I can identify the existing gap in the MRP process. I worked closer to the some of the Industry leader and identified gaps in the actual MRP process. With the help of them, I was able to design flow of actual MRP process of one of the plants in west India and compared it with the Standard process. After comparing, I was able to identify the probable gaps in the process, which can be bridged.

#### **C. Automation of Purchase order processing:**

Many organisations are still stuck in using Excel spreadsheets & email for routine process. Without Automation – they are spending lot of time in paperwork, don't have time to think bigger picture.

Procurement process is a process which include all the steps a business takes to obtain the goods & services that it needs (such as Identifying the most appropriate vendors, reaching agreement with suppliers, ordering, paying, receiving goods & services, documenting etc.). So, Automation of procurement process will optimize & speed up everyday workflows.

Purchase Order (PO) processing is one of the areas identified which must be automated because the purchase order is a common workflow that routes from an internal employee to his/her manager to authorize a purchase, often additional

approval is needed on a conditional basis. It replaces the need for traditional paper purchase orders and streamlines the process.

#### **D. Survey Method & Factor Analysis (for work from home and skills)**

Primary research is done to study what are the key components (out of 8 variables) which can be considered for affective and productive work from home. Samples are taken through survey method and using Factor analysis, 4 major components were identified out of 8 variables – Positivity for work in hand, Communication skills, Workplace Agility, Researcher of market trends, MS Office knowledge, Analytical skills, Knowledge of financial terms, Time management skills. SPSS software is used for the analysis of the data obtained from the respondents.

#### **A. The study population:**

The “target populations” are employees working from home and onsite

#### **B. “Sampling Techniques and sample Size”:**

##### **“Sample Profile”:**

Sample is collected from the population through survey method.

##### **Sample Size:**

This research includes Employees between the ages of 18 and 60 who are working from home and onsite

“Research Area” – PAN India

“Age Group” - 18-60

“Income Group” – All income groups

“Employees” - All profiles

“Sample size”- 71

### **3.6 Analysis of Data**

Data are obtained from the questionnaire and their analysis are performed using SPSS Software. Additional mathematical methods can be often used to accomplish accurate reductions depending on the requirement and scales uses.

### **Findings & Suggestions:**

#### **A. PESTLE Analysis: Automotive industry**

- It gives bird eye perspective in all environment from various points than one needs to check and monitor while examining on a certain thought/plan.

- This idea is utilized as a device by organizations to track the climate they're working in or when they are planning to launch a new product/service etc.

- It is an essential tool for understanding business sector development or decline, business position, potential and direction for operations.

## P-POLITICAL

Issue	Impact on Business
POLITICAL	
<ul style="list-style-type: none"> <li>• Politically enforced measures to contain the virus, such as implementing curfews, closing factories, offices, dealerships etc (<b>threat</b>)</li> <li>• Migration to BS VI norms by Apr'20 and government policy on electric vehicles (<b>threat</b>)</li> <li>• 100 percent FDI allowed under automatic route for auto sector component (<b>opportunity</b>)</li> <li>• Under new GST regime, GST on EV is reduced from 12% rate to 5% &amp; providing special privileges such as removal of tolls on expressway and providing priority parking spots (<b>opportunity</b>)</li> <li>• Government automotive mission plan (AMP) 2016-2026 (<b>opportunity</b>)</li> </ul>	<ul style="list-style-type: none"> <li>• Lead OEMs to shut down their production. This is enhanced by the need to secure liquidity and reduce overproduction due to the decrease in sales.</li> <li>• It is estimated that auto &amp; auto parts industry in India will have to invest over USD 10 billion to be able to manufacture BS-VI compliant cars over the next 3 yrs.</li> <li>• Healthy growth over last few years and India is emerging as global hub for sourcing auto components.</li> <li>• It will reduce the gap between EVs and IC engine vehicles, the tax benefit will help create an ecosystem that will encourage faster mass adoption of EVs in our society</li> <li>• The growing presence of global automobile Original Equipment Manufacturers (OEMs) in the Indian manufacturing landscape has significantly increased the localization of their components in the country.</li> </ul>

