CHAPTER 13

CHALLENGES FOR ICT IN REVERSE LOGISTICS

13.1 Introduction

In the era of e-commerce if it is mentioned that ICT has become one of the very significant market drivers then it would be justified. Like ICT Globalization, environmental focus, intense competition, short PLC and deregulation are few more parameters which have been driving market and show deep penetration into economy. The ICT has significant role but the execution process within the policies is not so easy way. It needs secured environment to deliver the eservice. Similarly there are many challenges before it to face and to solve. It deals with the freight transport accounts, inefficient utilizations of resources, uncovered external cost of the transport etc. As it has challenges then at the same time few opportunities are also there. The commercial equation would be balanced when we observe that the opportunities are succeeding all the challenges. In fact a challenge gets solved and then it generates opportunity for the market.

Let us take an elementary example to understand how after solving a challenge an opportunity gents generated. Earlier in conventional commerce an user physically visits the shop or the store in the market. It required travelling of the user from his residence to the store or shop. Before the visit it was planning was also necessary. The user visits the market place with an uncertainty of the availability of the product. It means at this stage user may not sure whether he is going the get the desired product. Well, in market while the user pays a visit, he may have varieties of the product available subsequently he may choose the desired one. After the payment of the product user may take that to home which also needs a travelling and transport. If the product is pretty big then additional transport is required. Another most important part is if the product is not available in the market then the visit gets failed and one more planning is needed for the next visit. It can be an overhead. This was the process in the conventional commerce where physically sale and purchase was performed. Now let us take it as a challenge. Travelling is an overhead for the user specially in the case when unknowingly the product is unavailable. The challenge can be solve by getting the system ICT enabled. In this user does not need to pay a physical visit just to
ensure the availability of the product as it can be known through virtual visit. And once the product is available and chosen by the user payment may be made online and product will be delivered on the door step.

The best part in this example is challenge has got a solution with generating few opportunities. Opportunities generated to user are:

- Even without planning several of the stores visited
- Multiple options available within the range
- Transport cost exempted
- Customer stays at reasonable negotiation stage.

With this ICT enabling technique at the same time the service provider also gets few opportunities in terms of business and employability.

- Promote marketing at great extent
- Communication gets easier with customers
- Easy to approach market
- Common logistics for multiple delivery
- Business extension enhances employability.

Considering all the extended parameters of challenges and subsequent generated opportunities takes the penetration of ICT in supply chain to another level. The demand of logistics and transport is increasing. Further, manufacturing and production being again significant. On the later stages security issues are also discussed along with trends and sustainable innovation in logistics.

As far as the ICT trends are concerned it is driven by five distinguished parameters. These are: Green IT, Collaboration, IT security, Business Intelligence and mobility. As such no green technology introduces at this stage but it has direct impact on that. Since IT deals with and encourages paper less work, and papers come from trees. Hence saving trees endorses saving of forest resources and hence pull down the temperature and then we would have more green environment around us due to not allowing deforestation. It will continue encouraging eco friendly technology to work upon. This is something which enhances the importance of Green IT. Security is another major breakthrough which comes across when we deal in ICT enabling technique. Security is something which cannot be ignored at any stage of the technology. Right
from the maintaining the database of the dispatched products till it gets delivered at the customer’s end the data and data processed should be secured.

![Figure 13.1 Key ICT trends](image)

**Business Intelligence** is one the very important key trends of ICT. Let us take an example to understand the concept. Many of us use to visit shopping malls on regular basis. Suppose we visit a shopping mall which has many stores of globally reputed brands. A customer visits the mall and makes choices of the goods which he will purchase. A customer randomly takes a school bag. Another customer takes a kids water bottle. Now there would be a non-zero probability that the customer who takes a school bag will also take kids water bottle. The situation may be applicable to not only a couple of goods rather a bunch of products. Now, from business point of view the shopping mall manager may think of arranging all the products in a way so that it enhances the selling of the mall. What kind of strategy the manager should adopt to increase sell of the products. Technically after scanning the data base of sold products and interests of the customers the strategy can be made. It also counts the behavior of the customers who have been visiting the mall on regular basis, who visit randomly and all those who visit vary rarely. The concept of data mining is being utilized here which retrieves information of all the visitors who perform transaction. The impact of this strategy can be seen in present day shopping malls, traditional markets and most importantly sale oriented market. It also guarantees the increment in selling of the products.

