5 IMPLICATIONS FOR SUPPLY CHAIN MANAGEMENT AND ORGANISATIONAL PERFORMANCE

Through this research work an attempt is made to examine supply chain dynamics of Indian telecom industry and identify key factors of industry’s supply chain which can enhance competitiveness of the sector. Study also assesses the existent parameters on which supply chain performance is getting measured and the way these impact organisation’s operational performance.

Based on the analysis of data collected, as analysed in the preceding chapter, implications with respect to every parameter are presented in this chapter. The findings derived from the analysis of collected data are presented based on major constituents of telecom supply chain, forecasting challenges in the sector, business model of ordering, challenges to indigenisation of telecom equipment, review of transportation scenario, relative impact of supply chain on revenue and cost of the sector, consequential damages coming to the sector due to challenges in supply chain, inventory and material planning scenario, usage of ERP package, warehousing operations and impact of supply chain on operational performance in terms of project performance, customer satisfaction and financial performance with separate consideration on revenue and cost.

Objective of examining the current supply chain dynamics of Indian telecom industry and identifying key factors of telecom industry’s supply chain competitiveness, is addressed through review of secondary data review and most of questions of primary data. Secondary data helped in examining the current supply chain dynamics and primary data helped in rating the key factors of telecom sector supply chain. Objective of assessing the existent parameters, on which the supply chain performance is measured, is addressed through question 17 of questionnaire where in respondents ranked consequential impacts of supply chain and high impacted parameters are identified on the basis of the same. Objective of identifying bottlenecks of supply chain performance and to find out the way they impact organisational
performance, is addressed through question number 3, 4, 11 and 29 where in respondents ranked multiple bottlenecks in order of importance and bottlenecks to performance of supply chain can be identified. Objective of suggesting ways to enhance effectiveness of supply chain operations, is addressed by proposing the response strategy for objective a, b and c. Based on secondary data review and primary data collection, ways and efforts were identified to overcome bottlenecks.

In order to test the hypothesis that there is significant impact between supply chain operations and operational performance of organisation, response is analysed for operational performance subcategories like marketing performance, financial performance in terms of revenue and cost, project performance, and customer satisfaction. To test the second hypothesis that supply chain management has more impact on cost rather than revenue of company cost and revenue parameters were ranked by respondents for question number 17 and 29 and result are analysed accordingly. Implications coming out from analysis for supply chain management are discussed in subsequent sections.

5.1 IMPORTANT CONSTITUENTS OF SUPPLY CHAIN MANAGEMENT

Based on sample data collected from respondents and obtained ranking as analysed in Section 4.2, following are significant constituents of telecom sector supply chain in order of rank obtained through data analysis:

a. Forecasting
b. Purchasing
c. Vendor development
d. Logistics
e. Analytics
f. Human resources
g. IT and ERP tools
h. Inventory Management
i. Warehousing
j. Training
Forecasting came out as most important factor based on respondents’ ranking. In the absence of accurate and timely forecast, players of industry are not able to forecast their requirement timely resulting into supply crisis to telecom operators. Due to this crisis scenario, indigenous players do not consider indigenisation of technology and hence resulting in negative trade balance for country. Telecom sector being high-technology sector requires a number of critical technical and commercial decisions to be made timely and accurately. Many of these decisions depend upon knowing the likely numbers of customers and their usage patterns that means demand forecasting. Based on analysis, forecast accuracy level for long term forecasts are significantly low and even for midterm forecast accuracy level is challenging and that means organisations are not able to visualise their demand with 90 per cent accuracy even in one quarter advance. Only during short term monthly forecast respondents feel that they can achieve satisfactory forecast accuracy level. With product delivery lead times going up to ten weeks or more challenges to supply chain are unavoidable which are impacting performance of supply chain and organisation performance. Since forecasting came out as most important constituent hence challenges to forecasting are discussed further in detail in Section 5.2.

Post forecasting, purchasing practices came out as most important factor which drives for success of supply chain in telecom sector and most of the respondents feel that it is one of the top six important constituents of telecom sector supply chain. In the absence of good purchasing practices achieving efficiency from supply chain is difficult. Telecom sector had adopted outsourcing model quite successfully mainly with multinational companies having origins outside the country. Organisations in telecom sector can gain further by adopting sound purchasing practices such as establishment of a principal supply chain group, aligning purchasing team organisation properly, use of optimum technological tools, ascertain partnership with major suppliers and promote collaborative sourcing, drive towards total cost of ownership, inventory optimisation, establishment of suitable controls on outsourcing to minimize risk

Ranked third is vendor development for developing new vendors for existing or new products which drives success of supply chain in telecom sector. Vendor development activities such as supplier evaluation, supplier training, product
development programme, measure supplier’s innovativeness, technical capability, and core competencies help any organisation to develop suppliers who can go with organisation in a long way. Logistics activities such as running order processing and transportations activities are ranked fourth by respondents. As observed during responsibility matrix of logistics activities, network operators outsource logistics activities to equipment supplier or to third party vendors with mix and match approach. Suggestion is to evaluate and determine global strategic logistics model so that specialist of field take up this activity and perform intelligent routing and consolidation.

