Chapter 5:

Data collection and Analysis

Data Collection and Analysis:

5.1 Research Design:

Planning of discoveries cannot be established; it is a work that should be planned. Research design is a framework which defines selection of method and specification of information gathering methods. It is an overall operation plan to define information nature, source of information, and methods of information collections. The information collected is relevant if it fulfills the objective of research question and information gathering proceeds economically, is termed as proper research design.
The effective research design allows data collection economically and within time frame. Data collection and analysis should be in a manner that it must attain objective of research.

Basic objective of this research is focus on exploratory analysis of---

1) Trend of supply chain automation in suspension system.
2) Effect of automation on supply chain performance measures and on customer satisfaction
3) How success rate of supply chain automation can be increased, a success model is proposed as outcome of this research.

The Population:-

The population comprises of all supply chain partners of suspension system manufacturing companies which include—

2) The chassis suspension system manufacturing plant exists in Delhi-National capital region.
3) Suppliers of chassis suspension manufacturing plants and their sub supplier.

The research result provides new facts and greater insight on supply chain automation which will beneficial to automotive industries, professionals of supply chain. This exploratory research is carried out by an individual research with resources constraint and time. A descriptive approach research design is found to be more appropriate as determined by objective & nature of study and resources
H1-- Automation of supply chain does provide positive and significant change in the existing supply chain management system and improve actual performance.

Questionnaire design on coordination improvement, ITR, conflict resolution, visibility of material flow, Highlight excess/obsolete inventory.

Fig. 5A1—Pictorial of research design with reference of 1st Hypothesis
constraints. Primary data was collected through scheduled by respondents with the help of persons trained specially for the purpose. Schedules are in form of objectively defined questionnaire.

Literature review first of all carried out to find influence of supply chain automation on its performance, organizational operation efficiencies and a detailed comprehensive explanation of status and automation influences is designed to be find out by descriptive research design. The factors, responsible to failure of automation, critical factors helps to ascertain success, performance measure factors studied though literature review and under taken to design of questions. The questionnaire is consequence of series of objective converted into questions in order to find out respondents views. Questionnaire designed in comprehensive way to motivate respondents so that they cooperate & reply accurately to all questions, Malhotra (1999).

A Likert scale is a psychometric scale or a technique which is used to measure and evaluate a statement, this technique is commonly used in survey conducted through questionnaires, such that the term is generally used interchangeably with rating scale even though the two are not synonymous. When responding to a Likert document item, respondents specify their level of agreement to an opinion presented as options.

Current research used Likert scale to measure the statement which the respondent is asked to evaluate according to any kind of subjective or objective criteria; generally the level of agreement or not agree on same things is measured. Generally response are gathered on options provided range from 2 to 10. Response option depends up on how closely variants researcher want to offer to respondents. , although many point scale may produce slightly higher mean scores relative to the highest possible score, which is checked on 10 point scale and out come as difference is symbolically. In provision of the other data aspects, there was very little difference among the scale formats in terms of variation about the mean point,

Likert scaling is a bipolar scaling method, gauging either good or bad response to a description. Sometimes a four-point scale is used; this is a forced choice method since the middle option of "Neither agree nor disagree" is not available.

After the questionnaire is concluded, each line item may be analyzed separately or in some cases item responses may be summed to create a score for an accumulation of items. Hence, Likert scales are usually called summative scales; it is very effective to analyze the whole paragraph.

This research used this scale to determine the mean line of whole summery and the result oriented calculations about facts. Assessment data can be categories by using Likert scale and
sometimes reduced to the nominal level by combining all agree and disagree responses into two categories of "accept" and "reject". Common statistical procedures used after this transformation.

Advantages of Likert Scale: - likers scale is very important tool to use for literature review and to know the accuracy level of any paragraph in the form of agree or disagree, statement is true or false,

Likert scales are among the most frequently used instruments in questionnaire surveys. They contain of a statement and a range of pre-defined responses which measure the intensity of one’s feelings towards the statement

The scale designed in this research to know effect of supply chain automation on related factors is followed as below--

1. Strongly disagree
2. Some what Disagree
3. Neither agrees nor disagrees
4. Some what Agree
5. Strongly agree

The five response categories are often believed to represent an Interval level of measurement. But it is acceptable if corresponding values are matching with empirical finding in term of values. Phenomenon are also exists where results are ordinal scale oriented.

The responses as an individual are generally considered as ordinal data, because we can presume that he is able to define difference of adjacent levels as interval data basic requirement is that difference in adjacent must be equal. Some researcher prefers to treat it as interval data.

Parker at el --- Since Likert scale is decided to use for this research, it is important to decide about statistical analysis which will use for analysis of data. A study is conduct as a pilot to know whether respondents considered data as nominal or ordinal while responding to questions asked through use of Likert items. This study is outcome of survey done through 260 questions answered by 26 participants. Generally non parametric tests are recommended
for Likert scale, it produced ordinal data is assumed. If it produces ordinal data we can assume equal distance between the categories, we cannot use parametric test such t-test-ANOVA or regression analysis. This study predicts that we can use parametric test.

Fig. 5A2---Pictorial of research design with reference of 2nd hypothesis

5.2 Questionnaire design—

It contains pre-structured set of 25 questions asked to respondents to provide their response. Questions are designed in fine tuning with objectives of study to find out automation effect,
current status of automation in suspension industry and finding solution to increase success rate. Some question has options while some other offer respondents to express their views on five points scale. Each section has sub questions to cover all objective aspects. The schedule questionnaire enclosed at the end of thesis as Appendix. It contains open ended question to get respondents views without any boundaries and close ended question as well. The details and purpose covered under each question is as below—

Historical evolution of supply chain automation in suspension system industry--

Almost all authors agreed to ERP as a solution and tool for supply chain automation as larger technology. Planning resources concept introduced by Gartner in 1990s as an evolution. It is also called as MRP II, application used by companies to manage their operation and information through all process. (Pairat et al 2005).

ERP also has certain limitation to address some trend of mass communication, standardization of process and data & integration of globalized business. Further research is to be done to address human and social issue which results into failure of technology investment. (Wagner & Sweeney 2011).

ERP solution available in market is not able to tackle dynamic nature of inventory planning. Organization needs information on low cost process destination of products so that offloading can be done to get cost benefits and process standardization can be maintained. ERP ability to incorporate process related data is also a challenge.

Due to the product proliferation, the complexity of product increases and there is need of rearrange multiple parts in category wise. This can be achieved by utilize an typical IT strategy for transfer of information, planning, control of inventory. Due to complexity OEMs also develop their designation and processing.

Automation is not a temporary trend and doing automation just sake of automation is not justified. There is level of automation to provide sustainable growth plan for business. In some cases automation is necessary, but first companies should study their requirement of automation. Companies should analyze all possibilities based on economic and technical feasibility to define degree on automation to be implemented. (Chan et al 2005).

The basic purpose of this question to know what level of automation suspension system manufacturer currently has. The end result of research is to predict automation effect and
proposing solution to automation failure, which can correctly replied by respondent, if they have exposure of automation of supply chain. So question designed to get answer on –

1) Types of automation tool /techniques in use currently.  
2) Since how long organization implemented automation of supply chain.

Automation of supply chain elements---

Every entity in SCM is customer of previous entity expect last one which is final customer, so to measure service quality of entire chain we have measure service quality of each entity and then summed up.(Kamakoty & Sohani 2013).

Innovation Demand Capturing and demand Creation, means any technology which supports marketing and organization operation defiantly having impact.

EMC Corporation makes estimation of 2.7 zetta byte that will exist digitally by end of 2012 globally, means a big data going to turn into business value. It is just a matter of fate that so many software companies manufacturing and developing software which can collect, store and analyses this big data.

The emergence of Cloud Computing offers resources so that this advance technology can be managed without taking knowledge of system. Big Data needs new skills and significant management to handle huge amount of data and organization have to take decision whether they require it in total or some part to unlock the business value.

Now availability of data is present in comparison of earlier about customer to sort and analysis of information for decision making but what happen to information regarding replenishment of these good and services. To address this issue ERP software companies like SAP develop advance planning system. This software have capabilities to plan and forecast demand, planning of supplier network, planning of production and distribution and activities like automatic procurement of goods, replenishment of goods and its billing.

Humans generally maintained fixed warehouse where as robots create more shelves by self-organizing. This lead to more space and more shipments. Robots works on software, which is constantly track every order and hence less error in comparison of human work.

Automation system make companies to control their storage, distribution as a centralized process control, attaining higher efficiency in the business production, decrease in production cost and significantly increasing in profit through productivity. Further security system
implementation gives reduction in failure of supply chain due to theft and accident. The elements of supply chain are encompassed to a greater extent or lesser extent by technology, high level or degree of automation and tools used to make it systematized. (Power 2005).

Supply chain has different stages to complete its process. Supply chain automation cannot be termed as full automation or it cannot be extracted all benefits without covering all stages implementation. The various stages of supply chain are –

1) Receipt stage – where all incoming material received
2) Bill entry—invoice posting of incoming material
3) Material Issue – Issue process and movement of material to machines.
4) MRP run— Material requirement planning through automation and generating schedule for supplier.
5) Assessment of FG stock --- Information regarding finished good available in company or warehouse.

Questions are framed to know the current practice followed by industry on various stages of supply chain. This will provide information of automation practices current practices and status.

Automation of supply chain includes customer—

The main objective of questions on customer supply automation is to know whether customer is part of automation or not. Supply chain automation is still partial automation without including customer.

There are many planning and measures which highlight various key issues for SCM. IT is one of those key used in SCM. Many supplier and OEMs uses IT, but found that there is no so output of using IT due to there is no updating in IT system

As OEMs and suppliers unique, there outsourcing will grow in future. Role of logistic service provider will be complex includes module assembly, inventory management and parts, it also include part's sourcing at India and global level. This role of logistic service provider will create the ability to handle the material of SC and its planning

It is observed that the cost of Indian auto product is 30 percent more than that of China or other markets; it is due to inefficient production and fluctuation in cost of fuel and wages.

Vendor management includes management of supplier of parts, service provider, so their management is necessary for global SCMs.
Supply chain partners do not have trust on each other’s. Therefore buyer and seller roles do not share information frankly which led to distortion in planning.

Supply chain related documentation and procedures are not updated. It does not keep properly and takes too much time to trace the documents. Production control, planning, procurement activity, financial activity and costing all collectively make it integration of multifunction application. (Gibson et al 1999)

Customer provides future business and to measure effect of automation on customer satisfaction is also one of the objectives of this research. Question asked to respondents on- do invoicing of delivery done through automation system. What is the procedure of getting customer schedule? Automation of supply chain cannot be including customer, if customer do not have installed any automation. Customer will be able to send demand schedule if he run MRP in his company, which is possible only when customer installed some kind of software.

Automation level according to user views---

IT department has very few problems after integration, it is easy exchange of data and information now as it happen within the system. It has more difficulties when we have many systems and integration favors one system. Now system works with fewer resources thus more efficient.

a) Inventory reduction.

b) Lead time became shorter

c) Planning became better and efficient by synchronization.

d) Mixed software and old development got integrated.

e) Information flow, quality and cost effectiveness.

f) Integrity provides more flexibility and business process to work out-side the corporate boundaries.

g) Error handling is easier. (Solomon et al 2011)

Adoption of automation software is one thing, after implementing taking all benefits is another thing. The management may take limited module of different functional areas but it is not
possible to buy partial module. The basic purpose of this question is to know user views on automation level. This will give insight story of user feeling. Do users are satisfied with supply chain automation. The question designed to ask- what is current level of automation from fully automation to no automation. User’s comments on current level of automation will provide input to automation software manufacturing companies and management of organization that current automations is not solving its purpose in all aspects.