### 13.2 Mega trends in Logistics and ICT
There are trends being developed in logistics transport and ICT. As sustainable development is a necessary for the environment hence it endorses green logistics or pollution free logistics. Similarly potential for disruption, strategic competitive advantages, constantly shifting sourcing options etc are the mega trends which have be evolved in the logistic. When we look into the tool of ICT it also generates some important trends. E-infrastructure, digital data deluge, data intensive science, virtualization, cloud computing security etc are the trends which are been evolved with ICT. It is important to know ICT is not only dealing with the creation of data warehousing rather data security is equally important concerned for this. A comparative tabular format is prepared below to understand the mega trends of ICT and logistics.

<table>
<thead>
<tr>
<th>Mega Trends Logistics</th>
<th>Mega Trends ICT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reverse logistics - green logistics</td>
<td>Open source software</td>
</tr>
<tr>
<td>Elongated supply chains</td>
<td>Digital Data Deluge</td>
</tr>
<tr>
<td>SCM considered a strategic competitive</td>
<td>E-Infrastructure</td>
</tr>
<tr>
<td>Advantage</td>
<td></td>
</tr>
<tr>
<td>Potential for disruption</td>
<td>Data-intensive science</td>
</tr>
<tr>
<td>Need for automated processes</td>
<td>Virtualization (incl. Web 3.0, Mobile technologies, Social networking)</td>
</tr>
<tr>
<td>Constantly shifting sourcing options</td>
<td>Data warehousing (incl. Data Mining, OLAP tools)</td>
</tr>
<tr>
<td>Need for global compliance and security</td>
<td>Cloud computing</td>
</tr>
<tr>
<td>Outsourcing of non-core functions</td>
<td>Security (data privacy)</td>
</tr>
</tbody>
</table>

As far as mega trends in logistics are concerned the green logistics is prime factor. It is not-negotiable. Again the concept of green means the technology which is environment friendly and energy saving. It promotes paper less work which leads to a resources saving at reasonable extent. The idea which governs it is IT enabled processing. Every time an office boy does need to take the receipt of the dispatched goods at various check points which usually happened in the conventional logistics. IT enabled processing is done via e-mail or some another soft technique. The information is being passed and shared through internet or some other telecommunication
methodology. Another factor is **Elongated Supply Chain**. ICT tools enabled supply chain management does not only deal with the dispatch and receiving of the goods through various check points rather it has got some extension too. Let us take an example to explain it. Above the concept of business intelligence is discussed. This concept is very is useful for the strategist and policy makers of the company. This idea looks for the expansion of the business to take it at new height. Customers are also getting benefitted as he has more options available to choose. Hence it is a win-win situation for both the entities.

One more very special trend in the logistics which says that the process has **Potential for disruption**. This concept can be understood with a real life example. In the conventional logistics processing where the information passes through physical mode. Suppose the entire logistics encounters any natural disaster. In this situation it becomes difficult to trace the product as entire logistics has got untraceable along with the relevant information. In modern IT enabled logistics trends deal with the information passing through various check points via some logical channel. It has another advantage called backup of the data as well. So at any stage or at any check point the data may be retrieved with appropriate algorithm. Bottom line is reasonable level of disruption may be handled with the technique. The need of automated process cannot be compromised with the modern logistics system. The GPRS system plays a very significant role in making processing automated. Say there are 10 different check point between source and the destination. GPS system enable lorries are transporting the goods and are on the way. The moment lorry crosses a specific check point then the locator will update the location of the lorry in the database so that the authorized person can trace it out. This process is repeatedly occurring at all the check points hence at every stage the location finding becomes simple at user friendly. Basically the update operation is done automatically as there is no DTP operator sitting at the office to update the location of the lorry. Advantage in this case is with the help of the past record on can compare the past and present performance of any lorry and further it may be optimized. It also behaves intelligently once the comparison is done at various level with huge chunk of data.

**Constantly shifting source option** makes it more competitive and more result oriented. The importance of Data Mining, OLAP may be observed over here. To make it simple let us take an example of source and destination. Again suppose there at 10 check points between source and destination. Once the lorry is departing from source and towards destination, it will be through
all the check points. For next check point source would be always static. Now the challenge is
after having GPS equipped lorry our system should be well enough to rotate the role of the
source at every check point. The data transmission and data update process is going on at every
place. A robust system may work as consistent data center for any the check points. Hence
constantly shifting makes it more reliable and location independent. OLAP will assist authorized
user to find out immediate location allow to take decision for the efficient transportation.

