Reverse Logistics A Tool for Organizational Excellence; A Pakistani Perspective

U. Hameed[1], G. Zailin[2], G. Zakria[3], W. Ahmed[4], M. B. Raza[5]

[1,2]*Industrial and Manufacturing Engineering Department, School of Mechanical Science and Engineering, Huazhong University of Science and Technology Wuhan, China*
[3,4,5]*Industrial and Manufacturing Engineering Department, University of Engineering and Technology Taxila*

***Abstract*-**Due to intense competition and globalization, the challenges associated with providing products and services at the right time and place as well as at the lowest possible costs have increased. The practicing of Supply Chain Management (SCM) has now become an essential requirement for staying competitive in international market. The importance of returns is obvious due to growing environmental concerns, sustainable competitiveness and corporate social responsibility. This is only possible with effective management of returns. In this article, the basic emphasis has been made towards the realization for implementation of reverse logistics in manufacturing industries of Pakistan. In this context, the current state of reverse logistics trends is studied in manufacturing industries of Pakistan. Performance index of developed and under developed countries are analyzed and efforts have been made to provide basic guidelines for improving organization performance through improving supply chain index by incorporating reverse logistics as a tool.

***Keywords*-**Reverse Logistics, Logistics Performance Index, Sustainable Development, Challenges for Reverse Logistics, Customer Delight and Loyalty.

I. INTRODUCTION

he Council of Logistics Management (CLM) has defined reverse logistics as "The process of planning, implementing, and controlling the efficient, cost effective flow of raw materials, in-process inventory, finished goods and related information from the point of consumption to the point of origin for the purpose of recapturing value or proper disposal" [i]. Generally speaking reverse logistics is the process of moving goods from their typical final destination to the manufacturer for the purpose of repair, refurbishment, remanufacturing and recycling (recapturing value), or proper disposal [ii].

A reverse logistics system incorporates a supply chain that has been redesigned to manage the flow of products or parts destined for remanufacturing, repairing, or disposal and to effectively use the resources and recovered products after repair and remanufacturing [iii]. Reverse logistics consists of almost 1% of the total U.S. gross domestic product [iii]. However it is not surprising that the process initially defined as "The return, exchange, repair, refurbishment, remarketing, and disposition of products" is now quickly emerging as an integral component in leading global organizations [iv]. Prominent OEMs in multiple industries are focusing on developing the reverse logistics process in order not only to sustain the existing customers by acquiring their confidence and trust level but also to enhance the business activity by increasing the number of loyal customers. Moreover it is a useful methodology for earning more profits by converting the defective returns into more useful product [iv]. Nevertheless it is a step forward to comply with environmental regulations, reducing operating costs and improving product uptime and quality at most. The graphical representation of reverse logistics is presented in Fig.1, where a closed loop supply chain system is shown with a clear distinction of forward and reverse logistics activities in detail.

This is an exploratory and descriptive study with the purpose to introduce basic and general concepts of RL in perspective with Pakistani manufacturing industries and persuade the local industry to accept RL as a mandatory business driver because authors believe that local industries are reluctant to adopt and implement this useful management. Focus has been made to present the benefits of RL implementation to increase customer satisfaction and loyalty.

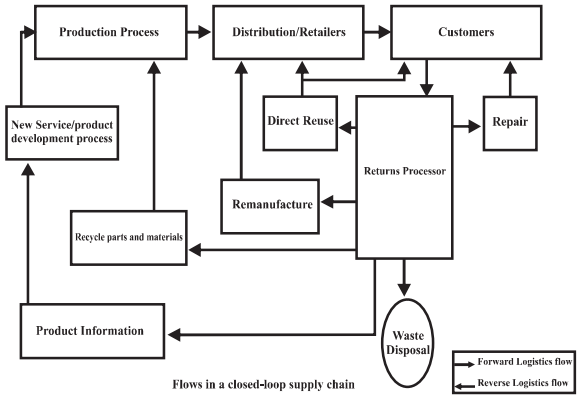

Fig. 1. closed loop supply Chain System

A. Reverse Logistics: Scope and Reasons

During the last few decades the reverse logistics have acquired sufficient attention as engineering field in academia and industry. The authors and practitioners have focused on numerous matters at strategic, tactical and operational level for effective implementation of reverse logistics. At the strategic level, the recovery network design has been studied in details [v]. At the tactical level, the focus has been made for establishing connections with partners and stake holders of network [vi]. At the operational level, inventories have to be managed and controlled [vii]. Significant literature is available for the implementation of reverse logistics in developed countries while there are few (if any) studies about the subject.