Automation Role in supply chain performance measure---

The performance measure of supply chain needed to know behavior of supply chain as it has improved or degrade. Some important measurement is needed to run company on a long way, so that it will help in achieving some particular goal.

Customers and sales: performance measure help check ability of organization whether it is fulfilling demand and satisfaction of customer. Performance measurement helps in knowing the factor which helps in optimizing the performance of supply chain. By measuring the performance factors the solution for increase in productivity can be increases.

During the supply chain working there arise some sources which are responsible for performance losses, the major source of performance losses can be find out. The performance measurement can compare to the master data to achieve the goal of organization.

A department can never prove to be progressive without having provisions of performance measurement. Every organization has established certain parameter called key result areas. Without measuring key result areas, relationship with progress /improvement cannot be established. So, question designed to ask respondents that are they getting departmental reports through automation software.

Automation effect on coordination---

According to merriam-webster 2003 ‘coordination is bringing together or concentrate for a common goal or activity.’

Requirement of coordination in supply chain arises due to many conditions

Performance and efficiency: as supply chain's member mostly concentrated on their own objective which results in the poor performance of supply chain. The member of supply chain should be coordinated means their objective should be aligned with supply chain's obj In supply chain due to automation the difficulty creates in programming and monitoring among members of supply chain which affect the coordination.
According to Wise et al. (1992), automation increased the need for communication. Costley et al. state that communication rate decreases, and Wise et al. say there is an increase in communication rate. Bower and Deater predict a loss in coordination on the other hand, Clothier says that automation improves coordination. Human cannot make decisions considering all factors; on the other hand, computers or automated systems have the ability to make decisions accurately. In an automation of supply chain, the information transfer rate increases.

Inter-organizational information systems are used within SCM to improve business of an organization to improve working culture, relationships with business partners, always impact on relationship at various levels within the organization and their external relations also through good communications and timely flow of information functions, allowing us to facilitate the use of advanced techniques of information and communication systems to build good business relations with partners.

Information systems play an important role in the industry in their growth by sharing any business-related or management-related views with immediate effect through a proper channel.

There is a lot of systems we have seen in the industry or we have developed so far, but the effectiveness of inter-organization information systems is very useful.

Large companies have complex business processes and require integration to work effectively. Small companies also need integration when they bind with other small companies to beat competition with large companies. In case system integration is not done, two or more systems exist parallel, reports taken from both systems through print-out are analyzed. Some integrated systems do not provide information as desired format of organization. It leads to difficulties in analysis of data.

Automation solution providers claim that automation integrates all processes in one system. In this way, it definitely makes better coordination through integration of all business processes. To test, a question is designed to ask respondents about automation effect in making better coordination. Coordination is a feeling/experience that can be expressed by respondents who worked in an automated environment of supply chain.

Automation role in inventory management---

Automotive industries exist globally having a low EBIT margin while compared with global leaders (10.4%), but they are maintaining high inventory turnover (18.2) and providing (97.3%) of delivery rating best in class (Global supply chain survey 2013). It means that by maintaining high inventory turnover and increasing delivery rating to customers, companies can survive even
Industry is a combination of assets including manpower which require intensive planning at every level.

For continuous success of any organisation depends upon its inventory control, the term inventory refers to total material purchased for the production. And the term inventory turnover ratio is refers the ratio of total sale to the inventory. There is increase and decrease in the demand and supply for this fluctuation the inventory has to be controlled to compensate the situation. The formula for

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\text{inventory turnover} = \frac{\text{cost of goods sold by past 12 month inventory}}{\text{inventory investment during past 12 month}}
\]

higher the turnover ratio indicates the performance of organisation that it works effectively and efficiently. The successfullness of organisation indicated by high inventory turnover ratio and high turnover ratio indicates that how economically an organisation working for production and selling of product. ERP help in planning, locating and movement of inventory which help in continuous optimization of inventory. SCM as have use of IT, strategic technology and planning which help in control the inventory, the more the advence SCM system more will be the inventory control.

By the use of continual improvement plan(CIP) the inventory can be moved in terms of money in no. of times during the year. The inventory can be fscillitated with help of SAPmm, a type of software use to locateing and handling of inventory for excellent performance of organisation.

To keep optimum inventory is prime factor in success of any supply chain. Since car manufacturer’s follows principles of just in time, formulation of inventory policies and steps to keep safety stock is must. Over inventory is dangerous for organization profitability and shortage will led to stoppage of machine /line, finally customer will not get products on time. So questions are designed in cover inventory turnover and identification capability of obsolete items as sub set. Questions asked to respondents to know—

1) Automation of supply chain effect in improving inventory turn- over ratio (Monitoring of inventory turn ratio gives value of inventory with respect sales flucation).
2) Do automation of supply chain help user in identification of obsolete item and items which are lying in excess quantity.

Automation effect on customer---

In coming day’s production and services grow in personalized manner to full fill the condition of the efficient and flexible system of production. It largely develop integration of business provider
and informed, demanding customer for value added product and services and linking of quality service with production is termed as hybrid technology (Cutler 2013).

Customer responsive improvement largely done by information technology to provide solution to Industry. (Auramo et al 2005).

Companies can enhance their response time from 5% to 25% by elements discussed above and also can translate this into saving of money and time. (Karkkainen 2003).

It also result in reduction of order execution time by 64% and ability to meet customer specific requirement is also improve in same percentage. (Piramuthu 2005).

The latest automation technology and tools helps companies to avoid their problem or deal with them immediately as they appear to avoid or minimize damage to their brand. (Anderson 2009).

Existence and progress of any organization is determined by its customer satisfaction level. Customer must also get some benefits by implementation of supply chain automation. So question is designed to reply by respondents – Do automation of supply chain increase customer satisfaction?. By implementation of automation organizations became more systematic. A huge data related to supply chain complexity can be easily collected, analyzed. Customer got information in real time as claimed by automation solution providers. This must reflect on timely delivery to customer. So, question is designed to reply by respondents – do automation effect on timely delivery to customer.

Automation role in visibility of supply chain---

The network economy is an emerging trend in automotive and other industries, so success of any industry will not lie to work as an individual industry, but as the chain of supplying and delivering industries. This demand supply chain transparency as more important and necessary to achieve. (Henk A. et al. 2003).

Organizations also concerned to adopt new technologies by which they came to know cubic space utilized during loading of truck (Heinze, 2006). They also exploring route optimization with respect to truck utilization and loading plan. They also doing utilization of satellite technology to tack their vehicle, to check fuel consumption and status of delivery at customer end in real time. (Bajaj et al 2002). This way technology allow transporters to integrate information flow and when it is in real time, visibility of supply chain get increase with extensive coverage and expertise services by transporter.
Supply chain visibility is highly desired by organizations –

1) To get the value of inventory instantly.
2) To know the quantity of components at any moment of time.
3) To know the status of components lying at various machine/stages.
4) To understand and know material movements.
5) To do better planning during sudden hikes in customer demand.

These objectives can be achieved through supply chain visibility. The question is designed to seek views of respondents – do automation of supply chain increases the visibility of supply chain?

Automation role in conflict resolution---

Multiple agents play a role in addressing supply chain problems as a whole integrated part. Material can be considered as an application of software such as DISPOWEB, INTA PS, KRASH, FABMAS, ATT, SCC acting as multi-agent and providing results as creation to implement a successful production plan. It is justifiable to conclude that integration of SCM in today's competitive environment is a must, and the architecture of MAS addresses planning and execution of supply chain management. (Sindhu & Wahid 2009).

Conflicts develop due to the intersection of departmental objectives. It does not happen in all cases, but some time developed with passage of time. In order to achieve productivity, production wants to make low volume components in a single shot to complete the whole month's orders. To achieve this wish, the supply chain department has to pull the whole quantity in a single shot which creates unnecessary pressure on the supply chain and its partners (suppliers). Secondly, the supply chain department has to maintain maximum inventory beyond the limit, which is also illogical. Automation of the supply chain may help the planner to decide in-house production lot with the synchronization of supplier's minimum production lot, so that a trade-off balance can be maintained in logistic cost as well. So, the question is designed to know the effect of automation in resolving such conflicts.

Automation effect on company competitiveness---

The organization without any automation system (independent information system) is lagging by 3 months in terms of operational and financial terms. Organizations that have enterprise systems, having administrative overhead, are less in comparison to organizations without enterprise systems, as so many information get collected automatically. For managing human resources, it provides data of thousands of employees easily and effectively to know their current competency skills, identification of training need, and making the schedule of training programs based on individual specific needs. Employees with enterprise systems get information in an integrated form throughout
the firms and they did not require skills of collecting and interpreting the information. It also manage infrastructure in more efficient ways and reduces overheads as technician do not need to wait for system fails, checked through an simulator. Dunham et al (2007).

Every year 10 to 30 % of logistic and storage operating cost get increased due to inefficient transport mode & storage decision just because of lack in information and methodology adopted. (Gracia P. 2013). This is reason companies’ starts to adopted global technology and model of automation for their administrative process, customer relationship process and productive processes. Some organization became early carrier of technology while some has postponed its implementation till new system attain its maturity stage (Fernandez,2004).

Ware house automation led to reduction in maintenance cost incurred on to keep inventory by 25 % and with same number of staff (head count), output in term of order compliance increase by 76% due to enhance in productivity. (Lee 2002).

Recently tremendous development takes place in automation of supply chain management. First one which is most important is to wok from a common data base between its supplier, logistic service provider i.e transporter, its customer and company itself as in a link. Secondly automation makes capable to communicate globally with an inexpensive means among channel partner like supplier, transporter and customer. It is really unquestionable. Thirdly automation is used to control inventories of plant and ware houses and releasing purchase order. Automation became necessary where repetition of wok exist or the work where chance of error due to human memory foibles. What are different types of automation exists is also important to know—to get knowledge of technologies available so that best suits to organization can be selected based on its impact on organization need.

Competitiveness can be termed as something more attractive in features/product/services to customer in comparison to other options available in markets. It is user experience of customer feedback on automation system installed by any particular company. Customer will never get delighted by purchasing of automation software; definitely he will get delighted by timely delivery and information of dispatches in real time. It is the user, who knows improvement sources/means. In case automation of supply chain able to win customer confidence and reliability, it will make company more competitive. Now a day’s customer expectation gets increased, customer not only wants information in real time, delivery on time, but also cost cutting in pricing. It means that data gathers in automation of supply chain must be used and analyzed to find out scope of cost saving. So question is designed to know user views on – Do automation is necessary to be competitive in market over other suppliers.

Automation sustenance difficulties---
Sustainability concepts aim to provide agile and lean enough for prosperity. By 2025 more focus will be on material effect on environment and adopt standard practice.

