

## FRAMEWORK OF REVERSE LOGISTICS

Framework of Reverse Logistics: The Case of Pakistani Industries

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### Abstract

By Products And Waste Materials Are The Parts Of Every Manufacturing Activity. These Wastes Can Be A Valuable Input For Various Industry Processes If Handled Properly And Can Cause The Environmental Damage If Handled Unprofessionally. It Is Usually Assumed That Supply Based Approach To Recycling Can Disrupt The Market Equilibrium Whose Beauty Reside On The Well Known Demand And Supply Principle. Recycling Industry Is Totally Depends Upon Supply Based Approach Because No One Can Predict The Returns In A Originating From Different Streams. Reverse Logistics Are The Valuable Input For The Recyclers. This Paper Presents The Framework Of Reverse Logistics Optimizing The Stakeholders' Gain, Social Gain, Economic Gain And Environmental Gain. It Identifies The Roadblocks That Prevail In Recycling Industry And Describes Various Types Of Returns And Wastes. This Paper Not Only Highlights The Recycling Activities But As Well Shares The Best Practices For Effective Implementation.

Key Words: Reverse Logistics, Supply Chain Management, Roadblocks, Operational Framework, Recycling, Best Practices

## Introduction

In The Era Of Information Technology Where The Whole World Is Connected And Going To Concentrate On One Point Market The Whole Globe. Rising Populations, Globalization Policies, Fluctuating Currency Exchange Rate, Oscillatory Behaviour Of Prices Of World Commodities And Wto Regulatory Requirements Are Threatening More And More. Intensive Competition Among Manufacturers Is Increasing Day By Day And Encouraging Them To Explore The Innovative Options For Waste Materials.

Increased Environmental Awareness And Upcoming Stringent Environmental Laws Exert The Pressures On Manufactures To Dispose Off Waste Materials In An Environmental Friendly Way Otherwise The High Pollution Charge And Closure Of The Manufacturing Units Will Be The Destiny. Returns Whether They Are Manufacturing Or Distribution Or Customer They Always Have A Potential For Cost Recovery And There Is A Way To Reclaim The Material To Capture The Monetary Benefits. Reverse Logistics Deals With The Flow Of Materials From Point Of Consumption To The Point Of Origin To Recapture Value Or To Ensure Disposal (Schatteman, Olaf, 2009).

As Per The Council Of Logistics Management, “Reverse Logistics Is 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”. Reverse Logistics Can Be Defined As Reverse Process Of Logistics (Afifa, 2011). Reverse Logistics Aims At The Backward Flow Of Material Which Starts From Consumer To The Producer And Defectives Appearing During The Manufacturing Process With A Goal Of Maximizing Value From Items Which Requires Proper Disposal (Rogers & Tibben, 1999). Reverse Logistics Starts

Where Formal Supply Chain Ends. It Starts From The Consumer Instead Of Supplier In The Forward Flow. Environmental Friendly Disposal, Monetary Returns To Parties Involved Are The Part Of Green Logistics And Requires Focus And Attention Of Life Cycle Assessment (Murray, 2000) This Is The Result Of Conscious Efforts From Industrial Waste Contactor And The Company Itself To Build The Company Image In Society And Provide A Confidence To Environmental Protection Agency.

### Literature Review

Logistics Is The Vast Field. In Supply Chain Context, Logistics Deals With Flow Of Materials, Equipments, And People From Point Of Origin To The Point Of Destination. A Flow Associated From The Supplier's Supplier To Customer's Customers Is Regarded As Forward Flow. But There Are Sometime Returns Of Any Form That Require Backward Flow Of Materials That Is Reverse Logistics. In Early Nineties, The Council Of Logistics Management Has Published Two Books On Reverse Logistics. The First By Stock (1992) Recognized The Field Of Reverse Logistics As Being Relevant For Business And Society In General. One Year Later Kopicki Et Al. (1993) Paid Attention To The Discipline And Practice Of Reverse Logistics, Pointing Out Opportunities On Reuse And Recycling. Kostecki (1998) Discusses The Marketing Aspects Of Reuse And Extended Product Life. Stock (1998) Reports In Detail How To Set Up And How To Carry Out Reverse Logistics Programs. In Literature There Are Many Models Which Are Developed On The Basis Of Linear Programming For Multi-Items And Multi-Locations (Kombas, 2011) The Structure Of The Operational Framework Of Reverse Logistics Is Not Restricted To Any Item Or Any Site Or Any Party. The Beauty Of This Framework Is It Involves All The Operational Stakeholders And Ends Up With 2s-2e Gain Model Optimizing

Their Gains. To Understand The Effective Operation Of This Framework We Must Explore The Impediments Which Create Hurdles.