The paper exclusively discusses the manufacturing industry of Pakistan with the purpose of RL implementation. In manufacturing industry, different types of manufacturing returns occur including scrap, defectives, rework, planned waste, production left-overs etc. [viii]. While the customers returns which is the focus of this paper, may include excess quantities, rejected materials, service returns (spare parts, repair), B2C commercial returns, reimbursements, warranty claims, end of lease returns, end of life returns etc. [viii].

B. Logistics Performance Index

During the last few decades, logistics and SCM concepts remained the focus of most of the organizations and researchers around the world for sustainable and continual growth of the companies. The logistics performance of companies is determined by an index called, Logistics Performance Index (LPI). The logistics performance index of the entire world came out to be 2.8 in year 2012 [ix]. The value of this index for USA in the same year was 4.0. Logistics Performance Index reflects overall score for perceptions of country's logistics, based on efficiency of customs clearance process, quality of trade, transport related infrastructure, ease of arranging competitive priced shipments, quality of logistics services, ability to track and trace consignments, and the frequency for shipments reach the consignee within the scheduled time [iii]. The index ranges from 1 to 5, with a higher score representing better performance [ix]. It can be seen that although the logistics performance index vary from country to country as per the business conditions and cultural constraints of the countries, however, even the most developed countries still not even touched the highest rating of the specified performance index. Table-1.1, presents the regional LPI derived from Logistics Performance Index Group, a team of World Bank.

TABLE I
REGIONAL LOGISTICS PERFORMANCE INDEX
(WORLD BANK REPORT 2012)

S #	Country	Logistics performance index 1-5 (worst to best) 2012
1	World	2.87
2	Low income zone	2.36
3	Middle income zone	2.69
4	Lower middle income zone	2.58
5	Upper middle income	2.78
6	Low and middle income	2.6
7	East Asia and Pacific	2.77
8	Europe and Central Asia	2.73
9	Latin America and Caribbean	2.67
10	Middle East and North Africa	2.58
11	South Asia	2.58
12	Sub-Saharan Africa	2.46
13	High income zone	3.48
14	Euro area	3.56

C. Causes of low LPI

There could be a number of reasons behind the low logistic performance index (LPI) of different companies around the world. But in the logistics scenario, micro analysis revealed the following most important factors:-

1. Companies usually emphasize on having an effective logistic system. Still forgetting to pay attention to a most important element of this chain: the management of returns.
2. Even though, few companies tried to compensate or adopt this specific area of handling returns, still the process they adopted was so mismanaged and complex that instead of increasing efficiency of their business activities, it actually brought chaos to the entire system.
3. Moreover due to the complexity of various processes involved in handling of the returns, unwanted worms like warranty conflicts, confusion and delay relating to segregation, decision regarding disposition, cost implications etc. make it even difficult to embrace the true essence of the return flow and the organization suffer huge loss rather than any benefit.
4. Overall the ratio of the return to overall company's production is very low as evident from the data given in Table 1.2 relating to the USA industry. Most of the companies' do not bother to even think of handling these returns rather than expensing their useful energies in transforming the catastrophe into opportunity. However such thinking on the long run creates a shortfall in the confidence level of the customers due to unavailability of the necessary after sales support.

An international survey carried out by a group of researchers in 2010 showed that the loyalty level of the customer was directly related to the assurance of after sales services, a company provides at the time of selling a product [iv]. Moreover the same survey showed that the growth in the number of customers was also an exponential function of availability of the after sale services along with other parameters.