Small enterprises face more challenges in implement automation. Types of automation prevailing in automotive industry are namely information technology, computer aided manufacturing, numerically controlled equipment’s, robots, flexible manufacturing system and computer integrated manufacturing. Small business owner have challenges to adopt automation as employee training, managerial philosophy and financial issue. Now India is ready to accept this challenge of implementing automation after China as enjoyed by USA and Western Europe. Automation can do wonderful for small enterprises.(Nrip & Limkar 2011).

A report from Gartner (Ganly 2006) says that 25 percent of the ERP implementations fail and that 80 percent are over time or over budget.

(Hong and Kim 2002) and (Rettig 2007) estimate that 75 percent of ERP implementations are "unsuccessful"

SCM increase the standard of enterprise by introducing IT strategy as help in the fast transfer of information. SCM also help in planning the schedule of order and execution of program in efficient way. SCM help to reduce error in execution of planning and control.

There were use of technology for making connection between customer, supplier, partners and intermediates but after that internet and electronic technology came to make stronger links. But for an efficient output rethinking of process of business and implementation of ERP is needed.

Success rate of supply chain automation is very low as explained in secondary data. There are some difficulties which organizations facing during implementation. Some companies implemented project and fails to attain its all benefits. Similarly some automation project implemented to whole organization (all functional areas). Later on automation software runs by limited function owners, generally as convenience of users. This is also counted as failure of project. So, an open ended question designed so that respondents can express their views on various problems faced to sustain automation of supply chain.

Supply chain automation and user satisfaction----

Kumar v (2008) said that today as internet technology is growing more and more the automotive company utilizes these techniques for continuous contact with their supplier. For the on line b2b transaction the internet is very useful. The inventory control & cost reduction in Ashok Leyland
is done by the same technology. The objective is to test this feature and feedback in suspension manufacturing industries.

An automation of supply chain increase production and generate large benefits by reducing cost so that risk to operator can be minimized (Gracia M.N, 2012). Automation provide full control of process which means tractability of product with other factors like units, weight, quantity, dimension, space required for storage and more over able to find out total inventory value at any time in more accurate and exact manner

Supply chain automation benefits are well explained by automation solution providers. The seller never says negative aspects of his product. The objective of this question is to verify supply chain benefits from user prospective. This question indirectly explains satisfaction level of users with supply chain automation. So question is designed to ask from respondents –what improvement they want in their current automation system of supply chain.

Automation software capability in adverse practical situation---

Industry is moving towards fourth revolution which is driven by network and internet. This technology making real world more closer to virtual growing in day by day. In coming day's production and services grow in personalized manner to full fill the condition of the efficient and flexible system of production. It largely develop integration of business provider and informed, demanding customer for value added product and services and linking of quality service with production is termed as hybrid technology (Cutler 2013).

Situations arise when system is not supporting to practical situation. It is a system fault or practical situation want to bypass system, this need to be understand. Every situation of such cases will differ from others irrespective of frequency of occurrence. Suppose an urgent material reached at company gate which is rigorously followed by purchase department. Purchase executive as came to know about receipt of material at gate, his first expectation is of inward it quickly. But material invoice do not have correct part numbers. Automation system does not allow this material to inward. Such situation is real life issue which can be minimizing, but cannot eliminate. So, question is designed to get views of respondents- Automation software address all practical situation of work.

User’s attitudes towards supply chain automation---

Supply chain automation is not always in good books of user. Some users find automation technology differently, which makes their job more tedious. They feel that this technology is not meant for them and objective of automation is not accomplished. The reason of such feeling of
user may be different than software demerits. This research objective to provide solution to increase success rate of automation cannot be achieved without including this aspect. So, question is designed as open ended to get views of respondents—quote the incidents when automation does not allow you to work effectively and efficiently.

Challenges of SCM automation---

The automation of supply chain is considered as an additional advantage rather than basic need. Worldwide scenario of automation through ERP, as predicted by research of Dantes & Hasibuan, 2011, shows Indonesia results into 80% of its ERP project to fails. A total of more than 50% of total ERP projects fails to attain its benefits as optimum value worldwide. China ERP implementation success rate is only 10%. ERP investment will not return anything if selection and implementation is done properly. Medium size industries generally considered as lack of resources, interesting to know having 2 or more software (ERP) in more than 40%. Similarly 15% mid-size companies having 3 or more .Aberdeen group conduct a survey on ERP implemented organization and find out that 25% organizations looking forward to for new ERP solution in next 3 years, 10 % would like to change ERP supported strategies in span of next 1 year and 15% are looking for change in existing ERP solution in next 2 year. Why too much of population would like to make changes , 50 % are in need of some more functions , 35% expect international capabilities with standardized solution and 40% are not satisfied due to user interface found clumsy. The names in list of companies which face problems in ERP implementation is very long including some reputed IT field organization like Dell and apple computers (Shahin et al),2010.

Hoon et al, ( 2001) identified critical factors for successful implementation of enterprise systems. Result of study ends up with 11 factors found critical. These are ---

1) ERP team work and its composition.

2) Change management programed and culture.

3) Support of top management.

4) Business plan – vision.

5) Business process re-engineering with minimum customization.

6) Project management, monitoring and evaluation of performance.
7) Effective communication.

8) Software development.

9) Testing and trouble shooting.

10) Project champion.

11) Appropriate business and IT legacy systems.

Challenges faces in ERP (automation system) is system version not available in country language. Its conversion in country language and find bugs in system. 2nd challenge is of cost of project increased due to delay in completion.

a) Underestimation of time line for completion of project and its complexity.

b) Data migration from old system to new system

c) Software system draw back--Financial module need changes in ERP as per their requirement, which is incorporated later on.

c) More challenges in unintegrated

d) Master data and source of data-team require adequate and proper knowledge of that.

e) Management of change and specifying platform for integration

Integration has so many benefits and address to challenge is must to avails that benefits. Solomon at el (2011)

The success model cannot be formulated without knowing the challenges faced by user in implementation and sustain automation. Based on secondary data five factors identified –

1) Operating cost of automation.

2) Complexity to understand software system

3) Accuracy of master data

4) IT/MIS department service level

5) Accuracy level of supplier schedule, MIS reports
Question is designed to provide ranking to each factors starting from most important, so that management can priorities their focus to implement automation successfully. Last option is left open ended to fill any other factors which are not covered in list so that respondents are not limited to boundaries in expressing their views.

The customer—

In Delhi-National capital region, we have two passenger car manufacturer named Maruti Suzuki and Honda siel car. Maruti has two plant in Delhi-National capital region located at Gurgaon and Manesar. Honda Siel Car also has two plant in Delhi –National capital region located at Noida and Tapukara. Maruti Suzuki is largest number of car manufacturer in India having 41% of market share whereas Honda car having market share only 3.6% (source report of Society of Indian automobile manufacturer). Therefore we include only Maruti in our sample. All four chaises suspension systems supplier of Maruti are taken as sample and 70% of their sub supplier taken into consideration as sample.

The chassis suspension system manufacturing plant—

In Delhi-National capital region there are total four chassis suspension system manufacturer named Gabriel, BWI automotive, Technico, Munjal showa and their sub supplier called tier 2 supplier are in total termed as population

Sample:-

The sample set comprises inputs from employees working in supply chain management at the level of executive, manager and Head of supply chain department, similarly executive manager & head of automation department of original equipment manufacturer and chassis suspension system supplier. Representative and plant heads of sub supplier and also included in some consultants and academic expert of subject total sample size 295 respondents.

The sample size had respondents from original equipment manufacturer and then their supplier as chassis suspension system manufacturer called tier 1 and their sub supplier called tier 2. Since every sample has equal probability of selection. For sub supplier we had taken 70% of total population and selection will be done randomly. Therefore sampling technique for sub supplier will be probability random sampling. The primary data had been collected from Maruti and its chassis suspension supplier’s employee through a questionnaire survey. This survey had take place on line (electronics), delivery and collection of printed, somewhere face to face interview.
had taken place. It included both close ended and open ended question as well as by interviewing and cover the employees of supply chain and automation department of passenger car manufacturer and their chassis suspension system supplier plants. For IT experts and academic experts and Plant heads, head of department open ended questionnaire will be part of data collection.

This section of research is dealing with selection of data collection techniques followed by sample population. There are two types of data collection methods

Experimental method and Non-experimental

Experimental/laboratory method are conducted in controlled condition in which hypothesis is tested by manipulating variable based on cause and effect relationships like a scientist. The types included under this head are laboratory & field experiment and simulation. Sample survey, field and case study comes under head of non-experimental method. Since topic taken in scope of current research are measurable and non-measurable. Inventory turn –over, timely delivery to customer are measurable whereas automation effect on competitiveness, conflict resolution factors are not measureable.

Reliability & Validity

There are two kind of error in measurement one is variable error and other is systematic error, if there is no any variable error in the measurement it is called reliability. There are two terms used in reliability stability and internal consistency. In some of the events there happens that the outcomes of a particular sample comes same or repeated during different application, this situation called stability on the other hand if the outcomes of event is different it called as unstable. For device to device the capacity of accuracy varies according to its structure, this capacity or ability to produce accurate result called the reliability.

Current research check reliability through method of test -retest

If there is a case or event having only one type of quantity to be measure then its reliability can be calculated by the test-reset method. In this case consider event and take measure of same sample at two distinct points in the given time. Compare the result of observation and we got a coefficient of measurement between two, if this coefficient is high then we can call the reliability as high but in case of lower coefficient it is low. This method cannot apply to the human being but can be applicable to the non-living things.
Test –retest method performed on 30 respondents. The response collected tabulated to takes means. Retest is conducted again on 30 respondents. The data is tabulated in excel sheets and means calculated again. The Pearson coefficient calculated between of both set of respondents. The observed value of r=1.21 , which indicates perfect correlation, hence data has reliability.

Validity---there should be an ability to measure that what he going to be measure, this ability called the validity and it is important property which any measure should always possess, it included that the measure is free from error. Method use in current research is face validity.

In some of the cases a measure can measure a degree of extent, but its index show a limited measure means it can measure more than it show or appear on it, this characteristics called face validity.

The questionnaire distributed to 50 respondents and feedback taken- do questionnaire is easy to understand and address objective. Responses received posted in excel sheets. the observed value shows that 99.3% respondents claim that question statements are clear and understandable.
5.3 Data Collection –

Data collected by distributing a questionnaire expended to three sections. First section is containing nine question designed to predict the trend of automation prevailing in suspension system supply chain. This section predicts information on-- types of automation software, when they first installed, what aspects of supply chain covered, how they rate their current system, by suspension automotive industry including their supplier and customer. First section questions have options for respondents to reply.

Second section covered information on automation effect –

1) On improving inventory turnover.
2) To identify and highlight obsolete/excess inventory.
3) Automation necessity to be competitive in market.
4) Automation effect on timely delivery to customer
5) Automation effect on enhancing customer satisfaction.
6) Automation capability to generate MIS reports
7) Automation effect on coordination between departments and employees.
8) Automation effect on visibility of material.

The objective of this section is to know automation effect on supply chain operational efficiency and on customer satisfaction level. The questions has option on five level from extreme conditions of strongly agree to extreme on negative side as strongly disagree.

Third and last section objective is to find out---

1) Non –logical function of software.
2) Draw back / Difficulties in current automation system
3) Automation software to tackle practical situation.
4) Automation software support in abnormal condition
5) Challenges in adoption & sustain of automation of supply chain.