### Roadblocks For Reverse Logistics

#### 1. *Lack Of Awareness About Reverse Logistics*

Impact Of The Reverse Logistics Is Implicit In Nature. Customers Have Greater Value For The Product In The Local As Well In The Global Markets. That Is The Reason Focus Towards The By Product, Scrap And Rejected Materials Is Less And It Has A Great Potential To Recover The Money Back.

#### 2. *Lack Of Technical Expertise*

Reverse Logistics Is The Forgotten Dimension. There Is No Formal Education Center That Educates And Guides How To Play In The Field Of Reverse Logistics. Mostly People Involved In This Business Are Uneducated And Non-Technical. They Have Learned The Recycling Techniques Over The Period Of Years And Doing The Businesses On The Basis Of Experience And Creativity. That Discipline Has A Lot Of Entrepreneurial Potential And There Is Lot Of Room That Educated People May Opt This Field As Source Of Income.

#### 3. *Inconsistent Quality Of Rejected Materials*

Production Of Waste And Nature Of Rejections Are Highly Unpredictable. No One Can Indicate The Nature Of Waste Generated. In Some Cases Like Defective Cartons Or Poly Film Or Confectionary Waste Or Biscuit Crumb Or Rotten Potatoes A Slight Idea Of Quality Can Be Conceived But Most Of The Cases It Is Highly Inconsistent The Quality

Of Defectives And Rejections. So Accordingly Every Time You Will Have To Explore Recycling Techniques Accordingly.

#### 4. *Financial Constraints*

People In The Business Of Reverse Logistics Can Work Either As A Local Waste Contractor Or Industrial Waste Contractor. To Be The Industrial Waste Contractor, One Requires A Strong Financial Muscle To Make The Payments On Cash At The Time Of Lifting The Rejected Material. Unless One Knows About The Fate Of The Rejected Material The Lifting May Ruin Or Destroy His/Her Whole Business.

#### 5. *Management Inattention*

Due To Green Logistics And Industrial Ecology There Is A Lot Of Pressure On Management To Dispose Them Off In An Environmental Friendly Way Of The Lack Of Information Of The Materials Demanded In The Small Markets. Top Management Is Highly Involved In The Core Activities Of The Organization That Is Why They Least Bother To The Rejections.

#### 6. *Poor Measurement System*

In Most Of The Organizations There Is No Formal Mechanism For Measurement. Usually They Combine All Waste Under One Head. No Doubt The Selling Is Item Wise And The Income Generated Is Booked In The Accounting Ledge The Amount Recovered Against Scrap Or Waste That Is Why. One Can Not Exactly Have Details What They

Have Sold In Which Category. That Hampers The Good Decision Making With Respect To The Disposal Initiatives.

#### 7. *Forecasting And Planning Constraints*

Mncs And System Based Organizations Have The Estimated Values For The Reverse Logistics That Is Usually Based On Previous Year's Estimates, Future Sales Projections And The Defect Reduction Initiatives. In Spite Of All These Efforts, There Are Some Anomalies Like Variation In The Temperature Of Cold Storage In The System That Results In Huge Quantities. Industrial Waste Contractor Is Supposed To Lift The Material And Suppose To Line Up The Resources Accordingly.

#### 8. *Inadequate Information System*

Information System Support Always Adds The Value In Reverses Logistics For The Identification Of The Rejections In Every Stage Along With Determining The Impact On The Bottom Line. Most Of The Companies Usually Have Inadequate Information System And Their Conventional Information Systems Do Not Contain The Information About Reverse Logistics.

#### 9. *Environmental And Legal Issues*

Due To Green Logistics, Industrial Ecology And Life Cycle Assessment (Brockmann1999, Geyer And Jackson 2004) There Is A Lot Of Pressure On Management To Dispose Off Reverse Materials In An Environmental Friendly Way. Heavy Pollution Charge, Bad Impact On Brand Image And The Closure Of The Businesses Compel The Management To Take Appropriate Measures To Handle The Materials.

