CHAPTER 11

E-COMMERCE FOR REVERSE LOGISTICS

11.1 Introduction
Not only in South East Asia (where the supply chain and logistics) have captured a huge market place but American countries also the E-commerce model for logistics is pretty active. The growth in the model is very aggressive. In this model the reverse logistics concept is recognized as re-use of the surplus goods and further remanufacturing of parts. The concept does not have that much freedom to implement its philosophy due to restrictions on this and as it is considered as the migration of conventionally practices on the web. Financial interest in the reuse of the product or the parts and legislation have been sufficient reason for any technology to develop and any application to run in specific domain. If we see the concept of reverse logistics which says all the operations related reuse of the material in eco friendly environment. It also deals with the collection and disassembly and processing of the used parts. From scientific thinking the reverse logistics encourages introduction of new elements in management of distribution/collection, remanufacturing or production planning and control over inventory. It has also interesting and emerging relations with the environment, business economics and ICT. The chapter will focus on the role of ICT in reverse logistics with objective to evaluate and examine the existing application of E-commerce in this field. The E-commerce is already defined in earlier chapter but to make it relevant we will consider it as concept to maintain business relationships, sharing business information, settling and executing agreements with the help of telecommunication networking devices. There are few stages mentioned to examine the same concept like trading of used products and parts of it, sales or post sales, purchasing. In terms of ICT it can be examined by data collection and ICT application to support re-distribution or re-manufacturing. E-commerce is different from the conventional commerce. The penetration of ICT tools describes it effectively. Because rate of growth of e-commerce is much better then rate of growth in the same specified time period. The people who are IT relate have given it a push. Like the penetration of Internet-based E-commerce in increases drastically. Since accessibility of EDI infrastructure is not so easy to the actors who are involved in the reverse logistics but still a
significant portion of EDI users intends to switch over to Internet based applications, Dekker R et al. (2000).

For an instance in 1997 there was an e-auction took place at Japan where used cars were sold out with the new ones without considering reverse logistics perspectives. This example makes it interesting as what kind of electronic market is related with the reverse logistics and how the benefits and risks would be evaluated. It would also be interesting to examine that how e-commerce is related to the components of the commerce and how channels of commerce would be coordinating if we observe the introduction of ICT in commerce. As it is believed that E-commerce will create a homogeneous market for all its users involving parts of goods and the components of the commerce hence it would be also interesting to examine that after introduction of ICT whether reverse logistics would secure its own place in the market as if now it does not have.

Figure 11.1 Product flow in supply and recovery flow

11.2 Reverse Logistics and Supporting IT System

The figure 10.1 shows the product flow of traditional supply chain network. The recurrent reverse logistics deals with the activities which posses inspection/separation, collection, remanufacturing, re-use, re-distribution, recycling, and disposal. Through some conventional
supply chain products are introduced into the market. Since the final product is introduced hence it is most likely to be used in its original form. For an instance if I purchase a computer from retailer then I will use it as a computer only. Suppose after a while I find some fault in my computer then it is no longer useful to me. For a customer the industry standard have evolved that my computer can no longer support them and therefore likely to return. Due to this frequently, the product is traded in a marked down price many times. In the fig. 10.1 it is mentioned by the loop between trade and original use. Another interesting point is even if there is repetitive change in ownership the products remains in its original form. The product was introduced into the supply chain for a purpose but the reverse logistics had generated an idea to allow alternate use of the product as well. In the previous example if my computer has some faulty then I need to see where the fault is? If the keyboard is ok then it can be used at some other place. if the mouse is functional then it can also be utilized at some place. if there is no fault with the storage than it also may be placed somewhere. Hence whatever applications are mentioned for the components of the computer are alternate utilization of the product/parts.