## E-ECONOMICAL

Issue	Impact on Business
ECONOMIC	
<ul style="list-style-type: none"> <li>• Weak consumer sentiments, both urban &amp; rural area witness Demand distress (<b>threat</b>)</li> <li>• NBFC crisis (<b>threat</b>)</li> <li>• Increased acquisition cost (<b>threat</b>)</li> <li>• Lack of clear migration policy towards EV (<b>threat</b>)</li> <li>• Make in India (<b>opportunity</b>)</li> </ul>	<ul style="list-style-type: none"> <li>• A significant decrease in the demand, especially in rural areas, for new automobiles is responsible for the degrowth of the auto industry. This factor, as per the report, is another reason behind the auto slowdown and has a weightage of 20 percent.</li> <li>• NBFCs are the major financiers of customers who do not approach banks, the liquidity crisis of the NBFC sector has affected auto sales to a large extent.</li> <li>• Higher insurance costs coupled with the introduction of the GST have increased acquisition costs by 2-5 percent.</li> <li>• Creates confusion among buyer, contributing towards a reduction in auto sales.</li> <li>• India offers low cost by 10-25% relative to that offered by Europe and Latin America. Hence, India is cost competitive as compared to other manufacturing countries</li> </ul>

**S-SOCIAL/CULTURE**

Issue	Impact on Business
<b>SOCIAL/CULTURE</b>	
<ul style="list-style-type: none"> <li>Increasing demand for vehicle-sharing and ride-hailing programs (<b>threat</b>)</li> <li>The pre-owned car market in India has been expanding considerably in the past few years (<b>threat</b>)</li> <li>Increasing projected demand of electric vehicle (<b>opportunity</b>)</li> <li>Online car sales may gain traction post COVID-19, auto retail needs to be virtual (<b>opportunity</b>)</li> </ul>	<ul style="list-style-type: none"> <li>Ride-hailing programs improve people's access to convenient transportation, corresponding to a potential decline in target customers' likelihood of purchasing new automobiles</li> <li>The pre-owned car market in India has been expanding considerably in the past few years and buying and selling of second-hand cars exceeded the sale of new cars in 2018-19.</li> <li>Suppliers will significantly be affected as automobile manufacturers switch to EV. Only few suppliers who take appropriate initiatives will survive &amp; succeed. Many new supply chain partnerships need to be created</li> <li>Automobile retail needs to become virtual, lean and flexible to align to the sudden accelerated change in consumer behaviour. This is likely to reverse the trend of declining car sales. Consistent with this consumer sentiment, combined with better online experiences, we anticipate an uptick in online car sales.</li> </ul>

**T-TECHNOLOGICAL**

Issue	Impact on Business
<b>TECHNOLOGY</b>	
<ul style="list-style-type: none"> <li>Rising fuel efficiency in automobile (<b>opportunity</b>)</li> <li>Increasing development of electric vehicles (<b>opportunity</b>)</li> <li>Covid19 drive enhancement of automation, digitalisation, IOT and artificial intelligence (AI) (<b>opportunity</b>)</li> <li>Redesigned Shop-floor (<b>opportunity</b>)</li> </ul>	<ul style="list-style-type: none"> <li>This prompt the companies to develop advanced automobiles with competitive fuel efficiency ratings.</li> <li>The remote or macro-environment presents opportunities for firms to develop electric vehicles, based on increasing demand in the market.</li> <li>In order to improve resilience to future pandemics, automobile sector may drive enhancement in these areas. Tier -1 players might adopt technologies around industry 4.0 to leverage IOT capabilities and building efficiency &amp; visibility via digitalisation.</li> <li>More low-contact technologies and robotics in place, the shop-floor will be totally redesigned, become more compact, with fewer stations and greater digital interventions and measures.</li> </ul>