Data analytics is ranked fifth by respondents one of the important constituents of telecom sector supply chain. Telecom sector supply chain by virtue of its design, deals in huge amount of data and at present such analytics have been ad hoc and scenario specific. Organisation had developed their own small segmented software to analyse data but had less success in methodically executing analytics across their operations. Human resources factor is ranked sixth by respondents as one of the important constituents of telecom sector supply chain. Organisations should accentuate processes to support higher management and employee support to improve the effectiveness of supply chain workforce and processes to overcome challenges to supply chain of industry.

IT and ERP tools are ranked seventh by respondents as important constituents of telecom sector supply chain. An efficient ERP system can increase simplicity across multiple supply chains by reducing multiple information distortions and increase information flow on real time basis. Also as reviewed ERP software is used for limited activities of supply chain of telecom sector and in order to bring further efficiency to sector it is must that ERP software is used across organisation for all functions.

Management of inventory is ranked eighth by respondents as another important constituent of telecom sector supply chain. Inventory management requires right material with right quality and quantity at the right time. Organisation that lacks control over inventory management plan enters into stock out scenario of few items impacting revenue of that organisation on one side and on another side, ends up in large quantity of other items resulting into excessive cost to that organisation. In order to avoid these
costs, organisation across sectors are entering into multiple partnership agreements which are resulting in risk transfer vide responsibility matrix of their respective contracts, rather than risk elimination by efficient supply chain management processes. These kind of risk transfer contract results in pull and push across partners and suppliers who offer risk bearing capacity got enriched with contract. All this risk transference comes at a cost which got built up in product or service cost resulting into impact or financial performance.

Warehousing is ranked ninth by respondents as one of the important constituents of telecom sector supply chain. By adopting prevailing best practices in warehousing organisation can cut time and cost in warehousing operation failing which organisation are wasting huge cost in terms of managing unbalanced inventory and manual operations. Training to human resources, cost optimisation efforts, and quality check parameters are mentioned by few respondents which impact performance of supply chain management in telecom sector.

5.2 FORECASTING CHALLENGES

Having briefly reviewed the present scenario of forecasting in telecom sector in India in Sections 4.2a, 4.5 and 5.1, it is confirmed that telecom sector is not able to forecast its demand in line with product lead time or development time. On further analysis, following challenges to forecasting could be identified:

a. Regulatory Scenario and Business Approach

With sudden growth in this evolving industry marred by multiple scams regulator is forced to impose tough and too much dynamic regulatory norms. This dynamism in regulatory scenario is spreading confusion in the industry resulting into difficulties in prediction and anticipating the future demand. With new government in place in 2014, expect that tough regulatory environment shall prevail in next five years at least. Tough regulatory scenario impacting revenue growth is putting pressure on industry to monitor and control cost and is resulting into business approach of putting pressure on faster rollouts of projects with short term or negligible forecasts. These urgencies and approach of addressing projects in killing time leaves the important aspects of
forecasting and results into addressing the immediate requirement with available technology or product line.

b. Forecasting Tools Techniques and Metrics for Measuring Supply Chain Performance

In the absence of any tool for forecasting which can capture variability of business environment of telecom sector and translates into product or component level forecasting, most of the forecasting in the sector is manual. This manual forecasting approach is based on predictive or judgmental capabilities of individuals which vary overnight resulting into very low or negligible forecast accuracies. Forecasting doesn’t seem to appear in hierarchy of structured supply chain metrics of telecom sector’s organisation in India and it becomes difficult to judge the approach to continuous, effective, and efficient performance measurement and improvement in forecasting. Hence, it becomes difficult to identify the most effective corrective action to be taken for lack of IT tools, processes, and professional competencies to achieve accurate forecasts.

c. Fast Changing Technical Environment

With influx of smart phones, data growth is clearly visible and expects a data explosion in next five years. Industry especially operators have to refocus their efforts on engaging customers through services and experience. With advent of new technologies every year to address data growth and due to competitive requirement, telecom service provider finds forecasting tough across multiple technologies.

d. Consumer Reaction to Market Strategies

Forecasting of any equipment or a service requires considerations of dynamics of the market and which is not easily attainable in Indian scenario. Sometimes trend data from other global markets is available but an unsettled market environment may render past data not just useable but this data may obstruct the forecaster from recognizing new opportunities, variations in trends, and market dynamics. When so ever new product and service is launched by telecom service provider considerable opportunity exists for each consumer regarding the product and service characteristics, and as a result significant uncertainty exists to forecast the likely levels of demand as consumer
reaction towards opportunity is un-predictive. In addition, the long planning and implementation periods required for many new telecommunications services may add to the forecasting uncertainty.

e. **Synchronisation of Deliverable across Constituents of Supply Chain**

Multiple products components or subassemblies are required to address requirement of a new site. To optimise the immediate cost of purchase buyer goes for buying the product from multiple sources but by virtue of different supply chain for these products lead times of these varies and some of the time these variations can go up to 8-10 weeks as well impacting deliveries and future forecasting of projects.