11.3 Information Technology for Reverse Logistics

With the understanding of the fig. 10.1 it may be observed that information flow is complementary with reference to the product flow between partners through supply chain and other networks. Here only if we see the difference between conventional and ICT enabled commerce then above example can be a prototype based on the conventional system. As reverse logistics is a exception driven process hence it differentiates it from forward logistics. Further the data flow in the recovery process is of poor quality hence it needs to introduce a different perspective in ICT system. It is also important to notice that there is an information dependency in between forward and the reverse logistics which is supported by the ICT. To handle the reverse logistics effectively and to generate accurate results sufficient and relevant information is required in addition to information systems that satisfy specific reverse logistics requirements. However there are three interrelated issues have been examined in the above context:

- For a product entered in the reverse logistics network we need to have quality data of the product.
- All the issues (interaction and information exchange between forward and reverse logistics) which can be in conflict should be addressed and resolved.
- Most relevant and potential oriented web applications for reverse logistics need adopted.
11.4 Product data collection in the Reverse Logistics Chain at entry level

Creation and update operation on the data base created is needed at every transaction. In fact it is needed whenever any addition or retrieval is observed. The product which is to be returned should be specified as far as the time, place and condition of the product is concerned. It is also important to mention the reason by which the product is being returned so that appropriate action could be taken up later on. For commercial purpose as perfect condition is marked for further proceedings. Now if we consider the product which has time dependent life like milk product etc then it is required to see whether the product is returned is within the specified time frame or not. Because after crossing the time frame it may not be possible to repair the damage occurred. Basically an logical explanation of the reason should be felicitated that why the specific product has become part of the reverse chain.

Conventionally the record of the products maintained is in paper form. The form of the record has so many constraints. Few are as below:

- It can be updated unless we have another print
- Frequently data retrieval is difficult (for large records)
- searching becomes time consuming
- Every new user needs new time for the utilization

After introducing the Electronic format of data collection (Electronic Data Product) which may certainly not have all the above discussed constraints. It offers the services in computerized form which has greatest advantage that it is fast in processing. Through multimedia one can not only store, process and visualize but analyze the complete data chunk within a few seconds. Analysis deals with all statistical data which is needed in forecasting strategies. Apart from the data storage only few more ICT tools available for the product whose data needed to be prepared. Bar Code, RFID (Radio Frequency Identification System) are techniques which enable the data entry process faster. The Bar Code is two dimensional data entry system which works on infra red frequency. It reads the code of the product which is embedded on the product. It reads all the textual data which associated with the product and sends the data to the processor. Similar technique is FRID. It is low powered radio transmitter which is installed in the product it has memory capacity also for storage of the data and is able to broadcast signals in combinations of 10M. The strong battery has also life of years and likely to continue. This technology also
enables the marketing options open for the product as it has broadcasting facility so it can be connected directly to the customers.

11.5 The Interactivity Issue between Forward and Reverse Logistics IT systems

In the E-commerce the most important thing is coordination among all the processes. Actually the soul of the E-commerce is connectivity and if any of the tools of ICT is being imparted to any of the processes then all related processes needed to be associated with that ICT tool. This is equally applicable to the forward and reverse logistics. For instance say on day 1 a product A is being purchased by some user. The sale and purchase is managed through IT enabled system. This was the process in forward logistics. Further, on day 10 a fault is detected in that then user decided to return it to the retailer. Here reverse logistics process starts. The user rushes to the retailer and returned the product to the shopkeeper. Now shopkeeper will check the data base and confirms the purchase of the product through that retail shop only. The moment shopkeeper confirms it the complaint is registered and product is sent for the necessary action.

![Figure 11.2 Interconnectivity through IT in Forward and Reverse Logistics](image)

The point of observation is, the shopkeeper was able to confirm only if he has the record of the product in his system. That’s why he could connect forward with reverse logistics processes. If shopkeeper would not having the details of the sold out product then he would have contacted to the distributer for the confirmation. This example shows the need of the interconnectivity for forward and reverse logistics. Fig. 10.2 also depicts it.

If we see the business houses are also doing transactions with the help of IT. The tools which support all similar transactional called EDI (Electronic Data Interchange) and Value-Added
Networks (VAN) for electronic transactions and network configuration, respectively. For various types of business activities it provides different transaction sets. "180 transaction set" is, in principle, the transaction set that encourages actually some aspects of reverse logistics. EDI applications are based on structured protocols, pre-established arrangements and bilateral information exchange. It shows the necessity of this tool. Any where if we apply the ICT tools then it needs additional expenses in terms of investment. Many times it faces lots of criticism due to investment in infrastructure, software development, hardware etc. Further once the set up is done then it produces many advantageous features like quick processing, better relationship among trading partners, a closed loop for electronic market place etc. all these technical integrating impediments requires emerging EDI/XML application with the web. This results easier introduction of new trading partners, low arrangement in cost and increasing in commercial activities.