**E-ENVIRONMENTAL**

Issue	Impact on Business
ENVIRONMENT/ECOLOGICAL	
<ul style="list-style-type: none"> <li>Rising concerns on the air quality effects of automotive emissions (<b>opportunity</b>)</li> <li>Rising interest in business sustainability (<b>opportunity</b>)</li> <li>Changes in climate patterns (<b>opportunity</b>)</li> <li>Raw material shortage (<b>threat</b>)</li> <li>Increasing traffic (<b>threat</b>)</li> </ul>	<ul style="list-style-type: none"> <li>Need to enhance its electric or hybrid automobiles to address rising concerns on the air quality effects of automotive emissions.</li> <li>Companies can improve its sustainability standing, corporate image and brand image, based on the rising interest in business sustainability.</li> <li>Need to develop automotive solutions that solve people's transportation problem linked to the changes in climate patterns</li> <li>New technology, car designs and recycling processes are required to make this medium-term threat. Also, the discovery of new plastics &amp; renewable fibres can reduce the likelihood of as shortage of material.</li> <li>Space for roads and car parks are needed to avoid congestion and improve mobility. Traffic control through alternatives types of collective transportation and stricter regulation on car use in urban areas might affect customers and consumer's behaviour.</li> </ul>

**L-LEGAL**

Issue	Impact on Business
LEGAL	
<ul style="list-style-type: none"> <li>Expanding regulations on automobile safety (<b>opportunity</b>)</li> <li>Motor Vehicles (Amendment) bill, 2017 (<b>threat</b>)</li> <li>Custom duty (<b>threat</b>)</li> <li>ARAI (Automotive Research Association of India)</li> <li>Legislations Governing Automobile Industry-               <ol style="list-style-type: none"> <li><a href="#">Motor Vehicles Act, 1988</a></li> <li><a href="#">Insurance Act, 1938</a></li> <li><a href="#">Indian Contract Act, 1872</a></li> <li><a href="#">Rent a Cab Scheme, 1989</a></li> <li><a href="#">Transfer of Property Act, 1882 [TPA]</a></li> <li><a href="#">Tax Law</a></li> </ol> </li> </ul>	<ul style="list-style-type: none"> <li>Business need to integrate new and emerging safety regulations in product design which will ensure compliance and boost the value of brands.</li> <li>The government can recall vehicles whose component or engine do not meet the required standards. Manufacturers can be fined up to ₹ 500 crore in case of sub-standard components or engine.</li> <li>Excise duty on diesel engines is higher than on petrol engines</li> <li>The objective of association are R&amp;D in automotive engineering for industry, testing, certification and homologation of automobiles, automotive equipment and ancillaries and framing of vehicle regulations. So, business should be in alignment with ARAI.</li> <li>Business laws governing automobile industry must be followed. Indian standards and norms are at par with international standards.</li> </ul>

**B. Actual MRP process Vs Standard MRP process:**

- The objective of this Procedure is to provide the guidelines to the companies for standard MRP process to be followed and identifying gap in the actual process as compared to the standard MRP process.

**1. Input for MRP? From where it comes?**

It is released on the customer portal (customer schedule/customer forecast) or released manually by customer.

For ex. – Mahindra has its portal but customer schedule is actually followed on manual system.

Input can be of 2 types:

- Electronic data
- Manual data



## 2. Above Input goes to sales and customer team first

Sales team dispatches/delivers day to day material as per customer schedule

### Process:

- Schedule comes to sales team
- Sales team upload customer input on company's system (it can be any system like oracle/eMPRo/SAP where planning is updated)
- Planning comes in that no. which is written on sales invoice (Finished good number)
- One BOM (Bill of Material) is linked with that Finished good number.