### *10. Absence Of Performance Indicators*

Absence Of The Performance Indicators With Respect To The Reverse Logistics Is As Well The Source Of Impediment. Waste Percentage And Value Recovered Is The Generic Indicators Usually Used In The Industry. There Is A Strong Need To Establish Some Indicators To Effectively Monitor The Reverse Logistics.

#### Reverse Logistics And Scope

In The Manufactory Units And Corporate World, Returns Are Very Much Imbedded In The System. There Are Some Returns From Customers (De Brito, 2002) Due To Not Meeting The Customer's Specifications And Some Time There Are Returns During The Manufacturing Process Because Of Unsatisfactory Parameters Or Characteristics Of The Product Within The Manufacturing Units. It Happen Many Times Distributors Take The Materials Back Just To Ensure The Effective Implementation Of The Product Recall Procedure. Whatever The Reason Is Product Returns (Dekker & De Brito 2002) Exist In The System And Types Of The Returns Materials Are Defined As Under:

#### *1. Manufacturing Returns*

- a. Scrap
- b. Defectives
- c. Rework
- d. By Products
- e. Planned Waste
- f. Production Left-Over

## 2. *Distribution Returns*

- a. Product Recall
- b. Promotional Material Returns
- c. Customer Returns (Retailer, Whole Saler, Distributor)
- d. Stock Adjustments
- e. B2b Commercial Returns
- f. Packaging