f. **Understanding of Supply Realities**

Most of the time key decision makers do not or do not want to understand supply realities of organisations associated as they consider threat of business loss will drive supplier to deliver the goods in timely manner without forecast. This results into short term forecasts based on their immediate requirement making it challenging for supply chain.

g. **Trust and Collaboration Level amongst Supply Chain**

Due to competitive scenarios across equipment vendors there are aggressive marketing approaches to commit deliveries to telecom service providers without forecast. Failure to meet those commitments reduces trust and transparency levels among constituents resulting into increased challenges to forecast towards equipment and component vendors. In case supply chain constituents understand and collaborate with each other to identify and de-risk the challenges to forecasting the accuracy level of forecasting reduces but in case these constituents remain in their water tight boundaries of their respective contract challenges to forecasting remains.

**5.3 BUSINESS MODEL AND FREQUENCY OF ORDERING**

Business model of delivery of products in the telecom sector is mainly on two models one is for box delivery and second one is for capacity built up. Box delivery model includes scope of supply completion till delivery of equipment at warehouse. Capacity build up oriented model call for extending scope of delivery till the equipment is
integrated in network and starts generating capacity and in few cases it includes management of operations as well. Based on primary data review, it is concluded that at present organisations in industry are using delivery models for both box delivery as well as that of capacity built up model. Capacity built up model is on downtrend side as of now which is unlike the scenario ten to twelve years when capacity built up model was the preferred model which gave rise to strong partnerships among telecom service providers and equipment vendors. However, there is still an appreciable presence of capacity built up models with multinational manufacturers because of previous long term contracts or available financing options from these multinational manufacturers or their origin countries which skew behaviour of telecom service provider towards imports or Indian manufactured products made by these multinational manufacturers rather than pushing for Indian products. Shift from capacity built up model to box model can bring opportunities for new players because service providers may not have long terms contracts and commitments towards capacity in their network. It is up to Indian industries to grab this opportunity for indigenising telecom products and increase the market share for Indian products so that foreign exchange outflow can be reduced.

Order cycle in case of overseas companies is better than that of Indian companies whether it is manufacturing or in trading this may further add into non-commitment of Indian entities to opt for manufacturing of these telecom equipment because in order to spend on development of product for Indian market and giving competition to the established multinational manufacturers needs to have comparatively long term commitments from service providers. Similar trend of long term commitment of buying specific product is observed in automobile companies in India where indigenisation level could be achieved because parent company placed long term annual purchase order for specific components on Indian supplier or agreed to take development cost for this equipment. This helped the automobile sector to achieve indigenisation target for the products being made for Indian market and which resulted into reduced outflow of foreign exchange from country.

Indian products have advantage in terms of lead time and product can be supplied in less than or equal to six weeks which is unlike the scenario for MNC manufactures of having origin outside India. Most of the raw material of these MNC
manufacturers shall be imported and hence time for getting raw material in India and doing value addition in Indian facilities is taking higher time and this challenge is being faced by all goods having low value addition in India. Since dependence on import is quite high these products get stuck in global shortage scenario like principal sitting in Europe or China may first supply to telecom service providers of other countries where margins are high and hence may result in delay of the projects or increase in cost so that margins of equipment are at par with that of developed economies hence putting extra burden on Indian economy by higher foreign exchange outflow.

As observed during primary data collection that comparatively telecom service providers don’t commit long term to their Indian suppliers for type of components required. Since order cycle for Indian suppliers is three months or less and in fact, it can go to ad hoc basis as well. That means service provider orders as and when required without considering the lead time. This results into non-visibility of long term off-take from Indian supplier and they don’t infuse much of capital in building up the capacity which results into capacity shortage or non-availability of material in time of need hence forcing service provider or equipment supplier to import goods. That is in spite of the fact that Indian products have advantage in terms of lead time and product can be supplied in less than or equal to six weeks unlike for MNC manufacturer in India where equipment supply may take comparatively higher because of lead time required from them for importing raw material and lead time can go up to ten weeks or more from these overseas manufacturers.

5.4 CHALLENGES TO INDIGENISATION OF TELECOM NETWORK EQUIPMENT

Post review of manufacturing scenario of telecom equipment in Section 4.6 and Section 4.7, it is established that country is not able to fully utilise the upsurge in telecom sector. Though the sector is able to bring money to economy in the form of foreign direct investment but on the other side huge amount of foreign exchange is flowing out in the form of pay out for the imported equipment or raw material, cost of IPRs, and profits to principal owners of multinational corporations. Central government and other stake holders realise these challenges for manufacturing in India and they
came out with few recommendations and steps to promote Indian manufacturing but results are not promising in increasing manufacturing and designing telecom equipment or its components. This results into huge amount of imports to meet ever-growing demand of this dynamic sector which offers unprecedented growth.

In spite of the fact that lead time of Indian telecom equipment is comparatively lesser, but still most of the buying is happening from multinational manufacturers having manufacturing within country. Though import value share trend had shown a reducing trend from 2011 to 2014 but this had given rise to Indian manufactured bucket and not that to Indian product as observed from secondary data review because overall import figures in country had shown an increasing trend (Figure 3-8) that means outflow of foreign exchange from Indian economy remained heavy.

