6 SUMMARY OF FINDINGS AND RECOMMENDATIONS FOR FURTHER RESEARCH

The study was set out to review supply chain operations and organisational performance in telecom industry and aimed to verify various factors of supply chain impacting performance on organisation level in telecom sector. It further aimed to verify and validate key functions of supply chain of telecom operator. The study has also sought to examine the current supply chain dynamics of Indian telecom industry and to identify key factors of telecom industry’s supply chain competitiveness. Further on study has sought to assess the existent parameters on which the supply chain performance is measured and to identify bottlenecks of supply chain performance and to find out the way they impact organisational performance. Study attempted to cover all facets of telecom sectors’ supply chain such as forecasting, purchasing practices, business modeling, manufacturing and import scenario, challenges to indigenisation of telecom input products, inventory management, warehousing and transportation scenario, material demand cycle, ERP software packages, and supply chain impact on organisational performance. Based on identified parameters and bottlenecks, study attempted to suggest ways to enhance effectiveness of these supply chain operations. The study sought to evaluate two of its hypotheses that there is significant impact between supply chain operations and operational performance of organisation and supply chain management has more impact on cost rather than revenue of company.

6.1 SYNTHESIS OF RESEARCH FINDINGS

The main empirical findings are chapter specific and were summarized within the empirical chapter 4 and 5, namely supply chain bottlenecks and their impact on competitiveness: Empirical analysis and discussions and implications for supply chain management. This section will synthesize the empirical findings to answer the study’s two research hypotheses.
Majority of respondents agree that supply chain operations impact operational performance of organisation in terms of performance parameters of project performance, financial performance, sales and marketing performance and customer satisfaction. As a result of the study it is found that supply chain operations impact these performance parameters to major extent hence the hypothesis is accepted. This impact on operational performance can be in terms of any of the following performance parameters:

a. Project performance can get impacted from supply chain operations due to changes in final closure timeline, quality, cost or any other deliverable of projects. Due to delay in timely delivery of equipment, tools or logistics services, project end date can get shifted and if organisation tries to crash the project by pumping in additional resources, it results in additional cost to project or impact quality deliverable of project because new resources hired for short term may not meet quality parameter most of the time as there is no adequate time for training and competence building.

b. Financial performance of organisation can get impacted by supply chain operations due to cost of material being sourced from suppliers, services’ cost of supply chain team, cost of logistics service such as warehousing and transportation, and cost of consequential damages due to supply chain operations. 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. Real impact on financial performance needs to be monitored by telecom sector at project level by establishing linkages of supply chain constituents with organisation financial performance.

c. Sales and marketing performance can get impacted by supply chain operations as it impacts expression of delivery capability of any organisation and impacts sales growth, market share, overall competitive position, and overall product quality. Organisation having challenges in timely delivery of right product at
right cost with right quality can get impacted by its sales and marketing performance due to efficiency of supply chain in delivering goods.

d. Customer satisfaction of organisation’s customer can get impacted by supply chain operations as these operations impact customer expectations related to delivery time, quality of product, cost of product, serviceability of product and softer aspects of supply chain. In present globally competitive scenario organisation performance can be improved by working on customer delight rather than working on customer satisfaction and organisation need to pre-empt the customer expectation and offer products and services through such differentiation that value of service can get differentiated.

Based on respondents’ feedback and empirical analysis, hypothesis for supply chain impacts more on cost than on revenue, needs to be rejected as study brought that supply chain operations impact revenue more than the cost. Impact to revenue can be due to supply chain parameters such as product lead time, transportation time, product quality, stock out scenarios, batch sizes, delivery accuracy at destination, supplier selection criteria such as single vendor or multi-vendor, effectiveness of supply chain teams, and forecast of equipment required to realise revenue.