TABLE II
RETURN % BY SECTOR
(COURTESY OF UNIVERSITY OF NEVADA, RENO CENTER FOR LOGISTICS MANAGEMENT, 2007)

S #	Industry	%
1	Magazine Publishing	50%
2	Book Publishers	20-30%
3	Book Distributors	10-20%
4	Greeting Cards	20-30%
5	Catalog Retailers	18-35%
6	Electronic Distributors	10-12%
7	Computer Manufacturers	10-20%
8	CD-ROMs	18-25%
9	Printers	4-8%
10	Mail Order Computer Manufacturers	2-5%
11	Mass Merchandisers	4-15%
12	Auto Industry (Parts)	4-6%
13	Consumer Electronics	4-5%
14	Household Chemicals	2-3%

5. On the other hand the nature of fluctuation in the return received by any company also makes it very difficult for the planners to accurately forecast the types of inventory required for the purpose of managing the different scenarios of the returns [x]. Moreover, accumulation of the huge unexpected return in the companies' junkyard sometimes makes the less storage capacity available for the forward production than the received defective / unwanted products. The management of these unwanted junk requires the utilization of useful revenue / resources that a company may utilize for further growth and the same is being expended on the value addition of the considered unwanted junk.
6. Most of the companies involved in the consumer related products often offer their customers the after sales service / maintenance facility. In this regard they usually receive appreciable amount of returns from their customers at all levels and from different destinations. Most of the time a centralize repair / maintenance facility is established. However, centralized repair and maintenance facility is the solution for slow response due to excessive work load of diverse nature on the facility. Although it also results in the development of expertise of handling different problems but at the same time too much diversification of work may result in the inappropriate and inefficient response by the overburdened employees and management.
7. Inventory management plays a vital role in supply chain and reverse supply chain management. The service provided to the customer eventually gets enhanced once the efficient and effective management of inventory is carried out throughout the supply chain network [xi]. Thus keeping the optimum inventory level in reverse supply chain is critical to reduce costs. Minimizing the total cost is meant for minimizing holding and shortage cost in the entire reverse supply chain. The minimization of the total cost can only be achieved when optimization of the base stock level is carried out at each member of the supply chain [xii]. However each part or function of the supply chain lacks in the in-depth coordination among different functions. Hence the result is the accumulation or shortage of the necessary inventory required for the effective management of the above mentioned scenario.

From the above discussion it is evident that there can be a number of reasons due to which the companies fail to excel in the supply chain management field. The failure to comply with the ultimate requirements of the supply chain management can drastically reduce the profitability of the organization and the company can fail to compete in the growing global market. To address these issues the current research is be focused on the return flows of the supply chain system with the aim to develop a conceptual frame work for efficient, effective, collaborative, optimal and customer focused reverse logistics methodology.

D. Companies with Successful Reverse Logistics Processes

Reverse logistics is an emerging area of importance in supply chain management field and many companies are practicing it. Every company, irrespective of industry, can adopt a reverse logistics process that can save money and generate profits. A company can also evaluate the potential to recycle its products to help improve environmentally friendly practices.

Bosch, an automotive and industrial technology company, builds sensors into its power tools that indicate if the motor is worth reconditioning. The sensors reduce inspection and disposition costs, allowing the company to realize profits on the remanufactured power tools [xiii]. General Motors simplified its process for returning automotive parts by allowing parts to be returned to a single facility using GM's pre-printed shipping labels. This less costly process enhanced GM's relationships with its customers and supply chain partners [xiv]. Volvo, a Swedish car manufacturer, anticipated the Swedish

government passing a resolution holding auto manufactures accountable for disposal of vehicles. Volvo implemented a reverse logistics process of salvaging and dismantling cars. The company generated revenues by selling the used metal, plastics and car parts [viii].

E. Manufacturing Industry of Pakistan

Pakistan is one of the developing nations of the world, striving to move forward with the world growing economies. However the pathway, Pakistani government and its people followed, for attaining the desired goals, was giving the desired results till late 80s. After the involvement of Pakistani government in Afghan war against USSR the main focus of the government was shifted from the economic growth towards the strengthening the country defense [xiv]. After retrieval of the foreign troops from the neighboring country and the aggressive progression of India and other south Asian countries in economic sector it has been realized by Pakistani government to step forward and take concrete measures in economic growth and sustenance. The policies and infrastructure is being established in cooperation with multinational alliances. However no significant growth in the manufacturing industrial sector of Pakistan can be seen till date [x].