From a reverse logistics viewpoint, another benefit is that XML/EDI can be the tool for interacting IT systems specifically designed. The legacy system EDI still used in forward logistics.

Take an instance of fig.10.2 it has three levels of networking infrastructure. Firewalls is installed for assurance of systems security. Any access would be denied if the request is originating from an organization outside the protected area. Violation further assures fortified communication system. All communication among the trading partners (as all organizations that are located in the same loop in specific topology) is supported through the networking structure.

### 11.6 Emerging IT paradigm for Reverse logistics

Though it has been proven that the IT application has tremendous bonding with so many e-commerce areas. There are ICT tool which have not been used directly in the reverse logistics but still have tremendous potential for reverse logistics process. For instance there are many market players which offer the customization facility in the product and they have good market capture as well. If user buys a computer from Dell then he will get the customization facility in the system. Now after purchasing a product user will customize the product and further is the product is detected with some fault the it needs to be returned. From manufacturer’s point of view it would be interesting to note that if company receives any customized product then the company would be able to make out the modification needed in the product as the feedback has come directly from the end user. Hence ICT technique enables manufacturer also to optimize the
production and capture the more share in market. It would be easy for a manufacturer to collect accurate information from an e-commerce application regarding current customer’s needs. Further, there are few applications existing which are based on internet that capture data on the behavior of their members to put a classification on their clientele into groups of customers. These customers are having similar preferences. This data is used for the analysis. If any event occurs (purchase of product) then upon the event and interest of the customer member of a group, the relevant data may also be used to promote the same items to the rest classes having similar preferences. It also considers the parameters of degree of acceptance.

From reverse logistics point of view this kind of mechanisms encourages interested parties gain capture accurate information on various parameters of the market and forecast or predict possible trends or price changes.

11.7 Electronic market Place

Actually the concept of Electronic market place is very interesting. It is interesting because it started with the concept of return management but slowly market evolves and it took a very different shape. I would like to take example of Indian online portal in e-commerce name www.olx.com. It provides platform to sell anything to anyone. Actually it also deals with the used product which is not in use for the owner. If owner wants to sell it to someone then he may put the information about the product on the portal and product seeker may contact the owner and then finally the product can be sold out. Now we see initially we suppose to return the product to the distributor or manufacturer and web portal was used as a tool to see the live status of the returned product. But slowly time progresses and then it took a different shape. It becomes a popular portal to sell used product effectively. The online line portal whose example is given just above uploads approximate millions of orders daily. It shows the popularity and efficiency of the portal. It has also worked on the mindset of the buyer and the seller.

Basically the electronic market place is product centered. Why product centered because huge number of used products are available virtually on the portal and potential customers get an option to pick the best one. Since the buyer and the seller can communicate directly hence they can have the best deal after mutual negotiation. In spite of this all there are many factors which may affect electronic market place.

- Geographical location of the servers
- Access rights
- Price determination mechanism
- Logistics aspects
- Level of customer satisfaction

For example USA sites www.ebay.cm and www.onsale.com have greatest coverage and significant visibility in the market. But these companies focus only on North America only because they have good density of customers in that area only. It also removes unnecessary overhead for the company people. The company www.qxl.com offers variety of services in the EU countries like Netherland, Germany, Italy etc. Here in this area it is more localized because it has not to overcome linguistic, logistic, cultural monetary barriers. It gives it another advantage.

The wide variety of products which are entered the market place lists electronic items, computers, hi-tech equipments etc. Although the electronic market place watches the vertical growth in all respect. Fig elaborates following three types of flows which enters the reverse logistics chain.

- Production waste
- Commercial returns
- End-of-use products.

Electronic markets which encompasses this are www.metalsite.com, www.qxl.com and www.ebay.com respectively.