**BOM:** It is of 2 types –

- Vehicle BOM (This is with OEM guys)
- Engineering BOM (This is with Tier 1 & Tier 2 supplier)

## 3. Requirement generation starts in system

After Input data is placed in the system, Requirement generation starts in system

For ex. – Schedule is generated for 100 pcs. (say in a month). So, first day wise requirement is generated i.e. how much quantity is required on which date. It can be anything, each week 25 pcs or in every 3-day interval 10 pcs. Required.

## 4. Back counting starts after requirement generation

### ○ Based on Quantity

Finished goods which is for sale to OE customer, stock is checked in FG stock.

Quantity counted in stock – Finished goods quantity, Semi Finished good quantity, WIP quantity. WIP quantity is of 2 types: Production semi-finished, raw material quantity.

Then after we go to Main store counting (check stock) or check is there any provision to check in transit material in system. Say for ex. – ASN (Advance Shipping note) system in company, if punched in system, MRP automatically count in transit. After this requirement, **Net requirement** is generated, whose schedule has to be release.

### ○ Based on Date

Say for example, customer requirement date is on 15/06/2020. Lead time to deliver this product is say 1 day (which is feeded on the system). So, FG

should be ready by this required amount on 14/06/2020. Then batch process is counted, how much is manufacturing lead time. Also, how much is machine availability, how much is load and on which machine is counted.

This is linked with the Net requirement which was generated earlier. This will tell on which date; how much material is required.

## 5. Planning team makes manufacturing calendar (Production calendar)

Working day of machine, shifts, weekly off, are put on the production calendar. After this MRP is generated.

## 6. Supplier Portal

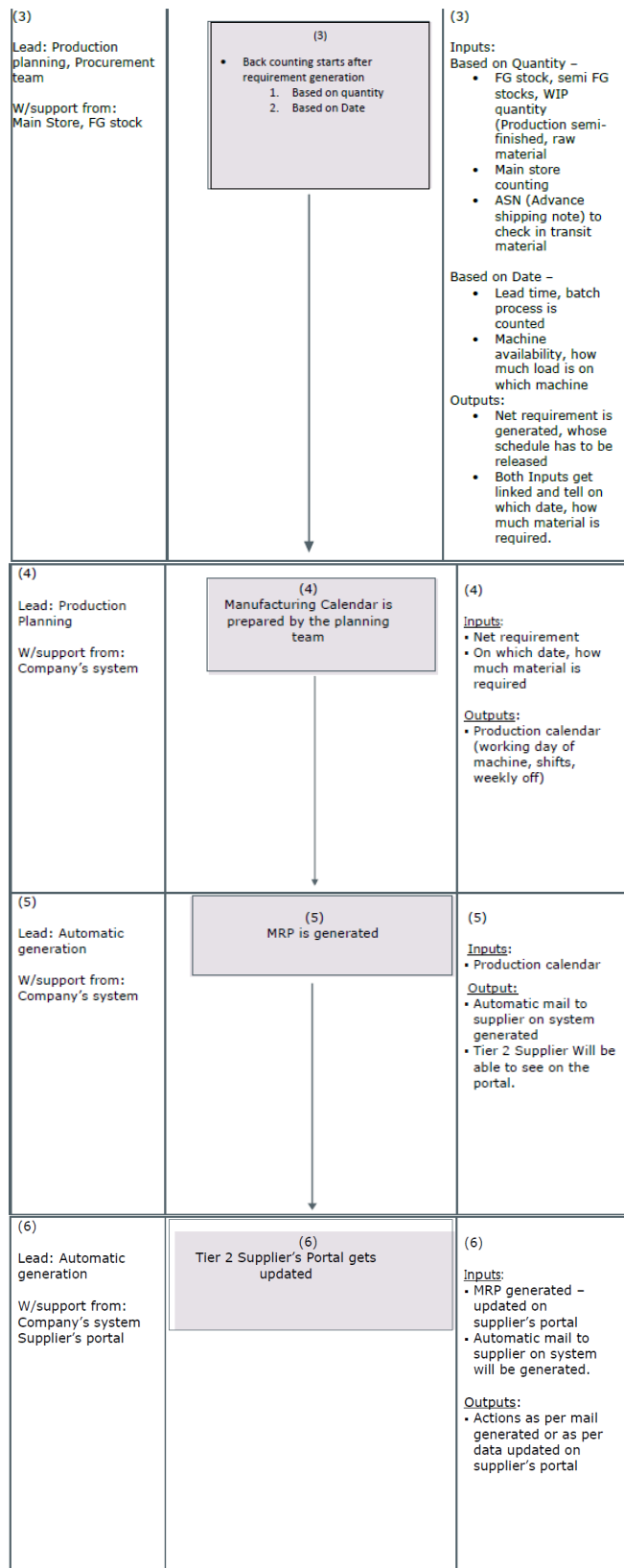
Tier 2 suppliers will be able to see on portal or automatic mail to supplier on system will be generated. They see, when to deliver/dispatch as per their lead time.