F. Basis of Pakistani Manufacturing Industry Downfall

1. In late 20th century while the rest of the world was focusing in achieving business excelling through adaptation of modern tools, techniques and methodologies, Pakistani industry were striving for the sustenance of obsolete machinery and techniques. The result was, as obvious, very high cost, high defect rate and late deliveries. All the factors outclassed manufacturing industry of Pakistan in global market creating a total loss-loss situation for the manufacturing firms [xv].
2. In a modern economy it is very essential to transform scientific research into competitive advantages. In the US, extensive collaboration between universities and industry and the ensuing transfer of scientific knowledge has been viewed as one of the main contributors to the successful technological innovation and economic growth of the past three decades [xvi]. At the same time, the insufficient interaction between universities and firms in the EU is, according to a report of the European Commission (1995) itself, one of the main factors for the poor commercial and technological performance of the EU in high-tech sectors [xvi].

   It can be understandable that even the European Union, which third world countries rate highly advance, still shortfall of the desirable technological excellence due to a slight less collaboration between the industries and academia than the USA [xvii]. One can imagine the condition of the technological growth of a society which has never thought of existence of such collaboration like developing nations. Unfortunately the current worst condition of Pakistani manufacturing industry is the best example of such non collaborative environment. This ultimately resulted in decline of the technological improvement in the industrial sector. The government and the private sector both are responsible in one way or another for the occurrence of such condition. Under the non-collaborative environment neither the government has the proper visibility of the technological needs of manufacturing sector (in terms of education as well as machines or equipment) nor does the industrial sector has the opportunity to get benefited from the enriched and concentrated technological hubs. In this scenario the suffering is of the nation as a whole rather than of a specific sector.
3. Non-collaborative attitude, unwillingness to acquire new knowledge and techniques and lack of required expertise ultimately results in the inefficiency of the people and process at all level of the business activities and does not remain limited to the specific manufacturing setups only. It grew like a cancer and damaged one organ after another. It is understood by even a small business owner as well that all the business activities are interlinked. One ineffective, inefficient One ineffective, inefficient process or person will subsequently affect the entire business portfolio if not taken care of.
4. Moreover the entire business moves around the end user or customer. Customers drive all the business across the globe. For any organization, customers are the resource upon which the success of the business depends. When thinking about the road map of success, the importance of customers cannot be ignored. Following are the proven guidelines for achieving business success :-
   a. Repeat business is the pillar of successful marketing strategy. It helps to provide recurrence and revenue for the business.
   b. Organizations are reliant upon their customers. If they do not nurture customer satisfaction and loyalty then they could lose their customers and ultimately the entire business will vanish from existence. Without customers the organization could not even think of survival.
   c. As per the modern terminologies the "organization is an entity build for customers, run for customers and co-existence with customers by bringing their desires in to reality".

If we look into a broader prospective of the business activities then it can be easily visualized that the business is run for the customers. It is obvious that all the organizations around the world are striving for extending their customer satisfaction level. The extension in the number of customers is merely dependent upon the quality of product and services one offer to ones customers. This offered attribute is sometimes not enough to retain the existing customers rather to expect an increase.

G. Suggestion for Sustenance and Development of Pakistani Industrial Sector

From the previous discussion on subject, the technological advancement by the use of collaborative strategy and to become a customer focused organization are the two building blocks of attaining the competitive advantages and sustenance development among a specific business portfolio specially for the reverse logistics applications.

The technological advancement comprises of the two main areas:-

1. Technological advancement in the area of enhancement and improving products, its related processes specially logistics movement by use of state of the art equipment / machinery etc.
2. Enhancement and improving different management processes for the purpose of increasing efficiency and effectiveness of different business activities particularly forward and reverse logistics.

Technological advancement in the area of enhancement and improving production and relating processes specially logistics movement by the use of state of the art equipment / machinery etc. can be attained by the collaborative efforts of the government / private sector with the academia [xvii]. Efforts are required to be put in by the government agencies, private consortiums as well as by the universities to create an understanding and harmonization between the industrial current and future requirements and the syllabus being taught at different universities and research centers [xviii].