Impact on cost performance can be in terms of delivery cost, cost of product development, inventory carrying cost, packaging cost, batch size, physical distance between customer and supplier, taxes of state, out of stock scenario impacting cost due to non-realisation of available inventory, premium freight payment, cost of reworks, cost of inaccurate forecasts, product selling costs, cost due to warranty expiration due to failure in supply chain operations, logistics transactions correctness, and cost due to fluctuations in exchange rate. Consequential damages to organisation performance due to supply chain performance can be in terms of loss in revenue, loss in market share, brand value damage, lost opportunity to win over competition and goodwill lost relates to revenue directly. Similarly consequential damages impacting cost to organisation can be increased due to rework cost, loss of anticipated cost saving, increased scrap cost, premium freight payment, and higher inventories contribute to cost to organisation directly. Besides these top 10 factors, losing supplier confidence due to lack of
forecasting, scarcity of material, loss of functional value are parameters which are also stated by few respondents while responding which is getting impacted by performance of supply chain management in telecom sector.

Study proposed to develop matrix of supply chain operation parameters with financial performance parameters. (Table 5-1) Ratios to which these supply chain parameters impact factors of financial performance may vary across organisation in sector. With development of this linkage matrix it is possible for organisation to clearly establish impact on financial performance from supply chain of organisation and define their goals / strategy for supply chain operations to optimise financial performance and its alignment with business strategy.

6.2 IMPLICATIONS OF SYNTHESSES

Telecom sector is and will keep on contributing towards the development of the country’s economy and growth. However, in jubilation of stupendous growth, country could not realise the true economic benefits from this sector as most of electronic equipment being used in the sector remain is imported or what so ever, is getting manufactured in country by multinational manufacturer is having high import content. Though Government of India, came out with multiple guidelines and recommendations over past few years to promote Indian manufacturing but results are still not encouraging and increasing imports is resulting in huge foreign exchange out flow from the country. (Telecom Regulatory Authority of India, 2010) (Telecom Regulatory Authority of India, 2011) (Press Trust of India, 2015) Real benefit to economy can be seen only when the products will be designed and manufactured in India because until then even for Indian manufactured items most of foreign exchange will be flowing out of shores of the country.

To grow into a potent player in the telecom universe, it becomes necessary for the country to have an agile manufacturing set up for telecom equipment so that value addition to economy can be maximised. In order to gain maximum economic value out of this industry it is must that debts need to be contained by optimising costs so that threats engendered because of forthcoming challenges can be contained. Industry need to push for this manufacturing set up to avoid excessive cost to economy by analysing
components of manufacturing process critically. In the last few years the central government initiated few actions to encourage manufacturing and engineering services of the telecom equipment such as allowing 100 per cent FDI allowance in manufacturing of telecom products, imposition of basic custom duty of 10 per cent on the specified telecom products outside the international trade agreement (ITA) and education cess on imported electronic goods. In the budget presented for the financial year 2015-16, to promote manufacturing of optical fibre cables, the government reduced customs duty on HDPE from 7.5 per cent to nil. Components and parts except populated printed circuit boards, used for manufacturing of ITA bound items were exempted from special additional duty (SAD). The Cabinet also permitted the Electronics Development Fund Policy in December 2014 to support financing for electronics system design and manufacturing, nano-electronics and information technology, including telecom. (Press Trust of India, 2015) The above actions taken by government might be called “protectionist” as these consist of actions to shield domestic manufacturing from foreign competition via tariffs and local content requirements; and provide export-related incentives. These actions may result in discomfort against India’s external obligations under the WTO and other free trade agreements, and also undermine India’s openness credentials towards international suppliers and countries. (Government of India, 2015) Economic survey done for the budget in year 2014-15 highlighted that eradicating immunities for the countervailing duty (CVD) will eradicate the negative shield being faced by manufacturers in India and this will promote manufacturing in India, without countering India’s global commitments.