Having briefly reviewed the existing state of manufacturing of telecom equipment in India, it is quite clear that in spite of efforts and recommendations from multiple stakeholders’ scenario did not change much over last two decades. Based on the primary data analysis, following are challenges which are there for indigenisation:

**a. Non-availability of Indian Products**

On enquiring about the high import value share content, the non-availability of Indian products or manufacturer came out the prime reason where in 53 per cent of respondents rank it as number one reason for not buying within country. During secondary data review it was found that actions were taken by government to promote Indian manufacturing but results are yet to be seen as there is no appreciable increase in Indian products.

**b. Quality of Indian Products**

Quality of Indian product is the second highest rated equipment with 47 per cent of respondents rating it in top two ranks. On one side product range is too less from Indian products and on the other side quality of products pose challenges for the telecom service provider to order it from Indian manufacturer because at the end they are also providing services to end users and can’t afford to increase down time of equipment by
implementing a product which is not assured of meeting performance quality parameters, as it is going to impact network quality.

c. Better Financial Deals
Better financial deals being offered by the overseas companies or their countries came out as another reason which has got one of the highest ratings. Example of former is like offering financing of products being supplied by supplier themselves or in order to gain new market supplier offers swap of old technology products with new technology products on free of cost basis. Example of second case is like finance being offered by source country’s banking and financial institutions and in turn securing future business for their country’s organisations. Better financial deals are ranked third by respondents, as 52 per cent of respondents rated it between ranks of one to five and at least 38 per cent respondents rated it between ranks of three and four.

d. Lead Time
With presence of approximately a dozen telecom service providers, market is highly competitive where each one of them is fighting price war and network quality challenges. Due to this aggression in market, sense of urgency always prevails and hence, products are being picked from available product range of prevailing suppliers without putting energies on indigenisation of these units which may take high lead time to develop. Lead time is ranked fourth by respondents as 57 per cent of respondents rated it between ranks of one to five.

e. Price Advantage
Products already available in current range of prevailing global suppliers will be having comparatively lesser cost to start with because those products had already been developed for global markets and development cost per unit is lesser while new Indian products requiring heavy development charges may have a higher cost in the beginning phase, though this cost may come down in longer range as economy of scale may be achieved by increasing volumes after increase of exports of same product. Price advantage is ranked fifth by respondents as 51 per cent of respondents rated it between ranks of one to five.
f. Global Commitments / Obligations

With more and more global telecom players entering into Indian telecom space that have the global frame contracts with global telecom equipment manufacturer, chance of Indian products getting a break in these global telecom service provider business is always going to be a challenge. Same is ranked sixth by respondents as 57 per cent of respondents rated it between ranks of one to six.

g. Aggressive Business Scenario

With fierce competition and dynamic technological environment where in every six months there is new technological development at global level, telecom service providers are working aggressively to improve network quality and hence giving users a global network experience. In such a scenario indigenisation push received a back seat from telecom scenario. Same is ranked seventh by respondents as 62 per cent of respondents rated it between ranks of four to seven.

h. Ease of Installation, After Sale Service and Warranty Policies

Though rank in last two by respondents, but ease of installation and after sale service play major roles while considering global players for awarding business. Telecom service providers enter into end to end deployment and operation contracts with equipment provider hence giving confidence to telecom service provider as risk of poor quality is transferred to equipment provider itself. Some of the equipment vendor goes up to replacing 100 per cent equipment in case of any discomfort to customer even if that product is working successful in other countries. Such end to end services by Indian companies is still non-existent.

i. Other Reasons

With swift evolution in this growing sector tainted by numerous scams government regulator is obligated to enforce harsh regulatory norms and due to multiple lobbying by multiple stake holders these norms keeps on changing. Due to this regulatory scenario norms there is multiple interpretation prevailing in industry which make it cumbersome for Indian suppliers to anticipate a business case since there is no surety of future demand. With arrival of changing technologies every year in this competitive
market telecom service provider need to adapt network changes swiftly and these pressures for changes in technologies makes it difficult for Indian suppliers to develop product for Indian market.

5.5 AWARENESS OF PURCHASE STRUCTURE BY VARIOUS VERTICALS OF ORGANISATION

During review of equipment manufacturing scenario, it was established that there are multiple products with intricate technologies (Table 3-3) and purchasing structure exists in sector (Table 4-13). In order to achieve best performance in supply chain, it is must that structure of purchasing is known to stake holders so that purchasing inputs can be first time right and rework in performance can be avoided. Based on survey data collected by respondents, (Table 4-11) technical planning team who plans the equipment requirement for the network is the one who knows most about purchasable products followed by purchasing team.

Project and operations team, who own most of field execution activity in field, is another major key stake holder as they are demand organisation towards supply chain. Based on primary data analysis though most of project and operations team knows about purchasing structure but appreciable amount of respondents feel that execution team either do not know or moderately know about purchasing structure. Similarly situations prevail for purchase controlling team as well. This may result in scenario where in a demand is raised by demand team of any component which supply team is not able to execute because purchasing level is different and because of gap in understanding multiple man efforts are being wasted.