This is communicated to supplier by when material should be ready for pick-up/on which date they need to deliver.

## PICTORIAL FLOW -

### Procedure:

Responsibility:	Flowchart	Notes/Deliverables
(1) Lead: Sales & customer team  W/support from: Company's System, Customer portal	(1) Customer schedule/ customer forecast is released on the customer portal or released manually by customer	(1)  <b>Inputs:</b> • Electronic data • Manual data  <b>Outputs:</b> • Sales & customer team upload customer input on company's system (emPro/SAP/Oracle)
(2) Lead: Sales & operations  W/support from: Production & planning, OEM guys (Vehicle BOM), Tier 1 & Tier 2 suppliers (Engineering BOM), Company's system	(2) Requirement generation starts in a system and BOM is linked with FG no. (Planning – which is written on sales invoice)	(2)  <b>Inputs:</b> • Vehicle BOM • Engineering BOM  <b>Output:</b> • After input data is placed in system, requirement generation starts in system. First day wise requirement is generated i.e. how much quantity is required on which date.



After Discussion with a few industry leaders, I identified major factors which are responsible for gaps in the Actual MRP process in one of the plants of auto ancillary company in western part of India.

### GAP – Major factors

1. Product's BOM is not made in a good way i.e. input quantity requirement is not entered properly in the system.
2. Rejection factor is not counted in a proper way.
3. Lead time calculation is not proper. There are 2 types of lead time -
  - Regular Production lead time
  - Lead time of started production after line is dry

And it is needed to give input to system, what is initial lead time and what is regular lead time.

4. WIP, how to consider? If production guy doesn't timely punch production, then there is problem, as without punch, system will not know actual production is done or not. Say for ex. – 500 pcs. Is produced but not punch in system. Then WIP = Zero, but at production location, materials = 500 pcs. So, machine occupancy/utilization will increase as to produce 500 more resulting in a poor shift utilization.
5. If Machine efficiency, Process efficiency, Criticality efficiency entry is not proper.
6. Production calendar is not properly punched in system. Say for ex. There is requirement of 100 pcs. and pcs. get equally distributed in production, then utilization will not be proper as production efficiency varies.
7. Fixed time needed to entered in system (like on time machine regular shifts lunch break, tea break, line change over, tool change over) for proper utilization.
8. Quantity mismatch between system and physical counting, then gap will generate.
9. Subjective Problem: If follow up is heavily relied on a person, who is high performing. His/her absence on critical days may create panic in the system.

### Challenges for eliminating gaps:

- Either change the whole system from scratch, which is time taking and costly.
- If system is already messed up, then correction is difficult to implement.

**C. Automation of Purchase order processing:**

Purchase order automation is the way toward utilizing centralized software to make a purchase order measure that naturally sends a purchase requisition to the suitable staff for approval, at that point once approved, consequently sends the PO record to the vendor. It replaces the requirement for traditional paper purchase orders and streamlines the process.