Now a question comes in front of all the policy makers that Is the logistics process locally
sufficient or there is a way for optimization also? Answer comes from **Global Compliance and
security** issues. Initially the concept of supply chain and management with ICT enabled
technique was started and executed in South East Asia. Later we also inspired and learnt a lot
from the technique and subsequently we developed our own technique. Now there may a
insecurity feeling for South East Asian countries when they compare the technology with us.
This is Global Compliance. Whatever technique is developed for that there is a global exposure
and examination to come across. There is no dividend for the upcoming technology except the
global competition. Actually it makes system strengthen and genuine. In the globalization era
market is open to all. Any firm can develop any technology and may or may not share the same
with the competitors. Security is another very significant point which is not negotiable. Now a
days there are the companies which have been using the concept of cloud computing to make
data and data center safe. Actually the cloud computing comes from the world where we need to
put data. Its kind of hiring the space with full proof security. A company may hire a cloud and
get it as private cloud. This will preserve the data of the company for a certain period of time.
This cloud provides a logical space in the open climate. Cloud service provider secures the entire
cloud with certain algorithm. Company gets an advance to access the data when ever company
wishes. Basically it acts as a data center. The cloud service is secured as it is made up various
non penetrated layers to protect the data. A logistics company may have several processes which
may not be executed within the company or company does not to take any over head in
executing few specific tasks. In that case company goes for the out sourcing. The point is taken
care with the fact that out sourcing process should not be core functions. This is also called **out
sourcing of non-core functions.** Suppose a logistics company has a process called creation of
the data base in a proper format for all the goods to be dispatched. It may require few man power
hours if even if the system is fully automated as supervision need an intelligent eye which can
be replaced by a machine. This is one of the core processes a company may have. If one thinks for the alternate arrangement for this then it is not recommended. Reason is company never would like to take a chance at the initial level. Now consider the process of identification of the lorries. This is something which may come in the maintenance of the vehicle company may think to outsource this process as it is not core one. A care is to be taken up when the process is directly related with the security of the company or the data. Hence former process is denied for the out sourcing whereas later on may be outsourced.

Bottom line is where ever there is a mega trend is in logistics there a counterpart mega trend in ICT as well. It is only because of the penetration of ICT tools in the logistics. Logistics may be a hypothesis or a concept and then ICT tool is acting as an operator for this. Like if SCM considered a strategic competitive advantage then we have E-infrastructure to bring that on floor. E-infrastructure is nothing but dealing the various aspects of SCM with all IT enabled techniques. For example if an user puts an order on web the request should immediately go to the concerned department and then department will informed to the shipping section. The beauty of the process should be how much easy the process of putting an order and get deliver the product at the door step. If is it easy and user friendly then it would be communicated others and then SCM will face real competition with the existing service providers.

13.3 Thematic Orientation of ECITL

There is an event called European Conference on ICT for Transport Logistics (ECITL) which is being organized since 2007 by Vorarlberg University of Applied Sciences (FHV). Its co-organizer is EffizienzCluster LogistikRuhr and the Fraunhofer Institute for Material Flow and Logistics and it is supported by different European Projects in the field of Logistics and ICT. European Union is the body which supports and encourages it externally. The goal of this theme base conference is:

- Futuristic innovations oriented strategy in transport logistic cooperation which can be created by ICT.
- Enabled by ICT for green logistics and innovations.
- Advantages and opportunities to increased application of ICT.
- Enhancing opportunities through ICT for information exchange.
- Secure and safe data exchange.
- ICT as enabler of security and safety in logistics.
• Introduce ICT in neglected areas to optimize the services.

**Figure 13.2 Logistics Service Platforms**

Further the theme of ECITL proposes two distinguish models as Logistics service platform and intelligent cargo. Both the models are presented below in figure 9.2 and 9.3 respectively.

**Figure 13.3 Intelligent Cargo**

**13.4 Seamless Information Exchange in Freight Transport and Logistics**

Specially in freight transport and logistics the information exchange plays extremely important role. In figure 10.4 the model of e-freight is explained. Actually it works on three successive steps.

• Road transport
- Water transport and
- Rail transport.