5.6 REVIEW OF TRANSPORTATION SCENARIO

During review of response of survey data for primary transportation from Indian supplier locations to customer warehouses, (Table 4-31) it is confirmed that in majority of cases equipment supplier is responsible for primary transportation and activity is further out sourced to third party logistics (3PL) provider. Certainly, deliver duty paid (DDP) is a good delivery term to have, only point need to be taken care is selection of 3PL in such a way that material reaches to customer at right time, in right quantity with right condition. However, for secondary transportation from network operators’
warehouse to site (Table 4-36) and reverse transportation form site to warehouse or site to site, (Table 4-37) network operator owns the transportation activity with support from 3PL and equipment supplier, with exception in few cases where equipment vendor is responsible that means though inventory in customer warehouse belongs to network operator but responsibility for handling remains with that of equipment vendor. This can become little bit cumbersome as there are too many players and handovers in process which will result in increased amount of co-ordination and manual tasks. Result of the same is reflected in delivery accuracy and quality of transportation.

In case of delivery accuracy in transportation majority (Table 4-38) of respondents confirm that delivery accuracy in case of primary transportation is greater than 70 per cent but scenario in case of secondary transportation is comparatively lower as lesser number of respondents confirm that delivery accuracy in case of secondary transportation is comparatively lower. In case of reverse transportation challenge is further bigger as further lower number of respondents confirming delivery accuracy of transportation. Similarly for quality of transportation, (Table 4-39) majority of respondents confirm that in case of primary transportation damages are less than 10 per cent and scenario in case of secondary transportation and reverse transportation, damages are comparatively higher because of multiple handovers and co-ordination issues. There is no second thought on this aspect this challenged delivery accuracy and quality of secondary and reverse transportation post additional cost risks for organisations in sector which is reflected while reviewing the cost as well. While reviewing the cost (Table 4-40) of transportation majority of respondents confirm adherence to budget in case of primary transportation logistics cost while adherence to budget in case of secondary and reverse transportation is comparatively lower. Certainly an improvement opportunity exists here for bringing down these delivery, quality and cost challenges.

Primary transportation for freight forwarding from overseas supplier, (Table 4-32) equipment supplier is responsible and equipment supplier is supported by third party agency for this purpose. This gives unity of command for directions to follow and give added benefits to organisations. However, for import licensing from regulatory authorities (Table 4-33) telecom network operator is prime responsible with support of
equipment supplier and in few cases operator had outsourced this to equipment vendor but all compliance related requirement remains with network operator because as per regulatory guidelines it is network operator who owns spectrum and compliance to spectrum related guidelines need to be carried by telecom service provider.

For custom clearance from Indian port, Table 4-34 it seems to be joint responsibility among network operator, equipment supplier, and third party agency. On further detailed analysis with few representatives and scenario of situation it is understood that, from regulatory perspective it is responsibility of network operator and all documentations are in name of telecom network operator but in few cases telecom operator had outsourced this custom clearance activity to equipment vendor who in turn has hired specific third party agency to deliver these services.

5.7 SUPPLY CHAIN IMPACT ON REVENUE OR COST

Supply chain impact financial performance of any organisation and organisations evaluate their financial performance on a high-level of financial goals or objectives which are being reported on monthly to quarterly or yearly basis, such as operating or net income, return on investment, (ROI), return on sales, profit margin, contribution, and earnings per share. These financial performance factors are important as these reflect the financial results of business decisions organisation take in day to day activities and all stakeholders understand this language of financial performance of business operations.

Results of these financial factors are impacted by supply chain decisions which organisation takes. An effort is made to review impact on financial performance parameter from supply chain decisions and same was analysed in previous Section 4.9. After analysis it came out clearly that supply chain impact revenue more than the cost and this understanding needs to be spread across supply chain constituents across sector. Revenue and cost factor are analysed with ten sub-factors like loss in revenue, loss in market share, brand value damage, lost opportunity to win over competition and goodwill lost relates to revenue directly. Increased rework cost, loss of anticipated cost saving, increased scrap cost, premium freight payment, and higher inventories contribute to cost to organisation directly. Other than these top 10 factors, losing
supplier confidence due to lack of forecasting, scarcity of material, loss of functional value are mentioned by few respondents which are getting impacted by performance of supply chain management in telecom sector. Losing supplier confidence is linked with lost good will and brand value damages which are already considered. Scarcity of material is related with loss in revenue hence that is also considered in above ten factors.