Table T5 Flow and web support

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<tr>
<th>Types of flow</th>
<th>Web enabled solution</th>
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<td>Production waste</td>
<td><a href="http://www.metalsite.com">www.metalsite.com</a></td>
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<tr>
<td>Commercial returns</td>
<td><a href="http://www.qxl.com">www.qxl.com</a></td>
</tr>
<tr>
<td>End-of-use products</td>
<td><a href="http://www.ebay.com">www.ebay.com</a></td>
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Few Indian market players are mentioned above but even in south east Asia new players have also arrived. www.amazon.com is the leading American player which has given strong completion to the existing Indian companies. After all it is the matter of the best services to offer and survival of the fittest all the time.
If we consider the logistics aspects of the electronic market place then following key areas explored.

- Virtual warehouse
- Inventory management
- Transportation
- Set up and operational specification
- Scheduling and routing
- Location identification

The final and most important aspect is the customer satisfaction. Outsourcing few above is common tactic of all service providers. A third party can be subcontracted for the few operations.

**A Case:**

Remarkably [Carsten N (1998)] provides a standardized rating system to assess the quality of items the marketplace which are featured. An intermediate important role is played by Thrusted Third Parties (TTP’s). It ensures no conflicts between seller and a buyer (e.g. if the goods delivered fails in meeting the specifications). To meet customer’s satisfaction level all other policies like insurance coverage for damaged goods, posting the seller's physical address, guarantee of returns in case of unsatisfactory items etc.

**11.8 E-commerce model for alternate use of the product**

Basically there are two categories of the products which are there in the open market. Market can be conventional or electronic. The first category is supplier driven where fresh or newly products are launched and promoted. The second category is customer driven where the remanufactured parts or equipment are promoted and sold to relevant buyer. In both the cases customer has significant role somewhere. In the first category details for the items is provided by potential customer in request and the search is performed by the supplier and then the procurement details. Based on this orientation, two main characteristics emerge for this model.

First, E-commerce for supply of pre-owned parts. It is region bounded. It means services offered by suppliers are usually a range of parts. It can be over a more or less defined geographical area. The success of the business process depends upon the identification of the parts effectively. It may acquire oral communication or via search engine methodology. It ensures both the interesting parties should manage to get in touch with each other then unique, common and unambiguous framework to be used o describe desired part.
Importance of web can not be ignored. As it can be a great help in finding potential supplier. For example www.find-apart.com which operates in US. Since every part has unique code number hence identification can be done through oral communication or further enhanced as well.

Let us take an example of demand driven disassembly. Though it is also possible. Supposed a part is requested and is not available directly. It may be available as a sub assembly unit. It means demand driven disassembly needs an efficiently large inventory of pre-owned products to fulfill demand as it may be perceived costly.

Remanufacturing case is little different. It actually works in a closed loop process and if user puts a request for a part then after some time or even eventually it may be made available or can be remanufactured as well. It refers to react or prevent maintenance for heavy industrial equipments.

As usual the guarantee of quality and time constraints is key factors in this scenario. The factor which is deciding is called urgency. As it has time constraint hence swift completion, and logistics become key factors and can not be negotiated. Thus we can see that a significant and simulating role of E-commerce in remanufacturing and reuse of the parts and the products.

11.9 Conclusion

E-commerce for complete reverse logistics solution has never been discussed optimally because it would be difficult to put a challenge like this. Since it does not allow a complete migration of existing activities and practices to a new infrastructure but it may certainly provide a tool to reconsider the existing structure to promote all business activities. Pharmaceuticals industry is place where the deep penetration of the e-commerce is observed. This model offers two options to customers. The first option is customer can describe his return, can put a request for a quote. After the best deal he can sell it. Another option is customer can request a quote for an order which he has planned to place.

The picture which comes out is very interesting. Remanufacturing is more demanding than reuse of the return.

However this area of web application is very active and very aggressively progressing. Especially that unorganized sector has even set a bench mark till now. With this reuse of surplus goods and remanufacturing of parts both have got important stimulus. If we talk about the South East Asia region where though e-commerce models are restricted because it is believed that it
only represents the transformation of conventional commerce practices to the web enable tools
decide this area eagerly awaits and expects further development exploring all the relevant
research issues.