Moreover incentives in the form of tax rebates etc. are required to be offered by the government to those industries / universities / research centers who regularly collaborate with each other for the purpose of searching solutions of various practical problems and try to develop new technologies for current and future use. In this regard it should be made mandatory for the industries as well as for the universities / research centers that the research project assigned to the different caliber of students should be taken from the practical problems / needs of different industrial sectors. Moreover the industries should be made bound to financially assist all such research projects. The result of research than can be utilized by the different industries to enhance their capacity and capabilities.Most of the work relating to the technological advancement of management process for the purpose of increasing the efficiency and effectiveness of different business activities relates to incorporate the essence of the emerging philosophies into the corporate function for identification and removal of the inefficient process (creating wastes) and for adaptation of the techniques useful for creating harmonization, stability and swift decision making ability relating to the changing stimuli across the different function of an organization. It means to study the existing process of the entire organization then map them to sufficient detail and investigate the areas creating hindrance to achieve the desired performance levels in perspective of implementing latest management philosophies.

After removing the inefficient / undesirable process (wastes) from the system, elements of different philosophies having similar or interactive behavior may be implemented together or one after another to ascertain the results. In most of the cases the achieved performance results when integrated with the technological advancement set the path way to success for an organization.

II. Points of Ponder in Reverse Logistics

The most important aspect of becoming the customer focused organization is to establish a close link between the customer and all other business facets in order to create a better understanding between the customer and organization. In the current world scenario the most important element of the business which is directly related to the customer in acquiring their needs / expectations and to remain in direct contact with the customers is the Supply Chain System. However conventional supply chain management techniques do not fulfill the results which are being expected by this state of the art management philosophy.

Hence it is now realized by most of the management executives that there is a missing link that is creating the inefficiency of the supply chain system [xix]. In the supply chain system the goods move from the OEM toward the customer / end user. During this movement a number of stake holders are involved which participate in enhancing the efficiency of the total system.

However, when a scenario arises where the movement of a product from the customer towards the OEM is desirable than considerable hindrances are posed by different stakeholders at each and every step of transformation including the OEM itself [xx]. Although this hindrance is not intentionally posed by all stakeholders but due to non-clarity of different scenarios mentioned below, barriers are automatically invoked:-

a. Is the product defective?
b. Is it under warranty?
c. Does it require repair or needs to be replaced?
d. Is it out of date or expired?
e. Is the manufacturing fault induced due to violation of user guidelines or occurred due to transportation etc.?
f. Will company accept the product?
g. Is it worth repair?
h. Can it be utilized otherwise?
I. Can recycling be done?
j. Is refurbishment possible?
k. Does regulation impose to recycle it?
l. Will it be helpful to earn name for the organization in reused / recycled etc.?
m. Will it enhance the customer satisfaction?
n. Is the return product needed by the organization?
o. Is cost of repair, refurbishment, recycling etc is feasible?

The answer to all the above or some of the question if unknown creates a total confusion situation in which final destiny of the return product is never decided and the return products eventually become junk. Most of the companies consider it satisfactory due to their shortsightedness of the worst consequences that the undecided return product will brought not only onto their fame but will also result in the loss of a huge chunk of loyal customer. The business essences will be lost and eventually a steady decline in the growth of the organization will occur. Such non customer focused organization will never be able to identify the causes of their business failure even though the reasons are most obvious one.

Hence it is call of the day to stream line and harmonize the various processes and steps involved in the management of return flows to get the full benefit of the supply chain system. If the missing link of the supply chain system is properly and efficiently addressed then the motive of the all organizational effort to become the business leaders will be finally attained. The management of the specified return flow in supply chain management system is usually referred to as "REVERSE LOGISTICS".

III. Challenges Involved to Improve Reverse Logistics

As previously discussed reverse logistics is a key ingredient of attaining the loyalty of the customers which ultimately results in the enhancement of the business portfolio [xviii]. Moreover if the reverse logistic activities are properly planned, executed, monitored and controlled then the same will become the assurance for the success of any business activity. However due to chaos and ambiguity of different scenarios involved in the execution of reverse logistics process companies fail to avail strategic benefits associated with RL system [xix]. Hence before proceeding it will be very beneficial to have an understanding of the main challenges involved in the implementation of reverse logistics.

a. Lack of awareness reading the importance of reverse logistics activities in business success.
b. Lake of understanding of the interrelationship between various steps / elements of reverse logistics.
c. Lack of awareness relating to the possibility of the high assert recovery ratio to the total product return or produced.
d. Poor policy relating to the warranty claims
e. Very stringent gate keeping policy
f. Poor planning relating to different elements / process of reverse logistics
g. Centralize recovery / disposition facility
h. Poor inventory management methodology
I. Slow response to the customer queries.
j. High time from recovery to final resubmission of the return product
k. Unavailability of the appropriate performance measure for evaluating the efficiency and effectiveness of different processes of reverse logistics.
l. Poor or insufficient data generation and collection.