Table 5-1 Matrix for Supply Chain Parameters with Factor of Financial Performance

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Supply Chain Parameters</th>
<th>Impact on Factor of Financial Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Delivery Lead time</td>
<td>Revenue of organisation</td>
</tr>
<tr>
<td>2</td>
<td>Transit time for delivery</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Right product quality</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Out of stock scenario</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Batch size</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Right location of delivery</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Single or multi vendor scenario</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Supply chain team efficiencies</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Forecast of requirement</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Delivery cost</td>
<td>Cost to Organisation</td>
</tr>
<tr>
<td>11</td>
<td>Product development cost</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Inventory carrying cost</td>
<td></td>
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<tr>
<td>13</td>
<td>Packaging cost</td>
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<tr>
<td>14</td>
<td>Batch size</td>
<td></td>
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<tr>
<td>15</td>
<td>Distance between customer and supplier</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Non modvatable taxes</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Out of stock scenario</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>Premium fright payments</td>
<td></td>
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<tr>
<td>19</td>
<td>Single or multi vendor scenario</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>Rework Cost</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>Forecast inaccuracies</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>Product selling cost</td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>Warranty periods</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>Logistics transaction correctness</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>Exchange rate fluctuations</td>
<td></td>
</tr>
</tbody>
</table>

In order to overcome this challenge, organisations need to create a matrix showing linkages of these financial parameters with supply chain parameters. With
development of this linkage matrix it is possible for organisation to clearly establish impact on financial performance from supply chain of organisation and analyse their acts in a way to optimise financial performance. Ratios to which these supply chain parameters impact factors of financial performance vary from organisation to organisation. Organisations based on their individual parameters can define these ratios and track these deliverables. A sample list of supply chain parameters impacting financial performance factors is listed in Table 5-1. Also as concluded for hypothesis 2 in Section 4.9, supply chain management impact not only cost but revenue also equally in-fact more than the cost, hence it is must that linkages between revenue and supply chain parameters need to be clearly established in organisation. Once these above mentioned linkages are clearly established in organisation, it helps organisation to align supply chain strategies with overall business strategy of organisation and help organisation to be agile by bringing flexibility in supply chain. In fact customer problems can be envisaged timely and solutions can be proactively implemented in supply chain helping with a satisfied customer resulting in a long term association and increase revenues. With inbuilt flexibility in supply chain, organisation can react to demand variations more assertively and can deliver product timely helping organisation to realise revenues pretty quickly.

On cost front, optimisation of supply chain processes results in reduction in the cost which translates into increased margins straight away. Cost of products can be optimised through sourcing of products strategically, optimisation of purchasing processes, ensuring sound demand and supply management reducing obsolescence. Warehouse and logistics optimisation efforts can be reduced by planning transport routes, optimising warehouse spaces and strategic positioning of the same, optimising skill based manpower, and automation in warehouses. Forecasting with more accuracies shall result in reduction of obsolescence hence reducing cost of obsolescence straight way and will also help in reducing man hours getting wasted to meet urgencies getting cropping up due to inaccurate forecasts.
5.8 SUPPLY CHAIN PROCESSES AND COST OF CONSEQUENTIAL DAMAGES

In order to ascertain parameters on which supply chain performance is getting measured respondents are requested to rate supply chain process with cost of consequential damages. (Table 4-52) Logistics processes of warehousing and transportation such as primary, secondary or reverse transportation where in maximum number of respondents confirmed that these are getting measured and being captured in business case accordingly. But measurement scenario is challenging for other important constituents such as forecasting process, training process to supply chain resources, supplier selection / evaluation process, and material planning process where comparatively higher number of respondents feel that either there is no measurement or cost is not captured in business case.

Absence of measurement of forecasting can pose major challenges to supply chain and impact ultimately to financial performance of organisation both in terms of revenue and cost as well as to marketing performance as well. In the absence of forecasting, a huge amount of risk remains that organisation will not be able to meet deliveries required by customer impacting revenues of organisations and on the other side there can be few components which get secured but enter into obsolescence impacting cost to organisation. Similarly in the absence of structured training process to supply chain resources, impact to supply chain performance is certain. As such, with right training and performance measurement processes a company can assess prevailing level of their supply chain and implement future course of action for improvement. Other than the conventional methods for analysing performance of training process for supply chain, few new developments have been made in supply chain performance development such as balanced scorecard, Supply Chain Council’s SCOR Model, logistics scoreboard, activity-based costing (ABC), and economic value analysis (EVA). Organisations need to leverage these tools to measure supply chain performance and implement new training programmes.

Supplier selection / evaluation process is another critical process which impacts performance of any organisation. Supplier selection is one of the most significant expectations from supply team because selection of suppliers can influence the price,
quality, delivery consistency and accessibility of organisation’s products and can help to bring down product costs without compromising on quality. Hence, a competent supplier selection process needs to be adopted for successful supply chain. Material planning process is another parameter which impact supply chain performance of organisation. As observed during demand planning review, (Table 4-63) most of the demand is rollout planning based but that planning is getting executed in a shorter span than that of lead time due to which partial products are not delivered as per expectation resulting in unbalance inventories and challenges to supply chain remains impacting performance of any organisation.

5.9 INVENTORY AGING SCENARIO
Inventory optimisation is one of the biggest opportunities improving financial performance of organisations. As exhibited earlier (Table 4-57) because of challenges in forecasting and material planning in telecom sector, inventory figure is too high and inventory in aging bucket of greater than 90 and 180 days projects another grim picture. These inventories can exist in any form either in warehouses, in-transit, or even on sites. Being fast paced technology oriented sector obsolescence of available inventory is another major challenge to sector. Challenges to financial performance due to inventory can go beyond direct costs and impact organisation performance through multiple factors such as stock-outs that reduce revenue, delay in order fulfilment impacting order to cash cycle, increase risk of penalty pay-outs due to delay in deliveries, higher expenses on increased working capital, and on account of cost to take care of inventories. To summarise inventory challenges can impact budgeting, demand forecasting, allocation of critical resources, and business strategy.