All the three transport modes are well connected with co-modality or can communicate on this common platform. This co-modality has services like e-freight and e-freight processes. Now the question arises how co-modality deals with the Rail, Road or water transport system. Basically co-modality establishes a huge data center for all the modes of transport. The information related with all the logistics associated with the road transport is stored in co-modality and this operation is repeated with rest of the modes of transport. It is also possible that between source and destination a part of distance is travelled by road and then train. In that case similar kind of data center is being prepared. One more possibility is that the distance between source and destination if travelled by road, rail and water medium. In that case similar operation may be performed with combination of all the modes of transport. Further if we see the role of E-freight services then E-freight has three distinguished stakeholders. From production side it has privilege to deal with the legal administration which also highlights policy and planning of the company. Here only one can see the terms and conditions of the company for the products and its reach in the market. Second stakeholder is the logistics firms which have the responsibility to take the product from source and deliver at the customer’s side. Here E-freight includes all the check point which are there in between source and destination. Efficient, safe and optimized transportation if a promise and commitment of any logistics firm. It is also a threshold for the logistics. Lastly most important third stakeholder of E-freight is customer. Generally E-freight has nothing to do with the individual clients. It works on corporate client or where the bulk consumption is being observed. It because of the cost involved in maintain and executing the E-freight is too high to entertain an individual customer. As an example in the E-infrastructure supposes an E-freight is dealing with 1000 bags of cement. Of course it would never be shipped to an individual customer unless he is a seller in himself. Say, this is to be delivered to a real state company. Then the role of E-freight would be to coordinate with production firm, logistics firm and the customer. Coordination means the data center would have a rich data base or knowledge base of all the three entities. Internally E-freight would also have the information about the strategy of the logistics firm to pick and deliver the product within the time. Further it has involvements of integration (semantics), stakeholders, framework character, legacy systems and integration into business processes.
13.5 Security and Risk Assessment in Logistics

As long as the ICT will involve in the logistics and transportation process the data and network security and safety of infrastructure will remain a challenge in front of designers. All the challenges which suggest us to implement emerges in concrete form as enabling door to door security. It also encourages to tackle and promote new B2A process (communication with authorities). The value added business process is another term which comes out with this assessment. Risk assessment is another important aspect which is not negotiable. Meanwhile the question may arise that what kind of risk may come across? firstly we may think for the natural disasters like earth quake, flood, fatal accidents, landslide etc.

All these natural disasters may affect the logistics operations very deeply. The architect needs to asses all the natural disasters for all kind of valid logistics operations so that safety measure can
be taken up in due course of time. The main concern to overcome the loss observed in any disaster is preservation of the data. Apart from the risk associated with the natural disaster technical failure is another risk which needs to be considered and subsequently the safety and security of the data. All those methodologies which are useful to assess risk and find the solution for the prevention from the disaster may open further scope for the business hence it will generate more opportunities.

13.6 Sustainable Innovations in Logistics

For any business to survive long or any technology to be competent and consistent in the market it is very important to practice new things. When it comes to profession and skill it turns into innovation. The development phase of any organization should deal with the innovative ideas to come up. It also optimizes the technology which is being used. The logistics also suggest innovation and in fact radical innovation but with high revenue potential.

![Figure 13.6 Drivers of Innovations in market](image)

Figure 13.6 Drivers of Innovations in market

Innovation in logistics (RL) defines few working parameters however it is not bound within. These are:

- Radical innovation, but with high revenue potential highly risky
- Technology oriented development and independent from identified customers’ needs
- Fast realization and relatively low-risk is possible
- Identification of unsatisfied customer need (market research)
- Research & Development activities induced by demand of customers

13.7 7- Innovation Properties
Innovation is purely scientific and technical terminology. Question arises why do we need to consider the importance of innovation in logistic operation? Actually in technology innovation is something which takes it to the optimization. We may have various technologies available to solve a particular task. The best possible solution is most likely to be adopted for the task. As per as logistics operations are concerned experts work on several dimensions to get the most feasible and optimal way to provide logistics solution. Let us take an example at small ground. Suppose a GPS enabled lorry is loaded with 5 tones of goods and ready to depart to the destination. Arrangements of goods in the lorry lets pilot make comfortable to drive the vehicle. If the goods are kept in topsy turvey manner then the pilot may feel difficulty in driving. Some innovation may allow the arrangement of goods in a way so that minimum is possible on the vehicle. Hence innovation can be considered because of which the lorry ready for smooth transport. It is innovation which has the risibility the make transportation smooth and hustle free.

In logistics industry segment technical innovation is discussed. Actually there is philosophy of 7 Innovations. These are:

- The Dispersion property: This philosophy suggest that circulation of innovation in more projects rather few. It leads towards long term survival. Actually this kind of innovation is not operation specific rather it may be applied into several other operations. The spectrum is pretty broad hence application is also comprehensive. The example which is discussed above may lie in this category as arrangement of goods in not only applicable to lorry rather it may be useful in inventory also or in case of warehousing where mining is expected to be pretty easy. It may also be applied to the place where space is a constraint and less space looks for more accommodation.