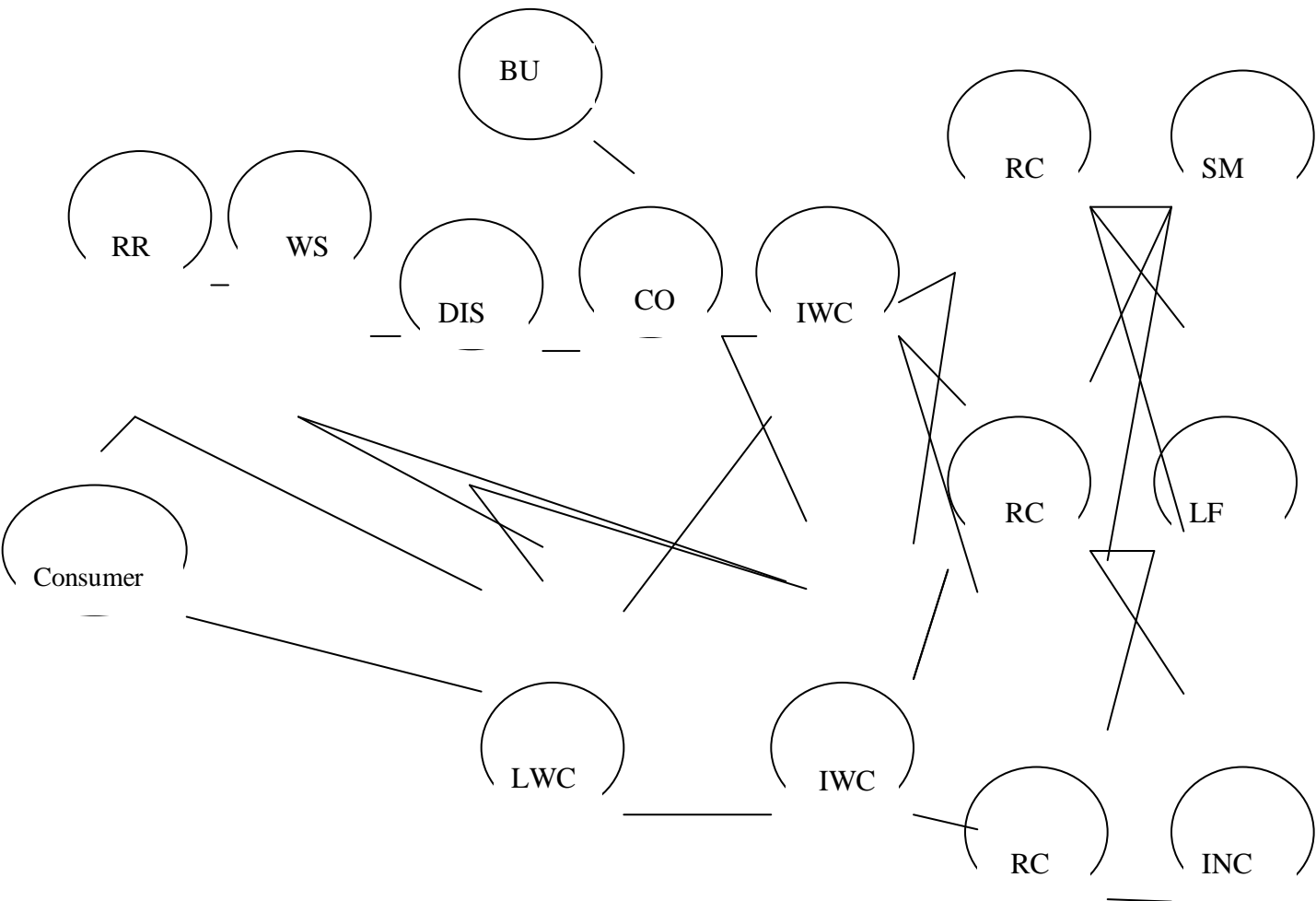
## 3. *Customer Returns*

- a. Excess Quantities
- b. Rejected Materials
- c. Service Returns (Spare Parts, Repair)
- d. B2c Commercial Returns
- e. Reimbursement
- f. Warranty Claims
- g. End Of Lease Returns
- h. End Of Life Returns

It Is Good To Know That One Of The Important Trend In Supply Chain Management Is Recognition Of The Reverse Logistics Operations. These Reverse Logistics Operations Include Many Recycling Activities Like Re-Use, Repair, Re-Furbish, Re-Assemble, Re-Manufacture And Reduce The Environmental Impact Performing Variety Of Activities Like Dumping, Biogas Generation, And Composting.

### Operational Framework Of Reverse Logistics

This Operational Framework Of Reverse Logistics Is Designed And Developed On The Basis Of Exploratory Study Of Industries Mentioned In Table 6. Operational Framework Is The Generic Flow Of Reverse Logistics In Pakistani Industries.



*Fig. 1 Operational Framework Of Reverse Logistics*

End Consumer And Retailer Follow The Stream Of Local Waste Contractor (Lwc) For Packaging Materials Like Empty Can, Empty Wood Boxes, And Plastics Materials. In Case Of Product Rejections, End Consumer Return Material To Retailer (Rr) Then Retailer Send This Material Back To Wholesaler (Ws) Then Distributor (Dis) And Then Company (Co). Wholesaler And Distributor May Have A Link With Local Waste Collector And Industrial Waste Contactor (Iwc) Depending Upon His Need But Retailer Has A Single Link With The Local Waste Contactor For His Reverse Materials. Company Always Engage The Industrial Waste Contractors (Iwc) As A Supply Chain Partner For Reverse Logistics To Ensure The Effective And Efficient Disposal Of Material Adding Maximum Value To Company. Industrial Waste Contractor Work With Multiple Recyclers (Rc) And Disposing Off Their Material With Best Monetary Recover. Recyclers After Due Segregation, Cleaning And Processing Sell Recycled Materials To Small Manufacturers (Sm). Few Quantities Go To Dumping Stations For Land Filling (Lf) Purpose And Some Which Cannot Be Land Filled Met The Fate Of Incinerations (Inc).

#### Limitations Of The Operational Framework

The Operational Framework Of Reverse Logistics Does Not Encompass The Waste Of Following Areas:

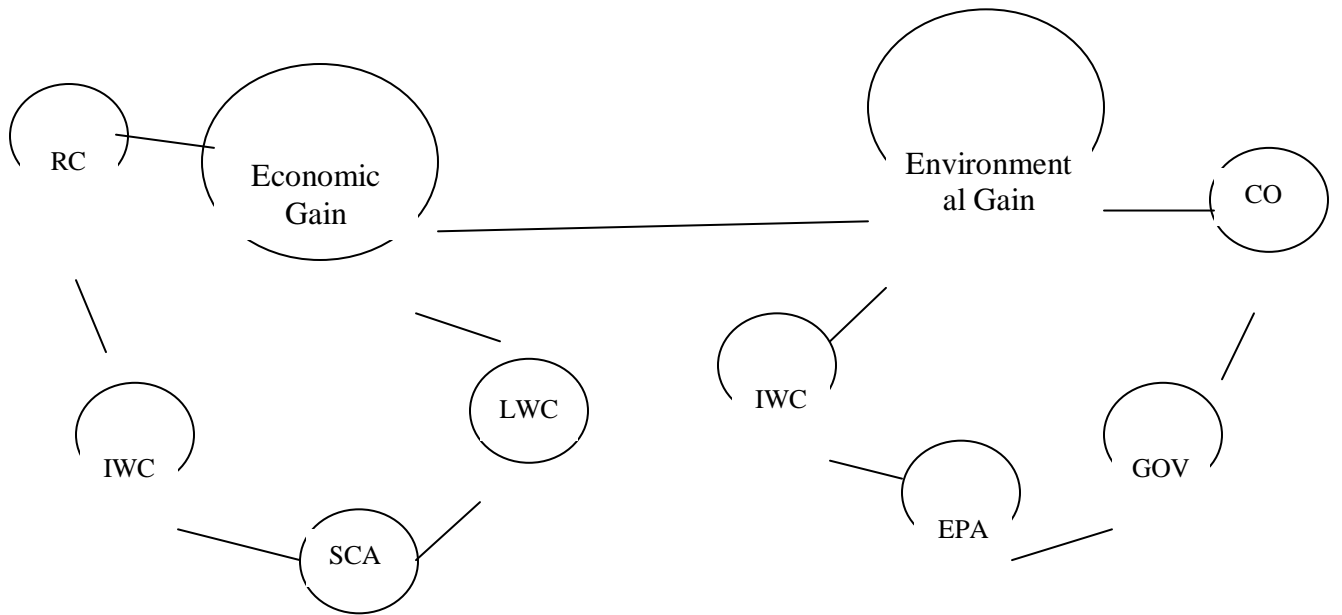
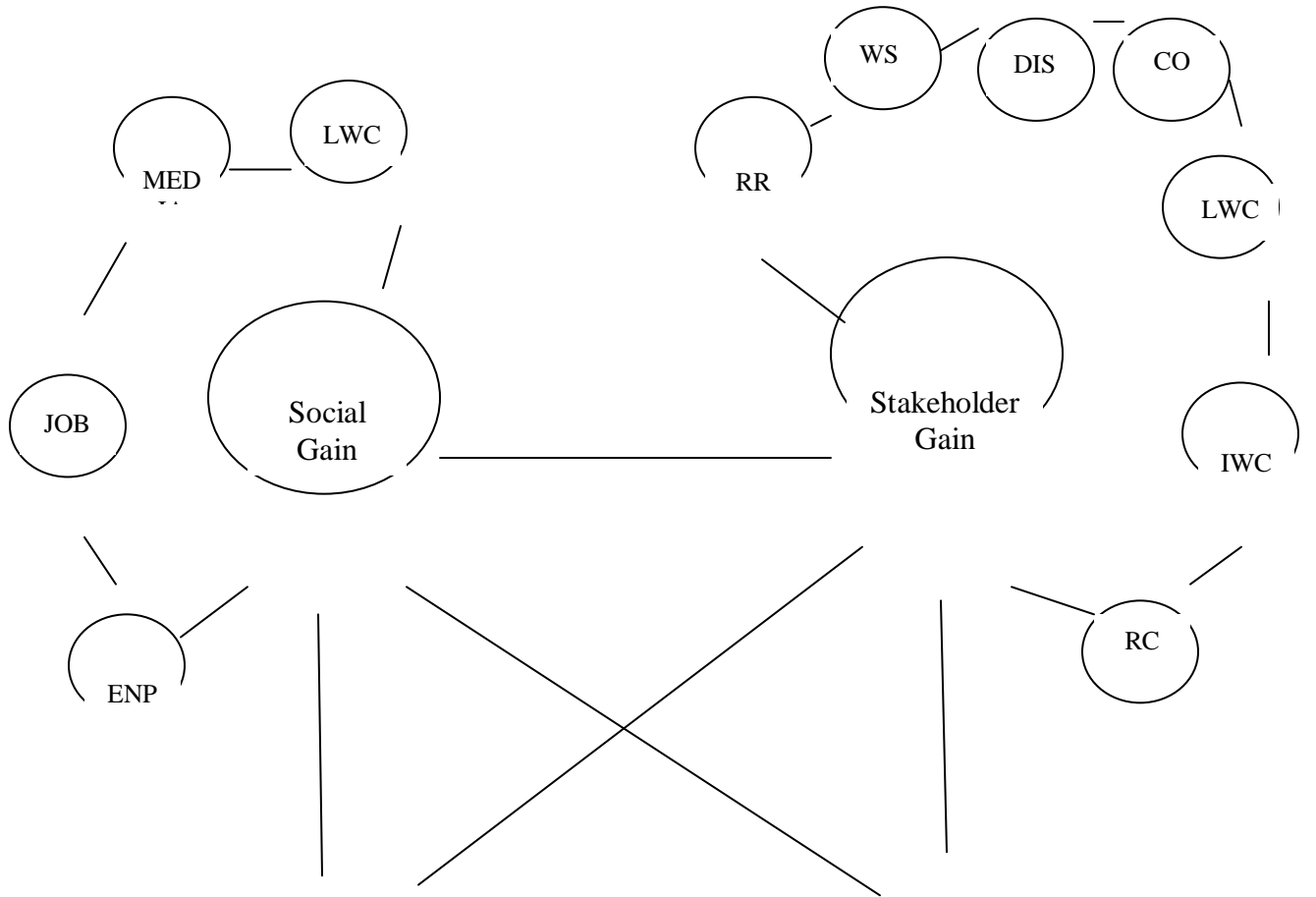
1. Hospital Waste
2. Municipal Waste
3. Radioactive Waste
4. Agricultural Based Waste
5. Cold Storage Waste
6. Pharmaceutical Waste
7. Hazmat Materials For High Tech Equipment
8. Meat Waste