IV. Benefits of RL Implementation

The following benefits at different stakeholders' level can be obtained [i]. A brief of such advantages are listed below:

A. Stakeholders' Gains
a. Stakeholders have win-win situation
b. Everyone earns benefits
c. Everyone love economic activity as it enhances the quality of life
d. Stakeholder's gain provides business opportunity
e. Stakeholder's gain drives value chain among all stakeholders and associated partners like transporter

B. Social Gains
a. Employability
b. Moral compensation
c. Job Opportunities
d. Encouraging entrepreneurial spirit
e. Media Fear
f. Entrepreneurial Spirit
g. Social Corporate Responsibility

C. Economic Gains
a. Creating impact at company productivity
b. Wealth creation
c. Cost Reduction
d. Monetary value addition
e. Enhancing profit margins

D. Environmental Gains
a. Environmental care
b. Environmental awareness
c. Green Image and Clean environment
d. Saving environment for future generations
e. Avoiding Pollution Charge
f. Enforcement of Environmental Laws

V. Results and Findings

Reverse logistics is one of the most emerging concepts both in the academia and in the industry. From the last few decades, logistics and supply chain management concepts remained the focus of most of the companies and researchers around the world for sustainable and continual growth of business activities. The concept of managing return flows from the market place back to the manufacturer destination for rework, refurbishment, reuse, recycle is not new. Examples can be given of reuse of products, materials and spares, waste paper recycling, deposit systems for soft drink bottles, metal scrap brokers and reusing of different automobile parts. However, reverse logistics as a research field is relatively a new area.

As a matter of fact, reverse logistics is usually considered as a nuisance because of existence of many inbuilt constraints offered by the various business sectors specially by the top ranking companies of that sector. Many of the companies alleged the efforts on RL as wasting the useful resources. Moreover due to unsupportive companies polices the RL efforts are usually failed to be fruitful. Nevertheless financial implications, lack of necessary knowledge, less technological exposure, non-customer focused approach, unclear company polices and least environmental concerns are few of the aspects creating the disinclination of the third world countries to adopt the proven advantage of the Reverse logistics system.

This paper promotes strategic managers to focus this overlooked dimension and pushing the tactical managers for exploring sustainable competitive advantages.

Failure to comply with the growing needs of integrated supply management system will definitely pose a reversing effect of the RL opportunities / benefits. The current scenario of business activities in Pakistan are a true reflection of the losses being incurred due to the misconception of this idea. A few companies like beverage industry, automobile manufacturer and some of pharmaceutical companies have adopted the concepts of reverse logistics in a smaller prospective [xxi]. However, due to their limited and inefficient implementation approach, they are unable to capture the real benefits of RL system. In this paper an effort has been placed to realize the manufacturing industries of Pakistan to adopt this useful aspect of supply chain management. It will definitely bring effectiveness in terms of sustainable, environmental perspectives and customer satisfaction and delight. In future efforts can be made to derive a workable, efficient and cost effective framework suitable for Pakistani environment.

VI. Conclusion

The implications of this study for Pakistan's manufacturing industry are plentiful. There is nothing for denying the fact that RL is a necessity for regulatory and customer service objectives. Reverse logistics has not received the attention it deserves and little or no attempt is being made to manage RL for managing costs and efficiency especially in manufacturing industry of Pakistan. Delayed responses, long return processing times, poor control of returned products create potential problems for the manufacturing companies. In the manufacturing industries of Pakistan, employing reverse logistics will lead to cost effective business enhancements and sustainable logistics operations. Mathematical modeling & simulation and the system dynamics modeling are open areas for research in future.

References

[i] M. P. De Brito and R. Dekker, "A framework for reverse logistics". Springer Berlin Heidelberg, 2004, pp. 3-27.

[ii] D. S. Rogers, and R. S. Tibben-Lembke. "Going backwards: reverse logistics trends and practices". Reverse Logistics Executive Council, Pittsburgh, 1999.

[iii] C. R. Craig, and L. M. Ellram. "Reverse Logistics – A Review of the Literature and Framework for Future Investigation." Journal of business logistics, vol. 19, no. 1, pp. 85-102, 1998.