- The Cliquet property: This property says that individual experiment should focus on short term goal as provides more flexibility. If it goes for long term goal it may time consuming before it generates any result. Precisely this innovation is reverse of the above. It is operation specific and if applied to another areas adverse results may come out. For example four wheeler human driven goods carrier may be equipped with a handle but it is only applied to travel short distance. If it goes to long distance, it would be very time consuming. For long distance small tempo may be preferred.
• The Long-gamma property: Here planned projects are not on priority rather free form experiments. Once emphasized experiment is explored then it will become more feasible then in depth knowledge. Actually innovations come from experiments. We cannot have an innovation unless we go through various experiments. Now the it depends on the task which has the priority. The priority oriented tasks cannot be taken up for the innovative strategy. Planned task is ready to execute with the existing technology and here we can only think for optimization and feasibility of the strategy. For example water filled transparent bottles may be used for source of light in the presence of sun for small and closed huts. It has been used in South African countries. The hut and installation of bottles in the huts are planned hence only optimization can be discussed. No further scope for innovation.

• The Optionality property: This is little different philosophy as speaks about the investment in people. It considers the people are assets of the organization. Innovation in this will get good break through. Its people of the organization who write the fortune of the organization. The company can not be good or bad, its all about the people who work there. Every organization believe that the people who are working with should excel at every stage. It depends upon policies of the organizations which keeps people with it or allow them to quit. Here innovation deals with the policy of the organization. Suppose morning 9 to evening 5 is the working hour for the people in an organization and total 8 hours. If all are instructed to follow this schedule then routing work is going on. On the other hand with innovation if organization allows its employees to work for 8 hours with flexibility in the schedule like it may be 8 to 6 or something like that then there is a
possibility that organization becomes more productive. Hence people are also there to be experimented and generate some meaningful results.

- The Less-is-More property: We all have heard about the famous slogan “**KISS**” which means keep it simple silly. Looking for narratives, rationalization, theories welcome complexities.

  ![Image](http://www.nif.org.in/ignite/awardeesprofile.php?profileid=127)

  **Figure 13.8 Microcontroller installed in the watch to send signal when required**

  *Source: http://www.nif.org.in/ignite/awardeesprofile.php?profileid=127*

Complication does not intend to premium. Einstein has also mentioned once that an intelligent fool can get things more complex, bigger and more violent. Hence it suggests little simple and typical innovation which may be integrated further. The philosophy says it’s very simple to get difficult and at the same time its very difficult to get simple. Hence innovation makes things simple too. A simple innovation is present in the picture below. A microcontroller is installed in the watch of the pilot. If any miss happening takes place with the pilot or near to him then with the help of a button the pilot may simple send a SMS to the control room for assistance. It’s pretty simple but may solve worth a problem.

- The Via-negative property: It discusses with self practice. While innovate anything the step of failure you guide you better. It gives a lesson to learn from failure.

- Non-teleological property: This variety of innovation technique teaches to get out of the conventional reading. Inverse of technological implementation is much more true. Especially in science physics. Theories born form practice more often than the reverse. It’s a very simple thing to arrange all goods in a lorry so that it maintains its center of gravity and allow the pilot for smooth transportation and smooth drive. How simple the thing is. Another advantage of this innovation is it utilized the space available optimally. Constraint may be that the things should be unloaded with no hustle. So bottom line is even if the innovation is simple and elementary it has several advantages which will open...
path for further innovations or scientific ideas. It may be non technical but the concept should consist the science.

13.8 Conclusion
Cheng (2012) had mentioned in the research that “Every change will generate opportunity so don’t afraid”. There is something which completes it and that is challenge. Opportunity always comes with the challenge. Ultimately this change, challenge and opportunity all three are well connected with each other. The change can be impact of a challenge and it generates opportunities. Opportunity and challenges are going hand in hand. More challenges more opportunity. This is also applicable in the case of implementation of ICT in return management. For instance while locating a product or a shipment through GPS system we face numerous difficulties but ultimately we could achieve the success with some new algorithm generated. These algorithms may be used further to solve some more problems. This is the opportunity generated with the challenges while tracing the product through GPS. In concluding note there are few points which need to be considered on top priority. The figure 12.6 elaborates efficient flow of logistics processes and stages. Sustainable logistics services are getting absolutely important.
Production and the usage of advanced ICT concept will certainly lead to organizational changes in logistics industry. It is absolutely important to achieve transparency in the logistics processes. ICT tool will be great help to achieve it.