Realising impartiality of encouragements between indigenous manufacturing and imports necessitates that all indirect taxes which are raised on indigenous manufacturer are also charged on imports as well that means if a country charges a sales tax, value added tax (VAT), or excise or gross sales tax (GST) on domestic sales/production, it should also be charged on imports. However, counter vailing duty (CVD) which is levied to offset the excise duty imposed on domestic producers, is not applied on few imports which gives benefits to imports. Also though it seems that CVD immunities on raw materials or other inputs support manufacturers in bringing down
their costs but that is not the real case because CVD can always be reclaimed as an input tax credit or modvat. Moreover, for the cases where both CVD and excise duty are exempted, it seems that there is no tax difference between indigenous manufacturing and imports but actually that is not the case because imported goods on one side does not carry any CVD and in addition to that it get discounted tax in exporting country but no such discount shall be available to indigenous manufactured goods. As a result imported goods may turn out to be cheaper than Indian goods and due to this indigenous manufacturer may not choose to enter into such a market as tax policy is penalising indigenous manufacturing. Economic survey 2014-15 highlighted that a well-structured tax structure in form of GST with one worldwide competitive rate and with scarcely demarcated immunities will avoid these kinds of penalties on domestic manufacturing and it will ensure that incentives given in source country are neutralised in importing country. As a result country shall be encouraging indigenous manufacturing without getting a protectionist tag and there will not be any violation of international trade obligations under the World Trade Organisation (WTO) or under Free Trade Agreements (FTAs). (Government of India, 2015)

This study predominantly is an effort to recognise the current dynamics of telecom sector and manufacturing scenario of telecom network equipment. Non-availability of Indian products, quality of Indian products, better financial deals, lead time, price advantage, global commitments / obligations, aggressive business scenario, ease of installation, after sale service and warranty policies, and regulatory scenario contribute to non-consideration of business case by Indian suppliers. In case efforts are put in for designing network equipment of current technologies of 2G, 3G or LTE then by the time product will be designed and developed in India, global technology will change and Indian designed product will become outdated. Considering this, a concentrated effort need to be put in by public and private sector including technical research institutions so that development efforts are directed towards future technologies like 5G for network equipment and 4G and 5G for end user equipment which are expected to be launched in next couple of years. Moreover, this process of reviewing the manufacturing scenario has to be dynamic because environment is not sacrosanct and challenges keep on changing on daily basis. Opportunity exists for
Indian suppliers and technical institutions to develop Indian product which can fulfil the need of future technologies and country’s outflow of foreign exchange can be curtailed.

6.3 STRATEGIC POLICY INITIATIVES FOR TELECOM SECTOR

This study has used empirical findings to show that the recommendation proposed by Government of India and steps taken by industry are not making the anticipated impact in saving foreign exchange outflow from country as electronic goods being used are either imported or Indian manufactured having high import content. Study has also strengthened the view point that supply chain operations impact operational performance of organisation in Indian telecom sector as well by impacting project performance, financial performance, sales and marketing performance, and customer performance. Study has used respondents’ feedback to show that supply chain operations impact revenue of organisations in telecom sector more than the cost on weighted average basis. The theoretical point of view for this justification suggests the need for policy review which will enable diversification of supply chain processes including that of indigenisation process towards Indian products and not only Indian manufactured goods. As ways forward following are proposed to be done so that supply chain scenario in the sector can be improved:

a. Category of Telecommunication Equipment for Indigenisation

Considering the value share of the category wise demand as analysed in Section 3.5, wireless equipment and end user equipment came up as top two categories which must be considered for indigenisation. Challenge in this sector is that it is so much dynamic that technology keeps on changing very fast and by the time result of efforts put in for indigenisation of these categories will be achieved technology will be evolving farther away hence, making efforts to go waste in achieving the end objective.

Moreover as detailed in Section 3.5, country is not able to keep pace with global technological developments and do not have any indigenous technology in these segments. Concentrated efforts need to be put in place first to develop indigenous technologies which is future oriented such as 5G equipment for wireless equipment segment and end user equipment to cater to 4G and 5G. But the time period available
with the country is not more than two years because 3G subscriptions are likely to be matured in next two to three years and 4G shall be able to start its growth period in another two years. (GSMA Intelligence, 2014) Moreover globally 5G trials have already started and in case country is not able to launch any product during this time period it will miss the opportunity for next likely technology and foreign exchange outflow shall remain in forthcoming technology as well along with previous technologies. Similarly, for end user equipment concentration need to be kept on 4G and 5G technology as 4G technology is going to remain here for another 6-7 years from end user perspective and if indigenous product is developed in next two years then country will have at least 5-6 years to harvest gains out of this technology. This will result in country achieving self-reliance at least in future oriented technologies.