[iv] R. Dekker, M. Fleischmann, k. Inderfurth and L. N. Wassenhove, "Reverse logistics: quantitative models for closed-loop supply chains", Springer Science & Business Media, 2013, pp. 109-119.

[v] M. D. Abdulrahman, A. Gunasekaran and N. Subramanian. "Critical barriers in implementing reverse logistics in the Chinese manufacturing sectors." International Journal of Production Economics 147 (2014): 460-471.

[vi] S. Senthil, B. Srirangacharyulu and A. Ramesh. "A robust hybrid multi-criteria decision making methodology for contractor evaluation and selection in third-party reverse logistics." Expert Systems with Applications 41, no. 1 (2014): 50-58.

[vii] K. Govindan, H. Soleimani and D. Kannan. "Reverse logistics and closed-loop supply chain: A comprehensive review to explore the future." European Journal of Operational Research 240, no. 3 (2015): 603-626

[viii] H. S. Kilic, , U. Cebeci and M. B. Ayhan. "Reverse logistics system design for the waste of electrical and electronic equipment (WEEE) in Turkey." Resources, Conservation and Recycling 95 (2015): 120-132.

[ix] A. C. Armstrong and B. R. Rubin, "Regional issues in the reconstruction of Afghanistan." World Policy Journal, pp. 31-40, 2003.

[x] C. Nuss, R. Sahamie and D. Stindt, 2015. The Reverse Supply Chain Planning Matrix: A Classification Scheme for Planning Problems in Reverse Logistics. International Journal of Management Reviews, 17(4), pp.413-436.

[xi] Z. Lu, and N. Bostel, "A facility location model for logistics systems including reverse flows: The case of remanufacturing activities", Computers and Operations Research, vol. 34, no. 2, pp. 299-323, 2007.

[xii] F. Schultmann, M. Zumkeller, and O. Rentz, "Modeling reverse logistic tasks within closed-loop supply chains: An example from the automotive industry." European Journal of Operational Research, vol. 171, no. 3, pp. 1033-1050, 2006.

[xiii] P. Guarnieri, V. A. Sobreiro, M. S. Nagano and A. L. Serrano. "The challenge of selecting and evaluating third-party reverse logistics providers in a multicriteria perspective: a Brazilian case." Journal of Cleaner Production 96 (2015): 209-219.

[xiv] M. S. Pishvaee, R. Z. Farahani, and W. Dullaert, "A memetic algorithm for bi-objective integrated forward/reverse logistics network design." Computers and Operations Research, vol. 37, no. 6, pp. 1100-1112, 2010.

[xv] M. El-Sayed, N. Afia, and A. El-Kharbotly, "A stochastic model for forward–reverse logistics network design under risk." Computers and Industrial Engineering, vol. 58, no. 3 pp. 423-431, 2010.

[xvi] Chiarini, Andrea, and A. Douglas. "The impact of logistics solutions on customer satisfaction: an exploratory qualitative study of manufacturing companies." Sinergie Italian Journal of Management (2015): 255-270.

[xvii] M. S. Pishvaee, K. Kianfar, and B. Karimi "Reverse logistics network design using simulated annealing", The International Journal of Advanced Manufacturing Technology, vol. 47, no. 1-4, pp. 269-281, 2010.

[xviii] Y. C. Huang, S. Rahman, Y. C. Wu and C. J. Huang. "Salient task environment, reverse logistics and performance." International Journal of Physical Distribution & Logistics Management 45, no. 9/10 (2015): 979-1006.

[xix] M. S. Pishvaee, and S. A. Torabi, "A possibilistic programming approach for closed-loop supply chain network design under uncertainty." Fuzzy Sets and Systems, vol. 161, no. 20, pp 2668-2683, 2010.

[xx] B. T. Hazen, R. E. Overstreet, D. J. Hall, J. R. Huscroft and J. B. Hanna, , 2015. Antecedents to and outcomes of reverse logistics metrics. Industrial Marketing Management, 46, pp.160-170.

[xxi] K. Sarwar, 2014, Commercially Viable Reverse Logistics in Pakistan: Extending the Supply Chain for a Sustainable Competitiveness, International Journal of Management Sciences and Business Research ,4, pp 54-65.