#### Assumptions

This Operational Framework Of Reverse Logistics Does Not Encompass The Waste Of Following Areas.

1. End Consumer Does Not Hold / Store The Packaging Materials And Empty Products
2. End Consumer Sells Packaging Materials And Scrap To Local Waste Collector And In Case Of Product Procured Returned To Retailer.
3. Medical Waste Is Not The Part Of The Operational Model.
4. Retailer Sells Outer Packaging To Local Waste Collector And Rejections Sends Back To Wholesaler, Wholesaler To Distributor And Then Company.
5. Wholesaler And Distributor May Engage The Local Waste Collector Or Industrial Waste Contractor Depending Upon His Need And May Return Materials To Company.
6. Company Always Engages The Industrial Waste Contractor For The Disposal Of Reverse Logistics.

Operational Framework Of The Reverse Logistics Gives The Driving Power To 2s-2e Self Sustained Model For Its Operation. Media Fear, Environmental Concerns, Competition And Monetary Returns Drive This Model That Ultimately Ends Up With Four Gains, Stakeholders' Gain, Social Gain, Economic Gain And Environmental Gain.



*Fig. 2 2s-2e Self Sustained Gain Model*

*1. Stakeholders' Gain*

- a. Stakeholders Have Win Win Situation
- b. Everyone Earns Benefits
- c. Everyone Love Economics Activity As It Enhance The Quality Of Life
- d. Provides Business Opportunity
- e. Driving Value Chain Among All Stakeholders And Associated Partners Like  
Transporter

*2. Social Gain*

- a. Employability
- b. Moral Compensation
- c. Job Opportunities
- d. Encouraging Entrepreneurial Spirit
- e. Media Fear
- f. Entrepreneurial Spirit
- g. Social Corporate Responsibility

*3. Economic Gain*

- a. Creating Impact At Company Productivity
- b. Wealth Creation
- c. Cost Reduction
- d. Monetary Value Addition

- e. Enhancing Profit Margins

4. *Environmental Gain*

- a. Environmental Care
- b. Green Image And Clean Environment
- c. Saving Environment For Future Generations
- d. Avoiding Pollution Charge
- e. Enforcement Of Environmental Law

Social Gain Loop Has Single Variable Linkages And Multi- Variable Linkages. Social Gain Has A Multivariable Linkage With Stakeholder Gain Building The Brand Image Of The Stakeholders,

Sr.No	Multi-Variable Linkages	Impact
1	Social Gain--- Stakeholder Gain	Protect Brand Image, Enhance Goodwill
2	Social Gain--- Environmental Gain	Green And Save Environment
3	Social Gain--- Economic Gain	Encourage Recycling
4	Stakeholder Gain--- Environmental Gain	Contribute Towards Social Corporate Responsibility
5	Stakeholder Gain--- Economic Gain	Win-Win Opportunity
6	Economic Gain—Environmental Gain	Creating Wealth Through Proper Recycling