Even though IP, packet switching and transmission category of equipment have lesser value share but these category of products carries maximum amount of security risks and hence indigenous design effort need to be put in this category as well, once country is able to gain confidence in the first two categories.

b. Actions Needed from Research Institutions

Research institutions of the country had collaborated in development of other sectors such as infrastructure, automobile and medicines to carry out research and develop products but efforts are so minimal for the telecom sector’s network equipment that these are not visible. Ministry of Communications and Information Technology had structured three organisations to help in research activity mainly Telecom Centre of Excellence (TCOE) for research activity, Telecommunication Standards Development Society (TSDSI) for standards development and, Telecom Equipment and Service Export council (TEPC) for facilitation of export of telecom equipment. However, out of 40 research activity approved by sponsors under TSOE last year, only seven belonged to hardware rest all were application development only. (Ministry of Communications and Information Technology, 2015) Reason for same can be gap in capability and global scenario. With newer technologies getting launched every year globally, this gap between available capability in India and global scenario is widening further.
In order to develop these future oriented technologies, research institutions need to come forward to collaborate with private sector and government wing to formulate research projects in joint collaborations for hardware development so that time bound development of new technologies can be carried out. Present research institutions need to be analysed for their capability in hardware development. Post review in case it is concluded that research capability is not available in country then there is need to collaborate with overseas research institutions for technology buyout or technical collaborations. In the absence of such an effort, achieving self-reliance for indigenous development seems to be difficult as current indigenous players in the sector either don’t have motivation or don’t have resources to put concentration on indigenous technologies and they are relying only on imported goods or on Indian manufactured goods of foreign origin.

c. Action Needed from Telecom Service Providers

Telecom service providers are backbone of telecom sector and they are the ones who are driving new developments in markets. Due to competitive scenario prevailing in industry they are busy in gaining or maintaining existing market foot prints. Without their active involvement, achieving self-reliance in indigenous design and manufactured product will remain a dream only. Two decades before when the sector started, technical competence towards wireless telecom network was negligible with these service providers and hence, they entered into multiple service contracts with foreign companies but over a period of time they acquired competence to design, deliver, and maintain their own network and developed local competence. Similar effort is required now for the telecom equipment. Recommendation is that they should drive indigenous development of these network and end user equipment by engaging with Indian suppliers of goods along with financing research institutions. This may impact their balance sheets immediately but in longer run they are going to gain a lot as they can bring down their cost appreciably leading to higher profits and return on capital.

In order to do so telecom service providers need to develop their network foot print over next 10-15 years and detail out the equipment required to achieve their
respective footprint. This forecasted equipment list can become the basis of
development of equipment in phased manner. For this development they can
collaborate with research institutions of country or with Indian manufacturers and
finance these institutions to develop these telecom gears. Since they will be involved in
development of these products, products thus designed and developed through this
process will get a preferential treatment automatically in their network.

Firms must enhance their capabilities to capture new opportunities out of
globalisation, management of risks, learning to enable innovation and adaption and the
need to balance global efficient and local responsiveness. In order to sustain growth,
long term performance various challenges before supply chain management needs to
be sorted out. These challenges can be minimising uncertainty, reducing replenishment
cycle time, minimizing number of linkages or stages in network, improving flexibility,
improving process quality, enhancing demand fulfilment capability, minimizing variety
and delaying differentiation and competing service.