Steps to understand how it works –

- 1) Login as user (say username: Rahul)
- 2) Go to Accounting > Purchase Order  
(Here, Employee information will automatically be filled in)
- 3) There will be matrix table as below:

Add/Remove	Item	Quantity	Unit Price	Subtotal
Grand Total				

Enter Item, quantity & unit price. Subtotal & grand total will be calculated automatically. This ensures that errors & correction drastically reduced.

- 4) Say, if grand total > ₹ 10,000, this form will automatically route to the DGM-Purchase for additional approval. Here, you do not need to take any additional steps. You can attach documents, can use camera on mobile to upload pics etc.
- 5) Authorize Sign - There will be touchscreen (which can be signed using mouse) and signature date will automatically take today's date.
- 6) Say for ex. Mr. Madhavan (Head-Purchase) gets an email notification and can click in email to view authorization request, he can review, to approve/deny/sent back to Rahul for correction.
- 7) If Yes (approved) & digitally sign using touchscreen on laptop (or smartphone) and finishes the workflow.
- 8) When workflow completes Rahul receives an email notifying the PO was successfully processed & email also contain pdf of completed workflow.
- 9) Once approved, it will automatically send the PO document to the vendor.

On a similar line, automation can be implemented for PO requisition, Invoice approvals and record keeping.

**Benefits –**

- Less time on paperwork
- More time on things that matter
- Fewer errors & Omissions
- Receive goods & services faster
- Greater Visibility

**PROPOSAL for Automation**

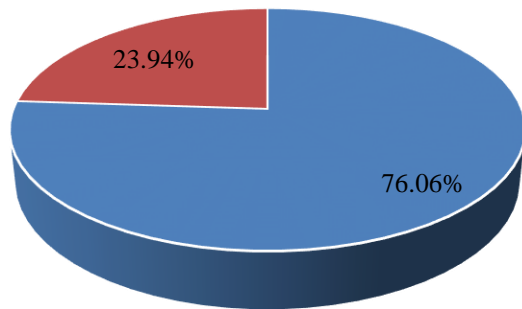
There is various software available in the market like for ex. Frevo, which is a 100% visual forms & workflows application. As PO is unique to every organisation, using apps like this, we create the exact automated purchase workflow which is required. Using this apps will help, in following ways –

- Drag & drop to create exact form layout
- Visually set up approval routing
- Incorporate dynamic behaviour without a single line of code (anyone can do it)
- End to end security encryption
- Cloud & on-premise options, lock-down security

Issue, with these apps or software is PO can be red listed. So, in group companies if such software is already running in any plant then similar types of automation can be done in other plants at various sites also (those having traditional methods for purchase order follow ups)

**D. Survey Method & Factor Analysis (for work from home and skills)****Data Analysis****Gender**

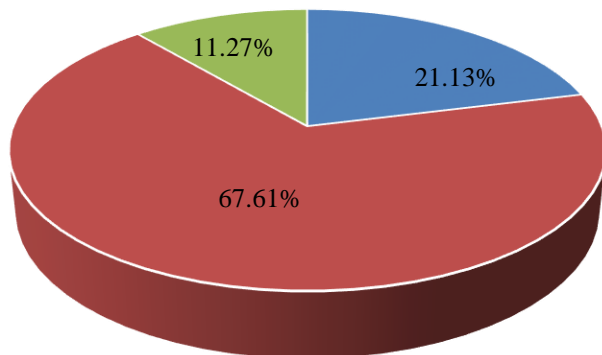
Gender	No. of participants	Percentage of participants
Male	54	76.06
Female	17	23.94
Prefer not to say	0	0.00

**Gender of participants**

■ Male ■ Female ■ Prefer not to say

**Age Group**

Age Group	No. of participants	Percentage of participants
<25	15	21.13
25-30	48	67.61
30-40	8	11.27

**Age group of participants**

■ <25 ■ 25-30 ■ 30-40

**Step 1:** Correlation Matrix for all variables is computed

**KMO and Bartlett's Test**

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.609
Bartlett's Test of Sphericity	Approx. Chi-Square	187.986
	Df	28
	Sig.	.000