This section contain open ended questions so that respondents can express their views without any limitation of restricted options

A questionnaire consists of 25 aspect of current problem in form of question was circulated to all persons included as samples through e-mails. Out of 295 respondent total 262 had given reply. 10 responses were found invalid. So, total 252 responses got to analysis
5.4 Data Analysis:-

Data collected from all respondent is represented by statistical techniques such as tables, Graphs. In this research we have data from three source named original equipment manufacturer (car manufacturer), chassis suspension system manufacturer and third one child components supplier.

Fig. 5A3—Statistical design
The objective of first 9 questions is to find out current state of supply chain automation prevailing in suspension system supply chain. Supply chain partners are practice supply chain principle since beginning of business. Every company has input of raw material and processes it to convert in a product which is ready to serve customer. It is an output of company by delivers products to its customer. The survey was conducted to know- how many supply chain partners installed automation software. The respondents were asked to reply against four options. The question statement is which automation software installed in your company. The options available were-

1) SAP
2) Oracle
3) any other
4) No software.

The response was tabulated in columns representing options by excel sheet. Then response frequency against each option is calculated in percentage as shown in below table.

<table>
<thead>
<tr>
<th>Automation Software Installed in co.</th>
<th>SAP</th>
<th>Oracle</th>
<th>Any other</th>
<th>No software</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>29%</td>
<td>15%</td>
<td>38%</td>
<td>18%</td>
</tr>
</tbody>
</table>

Table 5 -1 Automation software status

This table indicates that –

1) SAP which is considered as modern tool of automation is installed by 29% out of total sample population.

2) Oracle which is in practice earlier than SAP is installed by 15% out of total sample population.

3) Third category is of any other means installation of other local software developed by different automation solution provider .In this column 38% companies installed some locally made software out of total sample population.

4) The balance 18% of total sample population does not installed any software, which lies under fourth option of “No software”.
Graphical presentation of data is shown in pie chart as below in Fig no. 5A. During analysis of data it is found that 82% respondents of total sample population claim that they are using some sort of automation in their supply chain. Remaining 18% of total sample population does not using any software. It means they do not have that level of automation in their supply chain in comparison of other population sample.

Automation means reduction of human intervention in any process which can be attained by any means. An organization can work in excel sheet just by putting a computer system is also one type of automation. The category of any other is contributed to maximum percentage in comparison of other sample population. It indicated that companies need an automation solution which is less in cost and tailor made as per their specific need. SAP and oracle as combined is also contributed to highest percentage in total sample population. It means that automation by standard and branded is also capture slightly more share of market than locally developed software.

![Pie chart of share of automation software](image)

**Automation software type**

- SAP: 29%
- Oracle: 15%
- Any other: 38%
- No software: 18%

Fig 5 A – Pie chart of share of automation software

Second question was asked to respondent that what is ageing of automation software installed in their organization for automation of supply chain. The four options was given to respondents as--

1) less than 3 year.
2) less than 5 year.
3) less than 10 year.
4) less than 20 year.
The objective of this question is to know respondent and their company experience of software use in automation of supply chain. The response was posted in excel sheet. Then percentage is calculated which is represented in table no. as below.

<table>
<thead>
<tr>
<th>Ageing of automation software</th>
<th>Less than 3 year</th>
<th>Less than 5 year</th>
<th>Less than 10 year</th>
<th>Less than 20 year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ageing of automation software</td>
<td>9.60%</td>
<td>29%</td>
<td>42%</td>
<td>19.30%</td>
</tr>
</tbody>
</table>

Table 5-2 Ageing of automation software in %

1) The percentage contribution analysis in four factors shows that 9.6% of total sample population has automation in less than three year. It means that propagation of automation in suspension automotive industry is slow in comparison of earlier years.

2) The 29% of total sample population has less than 5 year and 42% of total sample population which is highest among all four option has less than 10 year. It means that 42% supply chain automation in suspension industry of NCR is bringing it in to last 10 year. 2002-2005 is the time period when suspension industry plan to do automation of their supply chain.

3) The remaining 19.30% of total sample population has less than 20 years of automation software installation. It indicates that in 1995 only nearly 20% of total sample population has automation in their supply chain. They are early adopter of technology and seem financial good as technology cost comes down over the period after first invented. The early adopters get benefits of supply chain and it takes another five to six years to spread the confidence in adoption of automation technology. The pictorial presentation of data is shown in below fig.( 5B ) in form of pie chart.
When we club percentage data of less than 5 year and less than 10 year, it is observed that 71% of total sample population done automation of their supply chain in last 10 years.

Overall data analysis indicates that mostly (82%) automotive industries of suspension system have automation software.

Next question asked to respondent was about process of getting customer demand. In any supply chain when customer demand is coming in real time (on line), it means that supply chain automation is not limited to organization internal movement. Customer is also covered in supply chain automation. Customer has implemented automation software in his company and connected suspension system as supplier. The respondents were asked to their opinion on three options of customer demand intimation as online, by e-mail and any other. The data obtained from respondent had posted in excel sheet. The data calculation is also done in percentage to analysis.

<table>
<thead>
<tr>
<th>Customer demand intimation automation</th>
<th>Online</th>
<th>e-mail</th>
<th>Any other</th>
</tr>
</thead>
<tbody>
<tr>
<td>44.70%</td>
<td>52.60%</td>
<td>2.70%</td>
<td></td>
</tr>
</tbody>
</table>

Table 5 -3 Status of Automation of customer demand intimation

44.70% of total sample population received their customer demand on line. It means that customer and supplier are connected with their supply chain automation software. In this condition customer is also get advance shipment notification about dispatch of quantity in real time and supplier is also get information when vehicle reached at customer site. 52.60% of total
sample population received customer demand through email. It means that customer and supplier are not linked with automation software. They exchange information through e-mails. Both the parties had computer system as automation machine.

Rest 2.70% of total sample population is getting information of their customer demand through other means. The meaning of other means that supplier get customer demand intimation neither by on line nor by e-mail. It concludes that 2.70% of total sample population even does not have computers or internet connection in their computers. They may exchange information through telephone, mobiles, courier or fax.

The graphical presentation of data is shown in below fig. (5C). It clearly indicates that half population of total sample get information in real time.

![Customer demand intimation automation](image)

**Fig.5 C- Status of automation of customer demand intimation by pie chart**

After getting demand from customer next step in supply chain is receipt of raw material and dispatch of finish good to customer. These both steps are controlled by a document is called invoice. The recording of invoice can be done by making entry in register which is a manual system. The recording of invoice can also be done by making entry in through automation software or just posting entry in excel sheet. When invoice entered in any automation software, process can termed as fully automation. When invoice posted in just excel sheet then process is not automated. The process is completed by use of auto featured machine where it has no link with other department. So, question asked to respondents whether they are making entry of invoice in automation software at company gate or not. The respondents have two options in form –
The data received in survey is posted in excel sheet and then converted into percentage as shown in below table (5-4).

<table>
<thead>
<tr>
<th>Automation of receipt at gate</th>
<th>yes</th>
<th>No.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>58.30%</td>
<td>41.70%</td>
</tr>
</tbody>
</table>

Table 5-4 Status of automation in receiving at co. gate

1) Out of total 252 respondents 147 response which is 58.30% of total sample population claim that their organizations makes entry of invoices and bills at company gate. Their companies have clear instruction that no material can inward in company without getting entry at gate. Some organization has different views on it as explained in next line.

2) The remaining 105 respondents which is 41.70% of total sample population do not make entry of invoices at company gate. A graphical presentation of data in form of bar chart is shown as below in fig (5D).

It clearly indicates that majority believe in making control of incoming and outgoing at gate itself. The security guard have computer skills is responsible to make entry at company gate in system. The skill and knowledge level of security guard is low, therefore, to avoid mistakes some organization (which comes as 41.6% of total sample population) do not make entry in automation software at security gate. Acquiring computer skills is not a big deal now a days. Computer education is now part of school education and students are easily grasping it. Companies can take decision either to train existing staff in computer entries (by explaining to take care of purchase order numbers, quantity, item code and its description) or they can hire young age security guards who have exposure to computer during their schools study. Making entries at gate is a step ahead than making entry at receipt stage, because it provide scope of manipulation after entering from gate as visitor is free to move and it may possible he will not report at receipt section.
Fig. 5D Status of automation in receiving at gate

This question asked to respondents to know status of inward invoicing automation. The objective of this question is to know, how much population sample makes entry of inward invoicing in automation software irrespective of stage of entry (at gate or receipt store). It may be possible that an organization has implemented partial automation. The data collected and punch in excel sheet. The data in percentage against option of yes and no is presented in table (5-5) as shown below.

<table>
<thead>
<tr>
<th>Automation of Inward Invoicing</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Automation of receipt at gate</td>
<td>80.50%</td>
<td>19.50%</td>
</tr>
</tbody>
</table>

Table 5-5 Status of automation of invoicing at receiving stage

1) Automation of inward invoice is practice by 80.5% of total sample population implemented. It means that inward - material control is highly desired by organizations. The organization does expenditures on material and other service. The bills of these services and material are controlled at receipt stage. When this process take place by automation, It is very easy to track and analysis. Manual operation may involve cutting and correction where as in automated process any individual can not alter the facts in back dates and time.
2) 19.50% of total sample population does not automate their process of inward material. It means that they keep records of inward material manually in registers or in excel sheets. In this situation chances of manipulation are more in comparison of automated system. The graphical presentation on automation of inward invoicing as shown below in fig.( 5E )

![Automation of Inward Invoicing](image)

**Fig. 5 E Graph of Status of automation of invoicing at receipt stage**

The next step in this research to know the practices follow at production floor. How material is moved from store to production. The ideal condition of automated environment is that first material issue from store. This activity is done by posting issue quantity in automation software and then material moved physically. Then production department manufacture material and output of each process / stage is entered in automation software. The physical movement of material is done only after posting data in automation software. This step give data how much ok part produced and how much got rejected in quality parameter as not ok parts.

In the same way next stage process output is entered in automation software. How many stages to be cover in automation, it all depends up on decision and direction of organization. The data collected on question that whether company issue material at production through system or not. The options given to respondent are two as yes and no. The data is posted in excel sheet and percentage of responses is calculated on option yes and no. The data is presented in table (5-6 ) is given below.
63.8% of total sample population says they are making entry in automation software while issue of material to production whereas 36.20% do not make entry in automation software.

It means that more than half population of sample believes that automation of store issue should be followed. The rest sample population which is 36.2% need support to make it happen.

Management of any organization really wants data on work in progress and how many parts get rejected in each process stage.

This is not happening with 36.2% of total sample population; hence they fail to tell their inventory as work in process in real time. In such industries they do physical count to get data on work in process.

It is a time consuming activity and production cannot run during physical count. Automated environment gives this data at any time without production stoppage.

Another negative aspect of this manual system is that process rejection quantity data may be manipulated which comes into picture during physical count.

The difference which may be of process rejection is considered as case of inventory loss. The graphical view of data is presented on bar chart as shown in fig. (5F).
One important aspect of supply chain is providing material schedule to supplier. The schedules are generated based on customer and inventory norms. Automation software has inbuilt mathematical logic sequence to generate demand automatic by posting customer monthly demand. So, question asked to respondents, “Do Company running MRP for their material planning”. The respondents were given option to answer as option of yes and no. The data received was posted in excel sheet. Percentage of response against yes and no was calculated. The result obtained as percentage is shown in table (5-7) as below.