In order to overcome this, organisations in the sector need to adopt inventory optimisation solutions by putting enhanced focus on improving accuracy of material forecast, improving alignment between service provider and supplier for material planning, plan resolution of obsolescence and optimise inventory levels without impacting revenue of organisations.
5.10 ENTERPRISE RESOURCE PLANNING PACKAGE USAGE

On reviewing supply chain’s ERP tools being used in the sector, (Table 4-62) most of respondents confirmed that organisation in the sector are using SAP and Oracle. Both these packages are leading supply chain packages available in the market. But on detail analysis respondents confirm that these established software are being used for ordering and issuance of material to site but same package is not getting used or being partially used for important activities of forecasting, system based material planning or scheduling, and for closure of deployment processes. Understand from representatives of automobile industry, these software packages offers forecasting and scheduling in automobiles companies but such development or customisation is not observed for telecom sector on the basis of respondents’ view point. In the absence of this customisation from these major software players, organisation resort to some small inbuilt software packages or Microsoft Excel based worksheet to execute these tasks. Marriage of these software packages to ERP software is not possible because of copyrights issues and other technical glitches on software package. In the absence of this end to end process closure, organisation and sector’s performance remain impacted. Understand dynamics and operating environment of telecom sector is different than that of any other sector and because of complexities of engagement of multiple players, it is challenging to capture variability of environment of telecom sector but certainly prospect exists for software providers to develop software which can offer end to end supply chain process closure and enhancement of performance of sector.

Further on for activities where these ERP software is being used, package remain closed for data processing and reporting for one to three days in a month, so practically working month of 22 days stands reduced to 19-21 days, in case there are no holidays other than weekends. Scenario becomes further challenging in case week end falls along with monthly closure. But being a high growth centric sector, opportunities exists for these ERP developing companies to review forecast and scheduling scenario and come out with specific packages to address challenges in the sector. This development shall help service providers, equipment vendors and other major players to increase revenues by capturing variables demand forecasting timely and schedule can be released to suppliers timely. In parallel this development will help these organisations to reduce
cost of obsolescence and cost of crisis management which is getting cropped up as on date due to ad-hoc planning and scheduling. While working on development of new package specific to telecom sector factor of closure also need to be kept in mind.

5.11 MATERIAL DEMAND CYCLE

Material demand cycle is the process of raising demand toward suppliers based on which supplier supplies the material. Based on primary data collected, (Table 4-63) most of respondents submit that material demand cycle is based on rollout delivery based that means even if customer or telecom network operator had released purchase orders yet green flag for material delivery is given to supplier only when rollout confirmation is there. However, there is presence of cases where material is being demanded based on purchase order only that means no separate delivery schedule is being released and supplier delivers material based on purchase order only. In case demand cycle is rollout delivery based then it is must that rollout should be planned timely so that synchronised delivery of material can happen timely. However as observed during primary data most of respondents submit that material rollout planning is on monthly, weekly or ad-hoc basis as and when required. Very few respondents agree that material rollout planning is being done on quarterly or on higher time interval basis. To conclude, scenario is such that rollout delivery plan is being shared with suppliers in a window which is less than the lead time of products which are going up to 10 weeks and due to this reason supply chain teams of the sector keep on doing crisis management.

Due to this crisis management, organisation end up in building up enhanced buffer stock to compensate for gap in delivery lead time and delay in communication of delivery schedule. This buffer stock built up carries a coupled business cost and on another side the prospective stock outs due to shortage getting cropped up due to late communication of delivery schedule can impact on organisation’s revenue and customer service levels. Supply chain of sector need to concentrate on this planning aspect critically so that delivery schedule communication need to be done timely through timely forecast, stress on consistent processes and strong communication channels between telecom service provider and equipment or infra service providers.
5.12 WAREHOUSING OPERATIONS

In order to manage huge inventories getting generated due to above mentioned practices in the telecom sector, a good warehouse space and management of the logistics activities in warehouse is must. In most of scenario storage space of equipment is being arranged and managed by third party agency appointed by telecom operators. (Table 4-64) These warehouse spaces and logistics operations are carried out by these third party logistics operators on behalf of telecom network operators. Equipment service and deployment partner support telecom operators and appointed third party agency. Material handling within warehouse is also being managed by same third party agency and equipment service / deployment partner guide and support for their equipment for kittling and packaging instructions wherever required. (Table 4-65)