**Table :1**

Null Hypothesis: No correlation exists among variables

Alternate Hypothesis: Correlation exists among variables

Here we can see that sampling adequacy is prevailing as KMO = 0.609 (as above 0.5 is acceptable). So here sampling adequacy is acceptable (Table :1)

Bartlett's Test – From above result we can see that Sig. = 0.000, so null hypothesis is rejected. So, there is some correlation ship among the variables (important requirement of factor analysis)

**Step 2: Factor Extraction**

Communalities		
	Initial	Extraction
Positivity_work_in_hand	1.000	.890
Communication_Skills	1.000	.722
Workplace_Agility	1.000	.800
Researcher_market_trends	1.000	.905
Knowledge_MS_office	1.000	.878
Analytical_Skills	1.000	.838
Financial_terms_knowledge	1.000	.505
Time_management_skills	1.000	.827

**Extraction Method: Principal Component Analysis.**

**Table :2****Factor Analysis –**

Factor Analysis is a strategy that is used to reduce large no. of variables into less no's. of factors. This method extracts maximum common variance from all variables and puts them into a common score. As an index of all variables, we can use this score for further analysis.

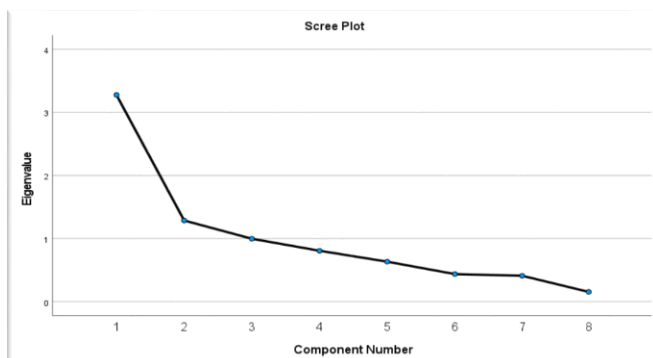


Total Variance Explained									
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.276	40.956	40.956	3.276	40.956	40.956	2.324	29.056	29.056
2	1.286	16.073	57.029	1.286	16.073	57.029	1.719	21.489	50.544
3	.997	12.464	69.493	.997	12.464	69.493	1.213	15.162	65.707
4	.807	10.083	79.576	.807	10.083	79.576	1.110	13.869	79.576
5	.633	7.916	87.491						
6	.437	5.457	92.949						
7	.410	5.125	98.073						
8	.154	1.927	100.000						

Extraction Method: Principal Component Analysis.

Table :3

Here we can see that 4 components are explaining 79.576% of the variance which is quite good (sufficiently explaining). After 4 components we can see % of variance is significantly dropping down. Also, we can see that, Eigen value for 2 components is more than 1, 3<sup>rd</sup> component is close to 1 and 4<sup>th</sup> component is more than 0.8.



From Scree plot also after 4 factors, line is becoming straight (i.e. %age of variance explained is significantly dropping down).

Component Matrix <sup>a</sup>				
	Component			
	1	2	3	4
Knowledge_MS_office	.767			
Analytical_Skills	.738			
Communication_Skills	.720			
Financial_terms_knowledge	.702			
Workplace_Agility	.629		-.570	
Time_management_skills		.672		
Positivity_work_in_hand		.639		
Researcher_market_trends	.587			.660

Extraction Method: Principal Component Analysis.

a. 4 components extracted.

Table:4

Above Matrix is sorted by size and small coefficients are suppressed (Cleaning). Here we can see that there are few cross loadings. Cross loadings are not good, so we should try to avoid cross loadings and if cross loadings do not go, then that variable may be item for deletion.