<table>
<thead>
<tr>
<th>Material planning automation</th>
<th>Yes</th>
<th>No.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>72.20%</td>
<td>27.30%</td>
</tr>
</tbody>
</table>

Table(5-7) Status of material planning automation

The 72.20% of total sample population run MRP for their material planning activities. It means that 27.3% of total sample population does not use automation software fully. The user has faced some problem either with running of this process of automation or they are not finding MRP output accurate. When it is a case of problem to run MRP cycle, it indicates problem of training as user do not have wish to run MRP. The management of organization has to take call on such incident. Management has to provide proper resources to run MRP. When it is case of MRP output, it means master data feed to software is not accurate. It percentage is also indicate that
this activity prevailed in organization follow after automation of inward. The graphical presentation of data in response of option yes or no is sketch by bar chart as shown below in fig. (5G).

![Material planning automation](image)

Fig. 5G material planning automation status chart

The next aspect after getting response on inward automation, material issue automation is of automation of F.G (finish good). When production makes entry in automation software after manufacturing, the material shows its existence in quality inspection. The quality department does inspection of material. If it is correct as per quality standard its punching does as ok material. The material punch in automation software as ok parts, get transfer to finish good. It means that at any moment someone can check what stock is lying as FG. The question asked to respondents is that, “Do they able to see /access FG stock through automation software (SAP/ERP)”.

The respondents have to reply on two option of yes and no. The data was collected and feed to excel sheet. The percentage of response against category of yes and no is presented by table (5-8) as shown below. The response received that 58.3% of total sample population can access stock of finish goods through automation software where as 41.6% do not able to access stock of FG through automation software.

<table>
<thead>
<tr>
<th>Automation of F.G stock</th>
<th>Yes</th>
<th>No.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>58.30%</td>
<td>41.66%</td>
</tr>
</tbody>
</table>

Table (5-8) Status of automation of FG stock

It means that 41.6% of total population not only able to see FG stock in real time, also not punching production data in automation software. It also reflects that 41.6% do not utilize software full feature and do not have inter linked supply chain. In this situation also there is
scope of manipulation in data of rejection produced during production of parts. F.G stock can be known only by physical count. This also not gives FG stock updated information in real time.

The bar chart graph of data on automation of finish good stock is as shown below in fig (5H). This data against yes and no option is same as response percentage on automation of receipt of material. It means that inwards and out wards control has equal importance of an organization. Not accessing FG stock is does not mean that organization dispatching their material manually. It indicates only that movement of material from production to FG area is not done in automation software. The material is moved from production to FG area manually and physically.

<table>
<thead>
<tr>
<th>Automation of F.G stock</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Automation of F.G stock</td>
<td>58.30%</td>
</tr>
<tr>
<td></td>
<td>41.66%</td>
</tr>
</tbody>
</table>

![Automation of F.G stock](image)

Fig. 5H Status of automation of FG stock

After running MRP material planner will send material schedule (demand) to its supplier. Organization has options to send schedule by e-mails, on line, by telephones/mobile, by fax. The material schedules information sent through fax is very old technology.

This technology is faster than courier/post at that time. Now a day’s mobile and telephone overlap this technology. So this category is name in this research as any others. If it is a case of online material schedule as MRP output, it means that customer and supplier are interlinked with automation software and get information in real time. If it is a case of material schedule share through e-mails to supplier, it means that manufacturers has automation of his internal material planning and can generate material demand schedule only. Then taking MRP output in PDF/excel file and then sent it to supplier through e-mails. The question asked to respondents that, “Do you company send schedule to supplier by”.
Three options are given to respondents –

1) Online as MRP output.
2) e-mail as MRP output.
3) Any other.

The data received from respondents is posted in excel sheet. To have better analysis data is converted to percentage response against three options. The data is presented in table (5-9) as below.

<table>
<thead>
<tr>
<th>Automation of supplier scheduling intimation</th>
<th>On line as MRP output</th>
<th>e-mail as MRP output</th>
<th>Any other</th>
</tr>
</thead>
<tbody>
<tr>
<td>13.80%</td>
<td>69.40%</td>
<td>16.60%</td>
<td></td>
</tr>
</tbody>
</table>

Table 5-9 Automation status in supplier scheduling

1) 13.80% of total sample population send material schedule to their supplier on line as MRP output. It means that 13.8% are well connected with their supplier through automation software.
2) The 69.4% of total sample population send material schedule to their supplier through e-mails as MRP output.
3) The remaining 16.6% use other means like telephone, mobile or fax to send material schedule to their supplier. It also indicates that 16.6% of supplier do not have computer systems, otherwise mails can be send through internet when supplier has a computer system and net connection which is a very common technology now a days.

The graphical presentation is bar chart clearly shows highest percentage is of e-mail option.
In earlier question respondents were asked about different aspect of supply chain automation. The objective of this question is get views on overall automation. The respondents were asked to give their views on four options. First option, supply chain in their company is fully automated. Second option that supply chain in their organization is semi-automatic. Third option that supply chain in their organization is under category of little automation. Fourth options that supply chain in their organization have no automation. The data received is calculated in percentage of response against each category as shown in below table (5-10).

<table>
<thead>
<tr>
<th>Status of automation in current supply chain</th>
<th>Fully automation</th>
<th>semi automation</th>
<th>little automation</th>
<th>No automation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>8.30%</td>
<td>69.40%</td>
<td>8.30%</td>
<td>13.80%</td>
</tr>
</tbody>
</table>

Table 5-10 Overall automation status
Fully automation supply chain is only 8.30% of total sample population. It means that scope of improvement in automotive supply chain is wide. 69.4% of total sample population vote that their supply chain is semi automation.

It means that these organizations are lacking on any one or more factor (receipt automation, issue process automation, MRP running, FG stock automation). The 8.30% of total sample population have little automation. It means that they only one or two process fully automated. 13.8% of total sample population has no automation.

In this survey we found that 18% do not install automation software. So, 5% populations which actually do not have any automation .They keep computers for their internal working and consider it as little automation.

The main objective of this section is to analysis benefits of automation of supply chain management. Harmonious relationship is must for smooth functioning of any organization. Supply chain productivity demand good relationship between its channel partners and among the staff of organization.

The Fig. 5J Status of overall automation pie chart

The production needs material availability at all time to run production line. The hips and down of material availability can be better managed if production and supply department has good relationship. The principal is applicable to buyer and supplier relationship as well. This question deals with supply chain automation effect on this relationship. The question asked from participants is that, “Automation of supply chain by installing MRP/ERP makes better
coordination within the supply chain department”. Out of 252 respondents 86 are strongly agree with this statement. 110 numbers of respondents are somewhat agree with statement. 10 numbers of respondents are neither agree nor disagree. 7 number of respondents are strongly disagree whereas 39 respondent are somewhat disagree with statement.

<table>
<thead>
<tr>
<th>Automation of supply chain do better coordination</th>
<th>Strongly Agree</th>
<th>somewhat agree</th>
<th>Neither agree nor disagree</th>
<th>Strongly Disagree</th>
<th>somewhat disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>86</td>
<td>110</td>
<td>10</td>
<td>7</td>
<td>39</td>
</tr>
</tbody>
</table>

Table 5-11 Response on automation effect on coordination

The data received from respondents feed to excel sheet. The percentage response against each category is presented in table (5-12) as below.

1) The 34.12% of total sample population strongly agreed that automation of supply chain do better coordination within supply chain department.

2) The 43.65% of total sample population are somewhat agree that automation of supply chain do better coordination in their department. It means that one third of total respondents agree with positive effect of supply chain automation on coordination. This indicates that automation of supply chain helps to develop harmonious relationship between employees. In automated supply chain environment data and information can be access by team members without depending upon individual wish.

3) The 3.96% did not express any opinion about statement. It might be possible they belong to clerical activity and do not have exposure to conflicting incidents.

4) 2.77% of total sample populations are strongly disagree with positive effect of supply chain automation on coordination.

5) Similarly 15.47% of total sample populations are some disagree on statement that automation of supply chain makes better coordination.

6) Overall total 18.24% of respondents are not agreeing that automation of supply chain makes better coordination.
The data is presented by bar chart diagram as shown below Fig. This graph clearly shows that respondents who are somewhat agree are the highest and strongly agree with statement are second highest.

The 3rd highest category is of respondents who are somewhat disagree that automation of supply chain makes better coordination with in department.

The lowest column on bar chart is of strongly disagree. It means that only 2.77% of total sample population does not believe on automation effect on better coordination.
Excess inventory can eat up all profit of an organization. Shortage of inventory cannot sustain customer during demand fluctuation governed by auto market. Inventory management is also part of supply chain matrices or key result area. Supply chain performance can be measured by level of optimum inventory maintained and level of customer satisfaction. So, respondents were asked to judge supply chain automation effect in improvement of ITR (abbreviation full form - Inventory turnover ratio).

Out of 252 respondents 191 are strongly agree that automation of supply chain do improvement in inventory turnover ratio. 8 respondents are somewhat agree. Out of 252 respondents 7 are neither agree nor disagree. It means they do not know about it. 8 no. are strongly disagree and 38 respondents are somewhat disagree about automation effect on ITR improvement. The data received is posted in excel sheet and frequency against each option is tabulated as below in table ( 5-13 ).

<table>
<thead>
<tr>
<th>Automation of supply chain do improvement in ITR</th>
<th>Strongly Agree</th>
<th>somewhat agree</th>
<th>Neither agree nor disagree</th>
<th>Strongly Disagree</th>
<th>somewhat disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>191</td>
<td>8</td>
<td>7</td>
<td>8</td>
<td>38</td>
<td></td>
</tr>
</tbody>
</table>

Table 5-13 Tabulation form of automation effect on ITR improvement

The data frequency is calculated in percentage against five items of Likert scale for better analysis. 75.7% of total sample population are strongly agree and 3.11% are somewhat agree. It means that total 79% are agreeing that supply chain automation lead to improvement in inventory turnover ratio. 2.7% are neutral about statement. It means that they do not have knowledge and experience about automated supply chain. 3.17% are strongly disagreeing.

It means they have bad experience of automation supply chain. They want to say automation of supply chain has nothing to do with inventory control. The remaining 15% chose option of somewhat agree. It means they want to say that supply chain automation helps to control inventory but not up to extreme extent.

The overall disagree about statement is 18.2%. In nut shell we can conclude that majority of respondents says that automation of supply chain do better inventory control and hence make
improvement in inventory turnover ratio. The data obtained in percentage on scale of strongly agree to strongly disagree is presented as below in table (5-14).

<table>
<thead>
<tr>
<th>Automation of supply chain do improvement in ITR</th>
<th>Strongly Agree</th>
<th>somewhat agree</th>
<th>Neither agree nor disagree</th>
<th>Strongly Disagree</th>
<th>somewhat disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Automation of supply chain do improvement in ITR</td>
<td>75.79%</td>
<td>3.17%</td>
<td>2.77%</td>
<td>3.17%</td>
<td>15.07%</td>
</tr>
</tbody>
</table>

Table 5-14 Percentage response against automation effect on ITR improvement

The graphical presentation of data in form of bar chart is shown in fig (5L). It clearly explain that respondent who says automation of supply chain improve inventory turnover ratio has highest column at 75.9%. Second highest column of bar chart is on somewhat disagree option. It means that strongly agree is first and somewhat disagree is second in representation of supply chain effect on inventory turnover.