*Table 7 Multi Variable Linkages And Its Impact*

Sr.No	Single-Variable Linkages	Impact
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1	Social Gain--- Media	Media Fear Encourage Towards Corporate Citizenship
2	Social Gain--- Jobs	It Enhances More Job And Employability
3	Social Gain--- Local Waste Collectors	Local Waste Collector Gets Good Return And Hire More Persons As Employees.
4	Social Gain--- Entrepreneurial Spirit	Wave Of Entrepreneurial Spirit Spreads And Encourage People To Build The Career As A Entrepreneur
4	Environmental Gain-- Epa	Strengthen The Role Of Environmental Protection Agency
5	Environmental Gain-- Govt	Establish The Good Governance From Governmental Side
6	Environmental Gain-- Iwc	Encourage The Industrial Waste Contactors To Manage The Things In An Environmental Friendly Way
7	Environmental Gain-- Co	Building The Company Image In General Public And In Society As A Environmental Friendly Company
8	Economic Gain --- Lwc	Local Waste Collector (Lwc) Gets Its Own Share
9	Economic Gain --- Rc	Recycler (Rc) Gets Good Return
10	Economic Gain --- Iwc	Industrial Waste Contractor (Iwc) Gets More Contracts And Good Returns

11	Economic Gain --- Sca	Supply Chain Actors (Sca) Gets Nominal Chunk Due To Various Reasons.
12	Stakeholder Gain --- Rr	Retailer (Rr) Gets Money Back Guaranty
13	Stakeholder Gain --- Ws	Wholesaler (Ws) Gets As Per Its Contract
14	Stakeholder Gain --- Dis	Distributor (Dis) Sends Back Material To Company And Money Back
15	Stakeholder Gain --- Co	Company Either Hold The Supplier Or Employees For Continuous Improvement And Earns Good Reputation
16	Stakeholder Gain --- Rc	Recycler Being The Part Of Reverse Logistics Love To Have Such Gain
17	Stakeholder Gain --- Iwc	Industrial Waste Contractor Gets Its Own Share
18	Stakeholder Gain --- Lwc	Local Waste Collector Sells Product To Industrial Waste Contactor And Generate Revenue

*Table 8 Single Variable Linkages And Its Impact*

## Reverse Logistics Activities

1. Reuse	(Value Added)
2. Recycle	(Value Added)
3. Repair Machinery / Equipment	(Value Added)
4. Refurbish	(Value Added)
5. Reclaim Materials	(Value Added)
6. Salvage	(Value Added)
7. Remanufacture	(Value Added)
8. Recondition	(Value Added)
9. Resell Products	(Value Added)
10. Return To Supplier	(Value Added)
11. Recover Chemicals	(Value Added)
12. Re-Assemble	(Value Added)
13. Compositing	(Value Added)
14. Landfill	(Non Value Added)
15. Incineration	(Non Value Added)

### Best Practices For Reverse Logistics

#### 1. *Find The Right 3pl*

Identification Of The Right Industrial Waste Contractor (Iwc) Is One Of The Biggest Challenges. Lucrative Returns Attract Many 3pl Service Providers To Quote The Bid At High Rate To Grab The Contract And Sometime Few Companies Award The Contract On The Basis Of Price Tag Without Properly Evaluating The Infrastructure,

Capacity And Capability Of 3pl Service Providers. Company Must Evaluate The Industrial Waste Contractor On The Basis Of Full Box View Comprehending All The Areas. Environmental Disposal And Optimal Gain On The Basis Of Win-Win Approach Should Be The Winning Principle. Zero Sum Game While Engaging The Contractor May Deface The Company Image And Mar The Corporate Citizenship.

2. *Explore The Sustainable Solution*

Appoint A Sustainability Manager Who Must Work For Sustainable Solutions For The Reverse Logistics And Keep On Working With Industrial Waste Contractors For More Value Addition Initiatives. Manager And Industrial Waste Contractor Must Be Awarded At The End Of Year For The Cost Cutting Initiatives And Exploring The Value Added Recycling Activities.

3. *Make The System Auditable*

Enhance The Visibility In The System. Encourage Documentation And Documentation. Keep On Conducting The Second Party Audits To The Industrial Waste Contractor And Customers Of Industrial Waste Contractors. Second Party Audits Not Only Help To Identify The Opportunities For Improvement But As Well Ensure The Effective And Environmental Disposal Of Reverse Logistics.