Future uncertainty due to regulatory scenario, demand uncertainty due to rapid change in
taste and environment, supply uncertainty due to unreliable vendor, process uncertainty due to
internal processes. All these uncertainties can be reduced by reviewing the process and
forecasting the requirement. Replenishment cycle time is time incurred in completion of series
of events that manage replenishment process such as order flow, product flow and cash flow.
Expected contribution of supply chain in manufacturing set up is to make products available on
real time basis without keeping safety stock as well as to prevent stock out. This is achievable
only if replenishment time is reduced so that restock can be done in lesser time with accurate
quality. Reducing the number of stages in the network of unification of tasks, avoidance of
duplication of activities helps in improving performance of supply chain; same can be achieved
through tools such as business process reengineering.

Flexible supply chain management practices reduces set up or changeover time in various
process and make manufacturing, assembly and distribution system enhance flexibility of
response. Effective supply chain is to do things right the first time itself, this is must for
improving the process quality. Same can be achieved through root cause analysis of poor quality
and by improving process capability. In case of defective delivery, supply chain management
must have systems for early recovery from failures.
Supply chain is required to perform under demand uncertainty and deal with challenges imposed by promotion and branding. Supply chain management has to make a fine balance between demands forecast accuracy and demand fulfilment capability. Variety minimisation can help to reduce inventories which can be achieved through steps such as standardizing product and service offering, modules based buying / production, postponing finishing operations. Product Quality and features can only be short term advantages. Proactive firms have to build their supply chain competency around cost efficient value added service to customers.

d. Action Needed from Government

Indigenisation efforts for telecom equipment in India started approximately three decades back with designing and developing switches for fixed wire line equipment with organisations like C-DOT, ITIL but over a period of time because of policies towards these organisations, country lagged behind technical capability for development. On the other hand, efforts started in China almost same time when efforts began in India but China has organisation such as Huawei, ZTE which had developed product range across all telecom product line. These organisations are catering to not only their domestic demand but are becoming a major player globally also by making their presence felt. These organisations of Chinese origin are giving a tough competition to veteran organisations of European and US origin such as Ericsson, Nokia, and Alcatel. In fact in few product ranges these have surpassed the later one. This could have been possible because of active technical and financial support of Chinese government and financial institutions. Few actions have been taken by government in last two to three years for promoting Indian manufacturing such as increasing FDI limit in manufacturing to 100 per cent, increase in custom duty to 10 per cent on specified product list, reducing custom duty to zero per cent to promote manufacturing of cables. Still these actions are not able to give desired results of indigenous design and development and target of achieving 80 per cent indigenisation by 2020 seems difficult, until and unless immediate steps are taken to repair the situation. Foremost steps towards this is to figure out Indian entities who can develop future oriented technologies, these can be prevailing educational research institutions or old public sector companies such as BEL, C-DOT, and ITIL who had capabilities for development.
but died down because of multiple reasons or private sector companies who have calibre to execute such massive projects.

Post identification Government of India can associate and partner these organisations along with Telecom Centre of Excellence (TCOE) for research activity and Telecom Engineering Council (TEC) under department of telecom in ministry of communication and information technology. These organisations can then work out concurrently in developing project plan and specifications for products required to be designed. Project reviews need to take place considering target closure of 2-3 years’ time so that output can be used in Indian network optimally before technology achieve obsolescence. In order to facilitate these organisations to fund these development projects, grants can be given to these institutions and research organisations in phased manner based on progress report. In addition to this government can fix up indigenisation level of volume of purchase along with value addition target in India by telecom service providers in next 5-10 years tenure. At present there is a wish list that 80 per cent of equipment will be produced in India by 2020. Same can be broken into year wise objectives for telecom service providers so that value addition by entities in India is monitored quarterly and trend can be measured to improve upon. From taxation and duties perspective, government need to push for implementation of GST with global tariff structure so that discounts and grant available in foreign countries can be nullified with equal amount of taxation in host country as per WTO norms. This will ensure that country is not tagged as protectionist and also it will help Indian companies by giving equal opportunity to them to perform resulting in reduction of import bias.