Since gap in both column is too much. So, we can conclude that majority is agreeing that supply chain automation is help to make better control of inventory. The percentage of somewhat agree and strongly disagree is only 3.17% of total sample population. It is very small, hence can make effect on results.

![Automation of supply chain do improvement in ITR](image-url)
The next important parameter is of your customer valuation about your performance as a supplier. A customer of automotive supply chain expects timely delivery of product with good quality and in full quantity (demanded by customer). The company makes investment in automation of supply chain also wants to know its effect on improvement of timely delivery. So this factor is added as subject of research here. The data obtained that 189 respondents were strongly agree with statement. The frequency of respondent, who experience supply chain automation do improvement in timely delivery to customer is 194 out of 252. 11 respondents were not able to state agree or disagree. They do not know it. 5 respondents out of 5 were strongly disagree whereas 47 respondents were somewhat disagree. The data collected and feed to excel sheet. The frequency against each option is as shown in table

<table>
<thead>
<tr>
<th>Automation of supply chain do improvement in timely delivery to customer</th>
<th>Strongly Agree</th>
<th>somewhat agree</th>
<th>Neither agree nor disagree</th>
<th>Strongly Disagree</th>
<th>somewhat disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>189</td>
<td>5</td>
<td>11</td>
<td>5</td>
<td>42</td>
</tr>
</tbody>
</table>

The respondent were asked to give their opinion on question of supply chain automation effect on timely delivery to customer against five option (strongly agree, somewhat agree, neither agree nor disagree, somewhat disagree).

The percentage of response against each category is expressed in tabulated form as below. The result obtained is that –

1) 75% are strongly agree.
2) 1.98% are somewhat agree.
3) 4.36% are neither agree nor disagree.
4) 1.98% are strongly disagree.
5) 16.6% are somewhat disagree.
When we club agree category it comes that 77% are say that automation of supply chain reduce time default of delivery to customer.

Even 75% of total sample population gives their consent as strongly agrees. It means that they support the statement to extreme. Strongly disagree category have 18.6% of total population, out of which 16.6% gives their consent partially.

<table>
<thead>
<tr>
<th></th>
<th>Strongly Agree</th>
<th>somewhat agree</th>
<th>Neither agree nor disagree</th>
<th>Strongly Disagree</th>
<th>somewhat disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Automation of supply chain do improvement in timely delivery to customer</td>
<td>75%</td>
<td>1.98%</td>
<td>4.36%</td>
<td>1.98%</td>
<td>16.66%</td>
</tr>
</tbody>
</table>

Table 5-16 Automation effect in timely delivery percentage wise

The data obtained is calculated in percentage and then presented in bar chart for visual analysis. It indicates that highest column is of respondents who strongly say automation of supply chain do improvement in timely delivery to customer.

Second highest column is of category of respondents who are somewhat disagree (16.6%). It means that majority of respondents accept that supply chain automation makes improvement in timely delivery to that customer.

Third highest column is belonging to neutral people who are not either in favor or not in disfavor. It may be possible they are not aware of dispatch reports as working in other sections. This percentage is very small and do not impact on results.

Remaining two options of somewhat agree and strongly disagree, proportion contribution is 1.98% which is very less, therefore does not have any significance in interference. Majority is with positive effect of automation on timely delivery to customer.
The management needs some reports and data to measure performance of department and also performance of organization. The supply chain measurement factors are inventory turnover, timely delivery, premium freight, logistic cost. The objective of this section of research is to know ability of automation software in generation of these reports. So, the question asked to respondents was, “Automation of supply chain able to find out data/reports related to supply chain metrics/key result areas (KRA).”.

The option given to respondents were

- Strongly agree.
- Somewhat agree.
- Neither agree nor disagree.
- Strongly disagree.
- Somewhat disagree.

The response received out of total 252 that 120 are strongly agree that automation of supply chain able to find report and data of department. 73 respondents out of 252 are somewhat agree and 13 are neither agree nor disagree.

Under category of strongly disagree no response found out of total 252. Total 46 respondent are says that they are somewhat disagree with the statement. The data is represented in tabulated form as below in table (5-17)
Table 5-17 Automation ability in matrices generation-opinion view

Automation of supply chain is able to find reports and data of departmental target (Metrics). 47.6%, out of total sample population are strongly agreeing that automation able to fine matrices. 28.9% are somewhat agree. It means that some partial data they may not be able to extract from software.

It seems that this issue of customization. When we club both 76% are agree on statement. It means that majority of user agree that supply chain automation able to find out desired reports and data related to department targets. 5.15% are neither agree nor disagree.

It means they do not have experience or knowledge about incidents when automation fails to provide metrics report. Out of total 252, 0% response found on strongly disagree about statement. It means that total sample population accept that automation ability in generating department target reports, may not be all reports, as 18.25 are somewhat disagree. The data is presented in percentage as below in table (5-18).

Table 5-18 Response in percentage, automation ability in finding reports metrics
To have visual analysis of data, it also present on bar chart as shown below in fig. (5-18). This graph clearly shows that highest column is of who are strongly agreeing that automation of supply chain able to generate reports and data of department key result area. Second highest column is of who are somewhat agree with statement. Third highest column is of somewhat disagree (18.25%). Forth highest column is of neither agree nor disagree which is only 5.15%.

It means that these also up to some extent are agreeing with statement. The sample populations who are strongly disagree with statement, column height observed is zero. The graphical presentation is shown in fig. (5N) as below.

![Automation of supply chain able to find data /reports of Matrics](image)

**Fig.5N Automation ability in reports of matrices**

The parts or material which is no longer of use is termed as obsolete inventory. Similarly part available more than specified maximum limit are known as excess inventory. The increase in both obsolete inventory and excess inventory is lead to decrease inventory turnover. The inventory turnover is one of the parameter to check organization health. The inventory turnover increase means more cash flow.

So, this factor included in this research in form of question asked to respondents that, “You able to find out excess/ obsolete inventory part wise automatically.” The option given to respondents are strongly agree, somewhat agree, neither agree nor disagree, strongly disagree and somewhat disagree.

Out of total 252 respondents, 191 are strongly agreeing that automation of supply chain able to find excess and obsolete inventory. 8 respondents are somewhat agree with statment.8 are neutral in their opinion, means they are neither agree nor disagree with statement of automation.
effect on inventory management. 3 are strongly disagree out of total 252 and 42 are somewhat disagree.

The response gathers in excel sheet to find frequency observed against each option. The below table (5-19) shows number of response received in strongly agree, somewhat agree, neither agree nor disagree and somewhat disagree. This table indicates that maximum numbers of respondents are strongly agree.

<table>
<thead>
<tr>
<th>Automation of supply chain able to find excess/obsolete inventory</th>
<th>Strongly Agree</th>
<th>somewhat agree</th>
<th>Neither agree nor disagree</th>
<th>Strongly Disagree</th>
<th>somewhat disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>191</td>
<td>8</td>
<td>8</td>
<td>3</td>
<td>42</td>
</tr>
</tbody>
</table>

Table 5-19 Response on automation ability on dead inventory in no.

The data contribution percentage wise is calculated to have better analysis.

1) The result in terms of percentage is that 75.7% of total sample population is strongly agreed. It means that majority of respondents accept that supply chain automation is able to find out excess and obsolete inventory. When we club this data with somewhat agree, the data became 78.8% which a marginal increment. This indicates that respondents are strongly agreed with statement.

2) 3.17% are neither agreeing nor disagree means neutral about topic.

3) The 1.19% of total sample population is strongly disagreeing that automation of supply chain can generate report of excess and obsolete inventory. This percentage is also very small and does not play any significance role in results.

4) 16.6% are somewhat disagree means they wants to say, some instances are existing where automation of supply chain cannot perform to generate reports of excess inventory or obsolete inventory.

The tabulated form of data received in percentage on Likert five item scale is shown in table (5-20) as below-
Table 5-20 Automation ability to identify dead inventory in( %)

The data is also presented in form graph to have visual interpretation of data at a glance. This graph clearly shown that highest column is of respondents who are strongly agreed (75.7%). The second highest column is of respondents who are somewhat disagree (16.6%), since it contribute to less percentage than agree category, so does not perform any significant role in result. 3rd highest column is of somewhat agree and neither agree nor disagree. The lowest height column is of strongly disagree.

Over all it indicates that since strongly disagree contribute only 1.1% and 75.7% are strongly agree, it can be concluded that automation of supply chain able to find out data on obsolete or excess inventory.
One more important factor of supply chain management in modern era is its visibility. The visibility means that production or production planning department can access stock of material in real time. This visibility of supply chain lead to many benefits like proper planning, avoiding management losses, avoiding last moment surprises. So, question added in questionnaire as, “Automation of supply chain make it capable to visible by other related department (finance, production, marketing etc.).”

The respondent were asked to share their experience and knowledge against five options as from strongly agree to strongly disagree.

1) Out of total 252 respondents, 192 are strongly agree that automation of supply chain increase its visibility required by other concerning department, 9 are somewhat agree. 4 out of total 252 are neutral means neither agree nor disagree.
2) Total 10 respondents are strongly disagree with the statement, it means that 10 respondent never experience visibility of supply chain in automation environment.
3) The remaining 37 out of 252 are somewhat agree that automation of supply chain increases its visibility. It means that they have some positive inclination towards statement.

The data received is feed to excel sheet. Then response received against each category are covert to summary by adding frequency of response against each category. The data summary presented in tabulated form as given below in table (5-21).

<table>
<thead>
<tr>
<th>Automation of supply chain increase its visibility</th>
<th>Strongly Agree</th>
<th>somewhat agree</th>
<th>Neither agree nor disagree</th>
<th>Strongly Disagree</th>
<th>somewhat disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>192</td>
<td>9</td>
<td>4</td>
<td>10</td>
<td>37</td>
</tr>
</tbody>
</table>

Table 5-21 Response in no. on automation effect on visibility

The responses frequency under each category converted into percentage as shown in below table (5-22).
1) The 76.1% of total sample population are strongly agreed that automation of supply chain increase its visibility.

2) 3.5% are somewhat agree on automation role in increasing its visibility to other department.

3) 1.5% are neutral means neither agree nor disagree. It means that they do have experience and knowledge on topic.

4) 3.96% are strongly disagreeing, means they do not thinks automation increase supply chain visibility.

5) The remaining 14.6% are somewhat disagree mean they are not fully convinced with statement. It means that they have experience where they did not found improvement in visibility of supply chain.

Under agree category 80% respondents lies, mean majority of respondents says that automation of supply chain increase visibility (material movement, material stock and inventories at each location). The respondents strongly disagree is very small proportion of only3.9%, has no significance in result or conclusion. 14.6% who lies under category of somewhat disagree has some inclination towards statement.

The data is presented through graph as well to have visualization of data. The graph is clearly shown that highest column is of respondents who are strongly agreeing that automation of supply chain increase its visibility. Second highest contributor is of respondents who are somewhat disagree. Third highest column is of strongly disagree (3.96%). Fourth highest column is of somewhat agree (1.5%).