*Conclusion*

This Paper Presents A Framework That Is Operational In The Field Of Reverse Logistics And Highlights The 2s-2e Self Sustained Gain Model That Is Basically The Main Driver Behind This Operational Flow. Open Media, Environmental Awareness, Brand Image, And Social Corporate Responsibility Are Key Variables That Provide The Conducive Climate For Its Success. List Of Recycling Categories The Value And Non-Value Added Activities. Best Practices Are The Real Strength Of Company To Enhance Visibility, Check Appropriateness And Search Long Term Sustainable, Economically Viable, Environmental Friendly, Labour Intensive Solutions. This Paper Encourages Strategic Managers To Focus This Forgotten Dimension And Pushing The Tactical Managers For Exploring Sustainable Competitive Advantages. Mathematical Modeling And The System Dynamics Modeling Are An Open Area For Research In Future.

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Tables

*Types Of Reverse Logistics*

Followings Are The Types Of Waste:

Nutritional Wastes		Biodegradable Wastes	
Sr	Description	Sr	Description
1	Chips	1	Rotten Potato
2	Starch	2	Potato Soil
3	Potato Peel And Hash	3	Wwtp Sludge
4	Undersize Potato	4	Kitchen Waste
5	Biscuits Crumb		
6	Broken Sweets		
7	Rotten Milk		
8	Wwtp Fat		
9	Vegetable Used Oil		

*Table 1 Nutritional And Biodegradable Waste*

Metallic Wastes		Plastic Wastes	
Sr	Description	Sr	Description
1	Iron Scrap	1	Polyethylene

2	Iron Drums	2	Polypropylene
3	Stainless Steel Scrap	3	Poly Film
4	Mix Metal Scrap	4	High Density
5	Aluminum	5	Laminates Wrapper
6	Tin	6	Empty Palm Oil Bags
7	Copper	7	Film Waste
8	Electric Cables	8	Pet Materials
9	Brass	9	Rubber
10	Machinery Scarp	10	Plastic Drums
		11	Plastic Cans
		12	Hard Rubber
		13	Printer Catridge

*Table 2 Metallic And Plastic Waste*

Sr	Paper/ Ghatta Wastes		Chemicals Wastes
Sr	Description	Sr	Description
1	Ghattah /Carton	1	Ffa
2	Ghattah Rolls	2	Pov
3	Newspaper	3	Nitric Acid
4	Stationary Paper	4	Used Mobile Oil

5	Paper Stips / Toffee Paper	5	Ink Residuals
		6	Solvents Waste

*Table 3 Paper/Ghatta And Chemical Waste*

Non-Organic Wastes		Bags Wastes	
Sr	Description	Sr	Description
1	Glasswares	1	Description
2	Sanitary Wares	2	Pp Bags
3	Lino Kinari	3	Leno Bags
4	Cotton Lint	4	Paper Bags
5	Cotton Yarn	5	Cement Bags
6	Sizing Materials	6	Meal / Seasoning Bags

*Table 4 Non-Organic And Bag Waste*

Waste Contractors And Recyclers

Sr.	Organized Recyclers	Sr.	Non-Organized Recyclers
1	Waste Busters	1	Malik Plastics
2	Green Earth Recycling	2	Saddaqt Recyclers
3	Tradeasia	3	Many More
4	Punjab Nylo Block Recycling Plant		

5	Lahore Compost Pvt Ltd		
6	Lahore Solid Waste Management Company		

*Table 5 Waste Contractors & Recyclers*

Industries Being Explored For Reverse Logistics

Sr.	System Based Companies	Sr.	Owner Based Companies
1	Tetra Pak	1	Expresspac Pvt Ltd
2	Nestle	2	Vandana Pvt Ltd
3	Pepsi Cola International Pvt Ltd	3	Organon Live Stock Feeding
4	Unilever Pakistan	4	Tradeasia
5	Coco Cola	5	Waste Buster
6	Packages Ltd	6	Metal Forming Pvt Ltd
7	Pakistan Tobacco	7	Chaudry Rice Mills
8	Descon Engineering	8	Shahraj Textile Mills
	Manager Based Companies	9	Wali Oil Mills
9	Asian Food Industries	10	Mehrab Packaging
10	Irfan Textile		

11	Mian Tyre And Tube		
12	Dic Ink Factory		
13	Maxim International		
14	Service Industries		
15	Green Earth Recycling		
16	Darson Industries		
17	Treat Corporation		
18	Kohinoor Textile Mills		
19	Spelling Packaging		
20	Ravi Motorcycles		

*Table 6 Industries Being Explored For Reverse Logistics*