e. Action Needed from Software Developer

Fast changing environment of telecom sector coupled with unclear regulatory scenario, lack of adequate tools or methods for forecasting often contributes to deviation in forecast accuracies. None of us knows the future exactly. Hence, no forecast can ever be entirely accurate but question here is of accuracy of prediction and justification with which one can clarify acceptable assumptions in support of a particular forecast. Moreover the forecast process has to be dynamic because environment is not sacrosanct and challenges keeps on changing daily basis.
Existing ERP packages being used by organisation in sector is not getting used for all supply chain deliverable such as forecasting, and material planning through structured ERP tools. Opportunity exists for software developers to develop product package which can capture dynamics of market during start up or execution of a service and convert it to forecasts for supplier and service providers. In order to bring efficiencies into supply chain and organisations there is a need to define a structured software package based system to capture the changing environment and alert its constituents to increase the speed and agility of company in responding to changes in its external environment.

6.4 RECOMMENDATION FOR FUTURE RESEARCH

The extent of this deliberation on telecom sector supply chain is widespread and versatile even at the country level. To create achievable policy strategies and development targets with regards to diversification, there is need for more studies at the country specific level to allow further assessment of local dimensions of the supply chain for telecom sector. Exploring the following as future research strategies can facilitate the attainment of this goal:

a. Manufacturing scenario and challenges in semiconductor industry which are inputs for electronic equipment for telecom sector
b. Software features available and expected from ERP software packages for telecom sector
c. Inventory analysis of telecom sector and amount of money stuck in warehouses or dead stocks on telecom sites- way forward for improvement
d. Logistics performance of telecom sector supply chain – Study for warehousing and transportation performance
e. Change in business modelling from capacity built up models to box models- changes and impact in Indian telecom sector

6.5 CONCLUSION

Telecom sector in India is quite instrumental in defining the growth story of country in multiple ways such as contribution through direct inflow of FDI in economy, infrastructure growth and enabler for growth of other sectors such as banking, tourism,
and transportation. Supply chain of telecom sector is network of multiple entities and
stake-holders such as telecom service providers, equipment vendors, infrastructure
providers, project and logistics services’ providers, components’ suppliers and
regulatory stake holders including Government of India. All these stake holders are
connected through interwoven matrix contracts with each other making supply chain
further complex for the sector. Huge amount of financial flow is happening across these
contracts, whether it is cost of services being charged to one billion consumers from
telecom service provider, cost of spectrum being paid to government by telecom service
providers or cost of equipment or services being paid to telecom equipment and
infrastructure provider by service providers.

Firstly this study has reviewed all major players of telecom sector supply chain and
representative engagement matrix showing relationship among these players is
formulated. Secondly, this study has made an effort to study the important constituents
of Indian telecom supply chain, such as forecasting, purchasing practices, business
modeling, manufacturing and import scenario, challenges to indigenisation of telecom
input products, inventory management, warehousing and transportation scenario,
material demand cycle, ERP software packages, and supply chain impact on
organisational performance. Thirdly, study has brought out that there exists a gap in
manufacturing scenario of telecom sector in India as most of equipment is either
imported or Indian manufactured by multinational organisations of European or
Chinese origins resulting into outflow of foreign exchange from county resulting into
negative trade balance. Study also attempted to bring out reasons of these high imports
in spite of efforts from Government of India in the form of guidelines and
recommendations. Fourthly study suggested that a gap exists in important supply chain
function of sector such as forecasting, inventory management, material demand cycle
and ERP software packages. Opportunities exist for organisations in sector and for
software developers to leverage this gap and come out with customized software
packages to reduce wastage getting generated. Lastly, study attempted to review impact
of supply chain operations on operational performance indicators of project
performance, financial performance, sales and marketing performance and customer
satisfaction. Study proposed to establish linkage of supply chain operations with
financial performance parameters of organisation of the sector so that relationship
equation can be established and performance can be improved.

Study proposed actions needed to be taken by telecom service providers,
government, research institutions and software developers. Study also proposed a list
of category of telecom products which should be considered for indigenisation.
Considering the importance of the sector in the growth of the nation. Finally study
proposed further probable research areas within the sector which can help to improve
the performance of the sector.