<table>
<thead>
<tr>
<th>Automation of supply chain increase its visibility</th>
<th>Strongly Agree</th>
<th>somewhat agree</th>
<th>Neither agree nor disagree</th>
<th>Strongly Disagree</th>
<th>somewhat disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>76.1%</td>
<td>3.57%</td>
<td>1.58%</td>
<td>3.96%</td>
<td>14.68%</td>
<td></td>
</tr>
</tbody>
</table>

Table 5-22 Automation effect on visibility –opinion view
The departmental objectives and targets on some factors makes interest clash. For instances, production prefers to takes big production lot (big lots means less change over time). The production department wants to increase its productivity by reducing change over time. For big lots, material departments need to procure excess material in single lot (supplier may not be able to produce this quantity in single lot). Similarly during cash flow crisis, finance department wants reduction in procurement, which may lead to disturbance in smooth functioning of material department. So, objective of this statement is to know the effect of automation in reducing such conflicting interest of departments.

The respondent were asked question to express their opinion on automation role in conflict on five options as strongly agree, somewhat agree, neither agree nor disagree, strongly disagree and somewhat disagree.

Out of total 252 respondents 92 are strongly agree. 108 are somewhat agree that automation of supply chain able to reduce intra-conflict. 4 respondents are neither agreeing nor disagree means neutral about the statement.

15 no. of respondents are strongly disagree means they are firm about their opinion. Rest 33 respondents are somewhat disagree out of total 252.

The data collected and posted in excel sheet. To get frequency of responses against each category tabulated form is as below in table (5-23).
Strongly Agree | some what agree | Neither agree nor disagree | Strongly Disagree | some what disagree
---|---|---|---|---
Automation of supply chain able to reduce intra-conflict | 92 | 108 | 4 | 15 | 33

Table 5-23 Response view on automation effect on reduction of conflict

The percentage contribution of response in each category is also calculated as shown in below table (5-24). According to that---

1) 36.50% of respondents are strongly agree that automation of supply chain do reduction in interest conflict among the departments. 42.85% are somewhat agree with the statement. When we club both category of agree, its value becomes 79.3%, means that majority of respondents are agree that automation has positive effect on conflict reduction.

2) The respondents who are neutral about statement are only 1.58%. It means that this small fraction of total sample population do not have experience of automation role in conflicting incidence reduction.

3) The 5.95% of total sample population are strongly disagreeing. Since strongly disagree percentage contribution is less in comparison of strongly agree, it does not make any significance in conclusion.

4) 13.9% are somewhat disagree that automation of supply chain reduces target conflicts.

The below table (5-24) is presenting summary of response in each category in terms of percentage.

| Strongly Agree | some what agree | Neither agree nor disagree | Strongly Disagree | some what disagree |
---|---|---|---|---|
Automation of supply chain able to reduce intra-conflict | 36.50% | 42.85% | 1.58% | 5.95% | 13.09% |

Table 5-24 Percentage of opinion on role of automation in conflict reduction
The data is also presented in graph chart to visually understand response received against each category as below in fig ( 5Q  ).

1) The highest column in graph is of respondents who are somewhat agree that supply chain automation do reduction in conflicts arise due departmental key results areas or targets.
2) Second highest column is of respondents who are strongly agreed with the statement. So, first two highest column is of agree category irrespective of up to what extents concludes that majority of respondents are agree (79.3%).
3) Third highest column is of respondents who are somewhat disagree.
4) The fourth highest column is of strongly disagree and lowest height column is neither agree nor disagree. It means that lowest contributor is of neutral about statement.

Fig. 5 Q Graph of Automation role in conflict reduction

Automation of supply chain involves cost and resources. Management is definitely interested to know, do it make difference to have automated supply chain over the competitor. The automation expenditure comes under the overheads and customer will pay equal amount to both company who has implemented automation and who do not implemented automation.

So, this part of research is focus on to have opinion of suspension system supply chain. The question asked that, “Automation of supply chain is necessary to became more competitive in market”.

1) The 127 respondents choose option of strongly agree out of total 252.
2) 71 respondents are somewhat agree on statement.
3) 9 respondents are neither agree nor disagree.
4) The 6 out of total 252 respondents are strongly disagreeing.
5) 39 are somewhat agree that automation of supply chain increase competitiveness and hence necessary.

<table>
<thead>
<tr>
<th>Automation of supply chain is necessary to became more competitive</th>
<th>Strongly Agree</th>
<th>somewhat agree</th>
<th>Neither agree nor disagree</th>
<th>Strongly Disagree</th>
<th>some what disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>127</td>
<td>71</td>
<td>9</td>
<td>6</td>
<td>39</td>
</tr>
</tbody>
</table>

Table 5-25 Response on automation necessity to attain competitiveness

Automation of supply chain keeps organization ahead in selection of organization as supplier in comparison of other competitor. Respondents results shows that ---

1) 50.3% are strongly agreed with this.
2) 28.17% are somewhat agree. Overall 78% are agreeing that automation is necessary in today era to have better business opportunities.
3) 3.57% are not belong to any category of agree or disagree.
4) 2.38% are strongly disagree means that they do not find any instances when automation helps him to be more competitive.
5) 15.47% are somewhat disagree with the statement.
Table 5-26 Automation necessity for competitiveness –opinion view

The graph shows respondents view under each category. The highest column is of strongly agree. It makes interference half population is agree and have instance of automation effect to increase their preference over other supplier of same products.

The next highest column is of somewhat agree and third one is of somewhat disagree. Forth highest column is of neutral category. The lowest height column is strongly disagree. It shows that respondents preference is to be strongly agree as compared with strongly disagree as lowest column.

![Automation of supply chain is necessary to became more competitive](image)

Fig 5 R Automation necessity to become competitive, graphical presentation

The primary responsibility of automotive supply chain is to provide products on customer line as per demand scheduling. Automation of supply chain requires additional resources (man, machine and money). So, management is definitely interested to know about automation effect on customer satisfaction. The management every step is dedicated to increase sales and profit, which has direct relationship with customer satisfaction. Therefore, this factor focused into current research. The data obtained shows that—

1) 190 respondents were found strongly agree that automation increase their customer satisfaction.
2) 8 are somewhat agree with statement.
3) 8 does not give any opinion on agree or disagree.
4) 15 are strongly disagreeing.
5) 31 are somewhat disagree.

<table>
<thead>
<tr>
<th>Automation of supply chain increase customer satisfaction</th>
<th>Strongly Agree</th>
<th>somewhat agree</th>
<th>Neither agree nor disagree</th>
<th>Strongly Disagree</th>
<th>somewhat disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>190</td>
<td>8</td>
<td>8</td>
<td>15</td>
<td>31</td>
</tr>
</tbody>
</table>

Table 5-27 Response on automation role in increasing customer satisfaction

The data is posted in excel sheet and frequency of reach respondents are recorded against options. The proportion of respondents against each category is also calculated. The data shows that ---

75.3% are strongly agree and 3.17% are somewhat agree. 3.17% have no opinion and 5.96% are strongly disagreeing. The remaining 12.3% are somewhat disagree.

<table>
<thead>
<tr>
<th>Automation of supply chain increase customer satisfaction</th>
<th>Strongly Agree</th>
<th>somewhat agree</th>
<th>Neither agree nor disagree</th>
<th>Strongly Disagree</th>
<th>somewhat disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>75.39%</td>
<td>3.17%</td>
<td>3.17%</td>
<td>5.95%</td>
<td>12.30%</td>
</tr>
</tbody>
</table>

Table 5-28 Respondents views in % on automation effect on customer satisfaction

The graph shows highest column is of employees who are strongly agree. The second highest column is some employees who are somewhat disagree. The height difference between first and second is too much, we can say that majority is agree that automation of supply chain makes positive effect on customer satisfaction. Third highest column is of strongly disagree. Since it is placed at third stage with a very small height column does not make effect on results. The column height of neutral respondents and some what agree is same . It means that both contributor are same in proportion.
Automation of supply chain increases customer satisfaction

Automation of supply chain is not one time job, it is an environment or culture in which users have to work every day to take its benefits. Management responsibility is to provide the resources, buying of automation system, training to employees and its implementation. Finally, users or employees of the company have to use and run it successfully. The respondents were asked to share their views on the difficulties faced by them to sustain automation of supply chain.

1) The 69% of total respondents are facing problems.
2) 31% do not have any problem.

This shows that the majority of users are facing problems in their current automation system of supply chain.

<table>
<thead>
<tr>
<th>Factors/Difficulties Face by company to continue or sustain automation of supply chain</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>69%</td>
<td>31%</td>
</tr>
</tbody>
</table>

Table 5-29 Difficulties faced by user to continue with automation of supply chain
The data frequency graphical presentation of above table is as below. The yes category column height is more in comparison of those who are not facing any problem. It visually shows that more user faces difficulties in continuation of supply chain automation.

**Factors/Difficulties Face by company to continue or sustain automation of supply chain**

<table>
<thead>
<tr>
<th>Factors/Difficulties Face by company to continue or sustain automation of supply chain</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>69%</td>
<td>31%</td>
</tr>
</tbody>
</table>

Fig. 5 T Response in % - automation sustain difficulty

Majority of employees are facing problem to sustain in automation. So, here it became worthy to analysis the factors creating problem in continuation of automation of supply chain.

1) 20% out of total sample population told high cost of automation operation as difficulty to sustain it.
2) 15% told, initial cost of automation stopping them to continue the project. So, cost whether initial or operational contribute as major obstacle in supply chain automation.
3) The user 15% of sample population feels that customization is poor in their automation software. Their software is not designed as per their company or work requirement.
4) A 10% respondent feels improper training is concern to sustain automation of supply chain.
5) Similarly 10% are not comfortable with software output accuracy level. It indicates that software generates reports or data is not reliable.
6) The 10% of total population are finding difficulties with rigidity of reports.
7) The 5% support that employees are not taking interest to continue automation of supply chain.
8) 5% told that automation is not implemented fully to all process of supply chain, therefore partial result also struggle to sustain.
9) 5% think the problem of data uploading (time consuming and tedious job) is main hurdle to sustain automation.
10) Remaining 5% update that automation software is not supporting to compensate market fluctuation, means it is mathematical program and avoid frequent changes in its function.

<table>
<thead>
<tr>
<th>Factors/Difficulties Face by company to continue or sustain automation of supply chain</th>
<th>In (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Operation cost</td>
<td>20</td>
</tr>
<tr>
<td>Initial cost of automation</td>
<td>15</td>
</tr>
<tr>
<td>Lack of customization</td>
<td>15</td>
</tr>
<tr>
<td>Lack of proper Training</td>
<td>10</td>
</tr>
<tr>
<td>Accuracy level</td>
<td>10</td>
</tr>
<tr>
<td>Rigidity of reports</td>
<td>10</td>
</tr>
<tr>
<td>Employee interest</td>
<td>5</td>
</tr>
<tr>
<td>Full automation by covering all departments.</td>
<td>5</td>
</tr>
<tr>
<td>problem of data uploading</td>
<td>5</td>
</tr>
<tr>
<td>Software -Nonsupport to handle market fluctuation</td>
<td>5</td>
</tr>
</tbody>
</table>

Table 5-30 Difficulties faced to sustain automation

The above tabulated form is converted to graphical presentation. The graph clearly indicates that highest column is of operation cost of automation. This factor is on top of user as problem. The users were given equal priority to lack of customization and initial cost of automation.