Warehouse activities such receiving, dispatch, following FIFO (First in First out), delivery accuracy (no shortage dispatch), and delivery quality (no equipment damage) getting delivered by these third party logistic service providers are analysed. (Table 4-67) For receiving at warehouse quite a good number of respondents submit that once vehicle reports at warehouse, it has to wait for more than four hours at least half of time. Similar feedback is received for dispatches of material. This kind of delay in receiving and dispatch results in wastage of resources and excessive cost for organisation. On following concept of FIFO Principle, most of respondents feel that FIFO is not getting followed up which results in an increase in the cost of obsolescence. In this fast changing technology sector as when so ever any new product is launched, it comes with better technology and capacity, which discourage users to use inventory of old products hence resulting in increase of obsolete inventory. On performance of warehouse operations in terms of delivery accuracy and quality, approximately one third of respondents feel that delivery accuracy is not good and failing at least two third of time. Similar trend is observed for delivery quality as well where in again one third of respondents submit that at least two third of time equipment is getting delivered with damages. Delay which is getting cropped up due to this gap in delivery accuracy and quality, results in shortage of equipment at sites and ultimately resulting into project delays impacting revenue of organisation. Cost being incurred to repair the situation or
product results in additional cost to projects. Hence these performance issue impacts both revenue and cost of organisation.

5.13 OPERATIONAL PERFORMANCE OF ORGANISATION

As reviewed in Section 4.15 sub-factors of operational performance of organisation are related with supply chain’s constituents of telecom sector and supply chain operations impact operational performance of organisation significantly. Impact of supply chain on project performance can be in terms of ultimate final closure timeline of projects, quality of products or work performed, cost or any other deliverable of projects. Any delay in supply of equipment will delay the project end closure date hence impacting delivery timelines. In order to push for recovering the project timelines, organisations push suppliers, service providers or deliverable entities within its own organisation which results either in cost overrun due to ramp up of additional resources or results in poor quality of deliverables from project, hence supply chain impacts project performance in all three indicators of project performance that is time, cost and quality.

Supply chain’s cost to organisation can be in terms of cost of material being sourced from supplier or it can be services of supply chain executives or cost of warehouse and other logistics service. All these costs contribute to financial performance organisations in terms of cost constituents as any variability in cost of material, services staff, warehouse space or any other service straight away impact its cost performance. Revenue of organisation can also get impacted from supply chain operations in terms of revenue coming from direct product supplies or in terms of revenue coming from services being rendered. Financial performance of any organisation which is getting impacted from cost or revenue can be guessed from financial results, such as return on investment (ROI), return on sales, profit margin, and contribution but real impact on financial performance needs to be monitored by organisation at project level by establishing linkages of supply chain constituents with organisation performance.

Sales and marketing performance is likely to get impacted by supply chain of organisation because it helps to demonstrate delivery capability of any organisation. The marketing efficiency of any organisation can be observed from the trends in its
turnover and market share. The factors for marketing performance are sales growth, market share, overall competitive position, and overall product quality. Since organisation are not able to deliver the goods timely to customer hence further sales and marketing performance is getting impacted due to efficiency of supply chain in delivering goods.

Post review of financial performance, project performance and marketing performance it is certain that supplier chain operations are going to impact customer satisfaction which relates to the fact that how much customer is satisfied with supply chain practices which can be in terms of delivery time, quality of product, cost of product, serviceability of product and softer aspects of supply chain. Meeting these customer expectations will result in a satisfied customer but in present globally competitive scenario merely customer satisfaction is not sufficient. Supply chain needs to work on customer delight and need to offer products and supply chain services to differentiate the same from competitions and to gain inclination with customers by enhancing the value provided to them. Hence for all supply chain services being offered to customer, analysing these constituents from customer satisfaction perspective will aid to a long term sustainable path for value addition in this sector.

5.14 SUMMARY OF IMPLICATIONS

To summarise the implications for the supply chain management, study brought forwards major constituents of telecom’s supply chain in the country. Prevailing regulatory scenario, non-availability of forecasting tool, fast changing technical requirement, consumer reaction to market strategies, synchronisation requirement of deliverables, understanding of supply chain realities and trust and collaboration level among constituents came out the major challenges due to which the sector is not able to forecast the demand strategically resulting into increased challenge for operational supply chain of the sector. Non availability and quality of Indian products, better financial deals by overseas manufacturers, lead time and price advantage, global commitments, aggressive business scenario, ease of installation and after sale service are major challenges to indigenisation of the telecom equipment resulting into the inflated import bill for the sector and leakage of foreign exchange from the country.
Supply chain operations impact financial performance of organisation in the sector in terms of both revenue and cost. Relative impact on revenue is higher in comparison to cost of the sector. Organisations need to develop matrix for factors impacting revenue and cost and the mathematical model developed from this matrix can help to predict impact of supply chain operation on financial performance of organisation. Implications from operational performance perspective can be in terms of impact in project performance, customer satisfaction, sales/marketing performance, and financial performance. So in order to improve the operational performance in terms of these sub-factors of operational performance, it is must that supply chain operations needs to be worked upon in respective organisations. Other than these parameters of hypothesis testing, implications for awareness of purchase structure, aging of inventory, transportations and logistics scenario, consequential damages’ scenario, ERP usage, material demand cycle and warehousing operations are analysed and presents important constituents which contribute to improve the competitiveness of organisational performance.