So, we may go with rotation, by rotation we may think of improving our model. Factors are rotated to make them more meaningful and easier to interpret. We used Varimax rotation for better interpretation

Rotated Component Matrix <sup>a</sup>				
	Component			
	1	2	3	4
Knowledge_MS_office	.930			
Analytical_Skills	.744			
Financial_terms_knowledge	.583			
Workplace_Agility	.528			
Time_management_skills		.855		
Communication_Skills		.699		
Researcher_market_trends			.915	
Positivity_work_in_hand				.884

Extraction Method: Principal Component Analysis.  
Rotation Method: Varimax with Kaiser Normalization.<sup>a</sup>

a. Rotation converged in 10 iterations.

Finding/Suggesting name to the factor (components) – On the basis of relationship between the variable, naming is done OR variable which has high loading on factor can be selected as representation of that factor.

1) Knowledge of MS office + Analytical Skills + Financial terms Knowledge + Workplace Agility (Knowledge of MS office can be selected as

components as it's had highest loading among 4)

2) Time Management skills + Communication Skills (Time management skills can be selected as component as it's had highest loading between two)

3) Researcher of Market trends

4) Positivity of work in hand

Component Transformation Matrix				
Component	1	2	3	4
1	.755	.521	.384	.109
2	-.480	.608	-.060	.629
3	.071	-.584	.465	.662
4	-.441	.136	.796	-.392
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.				

#### Reliability Test – Cronbach's

Case Processing Summary			
		N	%
Cases	Valid	71	100.0
	Excluded <sup>a</sup>	0	.0
	Total	71	100.0

a. Listwise deletion based on all variables in the procedure.

#### Reliability Statistics

Cronbach's Alpha	N of Items
.777	8

As reliability ranges from -infinity from +1, but we need to consider only those value between 0 to 1. If Cronbach's alpha is more than 0.7 is considered good reliability. Here, Cronbach's alpha is 0.777, means all the 8 questions have high correlation.

Item-Total Statistics				
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
VAR00001	25.2394	18.328	.582	.742
VAR00002	25.3239	17.222	.606	.733
VAR00003	25.1408	19.008	.445	.760
VAR00004	25.7183	16.720	.458	.760
VAR00005	25.5493	16.251	.601	.730
VAR00006	25.6056	16.157	.547	.741
VAR00007	25.1127	19.044	.379	.768
VAR00008	25.0141	19.100	.291	.784

#### Cronbach's Alpha if item Deleted –

We can see if any one question out of 1 to 7 is deleted, reliability is not improving (i.e less than 0.777) but if question 8 can be deleted as on deleting it reliability is improving to 0.784 from 0.777. But reliability is almost same even if question 8 is deleted, so all 8 variables (questions) need to be considered for measuring intention to work from home.

#### Conclusions

To conclude, it is essential for companies to have good strategic plans in place for overcoming turbulent times. In order to deal with any disruption, effort should be made to make your supply chain more resilient, responsive and efficient. This can be done by combinations of resolutions.

In a time, when COVID is putting extra pressure on the auto industry, effort should be made to recognize areas where work can be done to navigate through this turbulent time. Framework like PESTLE analysis of current scenario is done to identify threats and opportunities in the industry.

By comparing the MRP process of one of the auto ancillary plant with the Standard MRP process, gaps were identified so that it can be bridged further. Need of automation identified in the areas like PO (Purchase Order) processing and steps that can be followed to implement it successfully and lastly Factor analysis is done for identifying major factors (characteristics) which can be considered in an individual for him to efficiently work from home, as in this COVID scenario work from home is gaining boost. So, it is very much important to identify which all factors are there which can be considered in an individual who can effectively perform his job while working from home. Variables (components) selected for this were Positivity for work in hand, Communication skills, Workplace Agility, Researcher of market trends, MS Office knowledge, Analytical skills, Knowledge of financial terms, Time management skills. And out of these 8 variables, four components are selected which are defining maximum of variance (around 80%). SPSS software is used for the analysis of the data obtained from the respondents. Combination of these resolutions can be tried to navigate further through this disruption and turbulent time.

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