Third highest column is of improper training, accuracy level of automation output and rigidity of reports. The users given equal severity marks to all three factors. The poor customization and rigidity are same factor; contribute to 25 % as second most shouted issue of this research.

The other factors raised by user are employees interest towards mission automation, not covering all process (lack of full automation), problems faced by user in data uploading, software inability to address practical problem of market fluctuation. All these factors are given equal weightage by user.
The success rate of supply chain automation is very low. So, respondents were asked to tell about the improvements required in their current software.

82% told, they need some improvement in their current automation software.

18% are satisfied and does not required any improvement. The indication is that majority is not satisfied with current software and want some changes as improvement to provide more satisfaction. The data is presented in tabular form as below.

<table>
<thead>
<tr>
<th>Difficulties faced to continue or sustain automation of supply chain</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Need improvement in current automation software</td>
<td>82%</td>
<td>18%</td>
</tr>
</tbody>
</table>

Fig. 5U Difficulties faced by user in automation
Table 5-31 Improvement desired by no. of user

To provide visual interference, data is presented as graph. The highest column is of respondents who require improvement and lowest column is of respondents who are satisfied and do not require any improvement.

![Need improvement in current automation software](image)

**Fig. 5V Improvement desired in current software**

The respondents require improvement on some functions and factors as tabulated below.

1) The 23.53% would like do customization of their current automated supply chain and better interlinking of department. The user want to say that software is not working as per their specific need.
2) Respondent feeling on interlinking of department means that their works are integrated as organization in automated environment. For instance, buyer would like to know dispatch trend for correcting inwards of material.
3) 11.76% of total sample population need upgraded version of automation software.
4) The same percentage of respondents needs T-code standardization so that it can be easy learn.
5) The 5.8% feels that they should have options to open/work in multiple windows as improvement.
6) 5.8% wants start of bar code implementation for better tracing of material.
7) The same percentage of respondents requirement is generation reports as desired by user and managements.

This point is already included in customization, but respondents would like to gives special concentration on matter of reports generation. Semi automation to full automation is considered as improvement by 5.8%, they expect it will be more beneficial to increase scope of software to whole group. Some respondents faces problem to get reports on their department performance. It indicates that user of today era is more professional and worried about to achieve his targets.

<table>
<thead>
<tr>
<th>Improvement factors in current automation (software) of supply chain</th>
<th>In (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customization as per company need</td>
<td>23.53</td>
</tr>
<tr>
<td>Better interlinking of Department</td>
<td>23.53</td>
</tr>
<tr>
<td>T-code standardization</td>
<td>11.76</td>
</tr>
<tr>
<td>need upgraded version</td>
<td>11.76</td>
</tr>
<tr>
<td>Feature of opening multiple window</td>
<td>5.88</td>
</tr>
<tr>
<td>Bar code implementation to be initiate</td>
<td>5.88</td>
</tr>
<tr>
<td>Generation of desired reports</td>
<td>5.88</td>
</tr>
<tr>
<td>increase scope of software to whole group</td>
<td>5.88</td>
</tr>
<tr>
<td>Department performance matrices through software</td>
<td>5.88</td>
</tr>
</tbody>
</table>

Table 5-32 Improvement factors desired by user

The graphical presentation of areas where respondents wants improvement, clearly shows that customization as per user requirement and better interlinking of departments, height of column is same and highest in among other factors.

Second highest column is of respondents who say that t-code standardization and current version of software need improvement. It means that project team has to consider this improvement in their second priority.

Third stage includes five factors which user feels are not up to desired level. The user face problem in working in multiple window as system get slow down. Some user of third stage feels that bar code scanning to be implemented in their organization. User also desired customization in report generation, user faces problems to monitor their department performance and it also hurdle them to take proactive decision.
The user want whole group to be covered under automation. It indicates that partial automation does not able to justify its existence in generate all benefits. The department head find it difficult to measure department performance through automation software. It means, project team did not synchronize software with departmental checking points.

![Improvement factors in current automation software](image)

**Fig. 5X** Share of improvement factor wise

Automation software is designed with universal applicability by automation solution Providers Company. It is quite possible that some features are not of use for a particular company, at the same time company may found system has its limitation to tackle their actual issue in routine
working. The respondents are given two options (yes/No) to share their view on practical issue faced by user in automated supply chain.

1) 24% says, their automation software does address their real life issues.
2) The remaining 76% are satisfied with current automation as addressing all real life issue of supply chain.

<table>
<thead>
<tr>
<th>Practical issue faced by user in automated supply chain</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Practical issue faced by user in automated supply chain</td>
<td>24%</td>
<td>76%</td>
</tr>
</tbody>
</table>

Table 5-33. Practical issue faced by user

The Graph shows majority of people do not face issue to work in automated environment of supply chain as highest column under category of option No. The lowest column represents respondents who are facing practical issue while working in automated environment.

The above graph shows that only 1/3rd of employees facing problem (issue related to real life example where system does not support). Understanding these issues and finding their solution will further increase success of automation project. Practical issue as indicated in this survey is as below.
The total success of automation will happen only when user real life concern get resolved. All comments received from respondents are tabulated as below.

1) The customer demand some time increase or decrease than scheduled demand. It means demand get change with respect to what is planned to manufacture. The automation software is not having scope to adjust this increased or decreased demand.

2) There is no common platform of ERP interface. A company has X software and its supplier has y software, both cannot interlinked.

3) Automotive industries provide monthly schedule to its supplier and supplier has to deliver material within a month but at scheduled time. In this instance a supplier gives material at last day of month and buyer is not able to use it in whole month. The automation software is not able to recognize this time default. When some one calculate supplier delivery rating, it will show the day of delivery with 100% schedule achievement.

4) Similarly user feels that software is not able to interlink supply chain with other department. The software in some instances has its own inbuilt limitation to address all issues. Some user says that their software is not showing material availability at each process stage.

It does not means that above discussed issue cannot resolve, almost all has solutions. It is result of problems left unidentified at project stage and absence of focus on continual improvement.

<table>
<thead>
<tr>
<th>Practical issue faced by user in automated supply chain</th>
</tr>
</thead>
<tbody>
<tr>
<td>Factors/scope</td>
</tr>
<tr>
<td>1) Unable to recognize market related fluctuations</td>
</tr>
<tr>
<td>2) Non-interface of ERP between different companies</td>
</tr>
<tr>
<td>3) Delay of material not recognized-System rigidity issue</td>
</tr>
<tr>
<td>4) Non linking with other department</td>
</tr>
<tr>
<td>5) software limitation to address all practical situation</td>
</tr>
<tr>
<td>6) current software not showing material available at each stage</td>
</tr>
</tbody>
</table>

Table 5-34 Practical issues faced by users

Modern technology is better and advance in feature. This is tried to verify through this research.
1) The 63% of total population told that they have no incidents when automation became obstacle or they are not able to perform their work due to automated supply chain.

2) 37% of total sample population has experienced the instances of automation as hurdle.

<table>
<thead>
<tr>
<th>Incidents when automation became obstacle</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>37%</td>
<td>63%</td>
</tr>
</tbody>
</table>

Table 5-35 Incidents of automation as obstacle (in %)

The graphical presentation shows that highest column is of respondents who feel that automation does not act as obstacle at any moment. The lowest column is of who faces difficulties to perform their task due to automation.

The project team moves by direction of leader who has expertise in information technology (automation software). He does not have exposure of all functions of organization. It is necessary for him to get feedback on automation before and after implementation. This way project leader can improve automation success rate. So, current research adds up this aspect as well. The
respondents asked their preference on challenging factor. Last option was kept blank as open ended question. No answer received against this open ended question.

Respondents choose to give their ranking to suggested options only.

1) Maximum numbers (102) of respondents out of 252 choose operation cost as first challenging factor.
2) 79 the highest frequency of respondents chooses complexity to understand software as fourth challenging factor.
3) The factor of accuracy in master data is also considered as fourth challenging factor with highest frequency of respondent’s choice as fourth.
4) The service level of MIS department maximum number of respondent is 71 and places this factor in two categories (71 considered it as 2nd challenging and 71 considered it as 5th challenging).
5) Accuracy level of MIS report is placed as 2nd by highest number of respondents as 55.

<table>
<thead>
<tr>
<th>Factors</th>
<th>(Ranking 1 to 5)</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operation cost of automation</td>
<td>102</td>
<td>39</td>
<td>55</td>
<td>32</td>
<td>24</td>
<td></td>
</tr>
<tr>
<td>Complexity to understand software</td>
<td>32</td>
<td>31</td>
<td>63</td>
<td>79</td>
<td>47</td>
<td></td>
</tr>
<tr>
<td>Accuracy of master data</td>
<td>55</td>
<td>47</td>
<td>55</td>
<td>71</td>
<td>24</td>
<td></td>
</tr>
<tr>
<td>IT/MIS department service level</td>
<td>39</td>
<td>71</td>
<td>39</td>
<td>31</td>
<td>71</td>
<td></td>
</tr>
<tr>
<td>Accuracy level of supplier schedule, MIS reports</td>
<td>39</td>
<td>55</td>
<td>39</td>
<td>39</td>
<td>79</td>
<td></td>
</tr>
</tbody>
</table>

Table 5-36 Response on ranking of challenges

To make interference of data proportion percentage is also calculated.

1) 40.60% of total sample population told operation cost of automation as first challenging factor.
2) 31.25% rank complexity to understand software as fourth.
3) Similarly accuracy of master data is also placed at fourth place by highest frequency supported by 28.12%.
4) MIS department service level placed at 2nd ranking in challenges factors by assigning 28.12 % of total sample population and equally percentage supported it to place at 5th rank. Some more test required to make interference.
5) Accuracy level of reports is also placed at 5th ranks by respondents with 31.25 percentages.

<table>
<thead>
<tr>
<th>Biggest challenge in supply chain automation</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operation cost of automation</td>
<td>40.60%</td>
<td>15.60%</td>
<td>21.80%</td>
<td>12.50%</td>
<td>9.37%</td>
</tr>
<tr>
<td>Complexity to understand software</td>
<td>12.50%</td>
<td>12.50%</td>
<td>25%</td>
<td>31.25%</td>
<td>18.75%</td>
</tr>
<tr>
<td>Accuracy of master data</td>
<td>21.87%</td>
<td>18.75%</td>
<td>21.87%</td>
<td>28.12%</td>
<td>9.37%</td>
</tr>
<tr>
<td>IT/MIS department service level</td>
<td>15.62%</td>
<td>28.12%</td>
<td>15.62%</td>
<td>12.50%</td>
<td>28.12%</td>
</tr>
<tr>
<td>Accuracy level of supplier schedule, MIS reports</td>
<td>15.62%</td>
<td>21.87%</td>
<td>15.62%</td>
<td>15.62%</td>
<td>31.25%</td>
</tr>
</tbody>
</table>

Table 5-37  Response on ranking of challenges (in %)

The tabulation form of data in percentage does not makes interference and conclusion clearly as same factor is placed at two places. Statistical testing will make better interference of ranking of factors.

Next chapter includes statically testing of data, which helps to make interference and converting data into meaning full conclusions.