Reverse Logistics: Introduction to closed loop system to the beverage companies in South Africa.

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Abstract

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The thesis is to research on reverse logistics, to provide knowledge on the system of a closed loop for PET bottle and cans recovery, and the introduction of the deposit refund system. The purpose is to tackle the issues on green logistics, report on sustainable supply chain, how the PET bottles and cans have the effect on the environmental and economic impact, how a closed loop system and deposit refund system, can deliver benefits to companies. This will support the recycling systems and practices, with a long-term sustainable design to enable manufacturing companies to reuse and remanufacture PET products.

The thesis consists of the theoretical part, report on some of the recent research in this field, with the focus on the vital and tactical issues. Illustrate each area, present key insights, provide the reader with an overview and specific in-dept knowledge and systematic framework that are used. In some cases, suggestions are provided in this research thesis and an introduction to some recent development techniques, to identify the most common and important issues to successfully steer practices in the recycling of PET bottles and cans. The writer will be including an observation, done from two companies that operates in Finland (Palpa and Tomra) and from South Africa (Petco and Mpact) which provide the same services, to display in their interrelationship.

The main objective of this study is to answer the questions of: What are the environmental and economic impacts of reusing and recycling bottles? Also concentrating on what is reverse logistics and closed loop system, how is green logistics defined. The South African legislation compared to European regulations and the introduction of deposit refund system, how does Tomra close loop system works, and Petco collection system handle their reverse logistics and what are the differences and similarities between the companies. From the theory provided it shows that South African recycling systems and practises still need some improvement. The government need to provide more measure and strict regulations on waste management, green and reverse logistics implementation and not focus more only on profit but on thinking towards environmental consciousness. The goal is to make sure that environmental sustainability is reached, in many organisations' operations and processes.

Keywords
Reverse Logistics, Closed Loop System, Green Logistics, Recycle, Re-use,

Table of Contents

1 Introduction 4
1.1 Background information 4
1.2 Research objective and task 5
1.3 Research significance 5
1.4 Key (Terms) 6
2 Conceptual framework 7
2.1 Green Logistics 7
2.1.1 Benefits of greening logistics and supply chain management 9
2.1.2 Structure of Green logistics 9
2.1.3 Barriers of Green Logistics 12
2.2 Environmental impact and Economic benefits of reuse and recycling 12
2.2.1 Environmental impact 12
2.2.2 Economic benefits 14
2.3 Sustainable Supply Chain Management 16
2.4 Legislation between South Africa and Europe 18
2.5 Recycling of PET bottles 20
2.5.1 Advantages of recycled PET 21
2.5.2 Recycling aluminium beverage can 22
2.6 Reverse logistics systems 23
2.6.1 Benefits and challenges of reverse logistics 26
2.7 Close loop system 27
2.7.1 Challenges of managing close loop system. 28
2.8 Introduction of Reverse vending machine: Deposit refund system 29
2.9 Benefits and challenges of Reverse vending machine 32
3 Case study company: Reverse logistics in action 34
3.1 Tomra-Close loop system- current trends 34
3.2 Palpa-Reverse logistics- operations 35
3.3 Petco 36
3.4 Mpact 36
4 Methodology 38
5 Discussion and Conclusion 39

1 Introduction

With the environment condition declining rapidly municipalities and companies are challenged with the difficulties of solid waste management. The ever-increasing population globally and change in habits of consumption of solid waste management, challenges are created for municipalities, organisations, and individuals (Marshall & Farahbakhsh, 2013) (Dowlatshahi, 2000). Government, industries, and communities are contemplating on new technological solution for the recover, recycling, reuse, and remanufacturing, in aiding to eliminate the discarded of waste in landfills. With limited resources for management, the lack of responsibility from makers, the load of waste worsted.

Reverse logistics system enables products to be qualified for repairs, alteration, distribution of the parts and be reused as raw material to be recycled for future use. The growing awareness on Reverse Logistics and Closed-Loop system issues arises with public awareness (Dowlatshahi, 2000). Many companies view Reverse logistics as a business opportunity, as it provides revenue and strategic benefits and not a cost for the companies. It reduces waste sites by including recycling, material substitution, reuse, and remanufacturing, by involving collection, disassembling, and processing used products, materials, and packages to provide an environmentally safe method of recovery.

Effective and efficient waste management initiatives are difficult to implement because of the diverse waste that is generated. One of the benefits from sustainable reverse logistics operations is green logistics. Technological innovation has made it possible for the reuse and remanufacturing of goods to maintain the balance between the environment, economy, and society. With the consideration of some core fields of supply chain management, reverse or close loop supply chain and green or sustainable supply chain management deals with the integration concepts of economic, environmental, and social concerns. Reverse logistic focus on optimizing the whole supply chain service through economy, environment, and social performance. Revers (Vernuccio a. e., 2010)e logistics is a good approach for individuals and companies to became environmentally friendly and to reduce waste that impacts on nature and provide sustainable methods for the future.

1.1 Background information

Conditions are in place for Africa to be the driver of the success of the 2030 Agenda for Sustainable Development. Indeed, Africa has the resources, the demographic dynamics, and the policy space to take up a new and dynamic role in the world economy. With trade liberalization, foreign direct investment and improved educational achievement, has helped to reduce poverty.

Many businesses use reverse supply chain also referred to as reverse logistics to handle inventory problems, to add value and sustainability to business processes in a cost-effective way. Over the years reverse logistics have change with technological innovations to provide business with obtaining value and providing them with systematically practices having more control of their products after the end user, the overall goal is to gain value.

Product components or finished products are collected, sorted, and returned to suppliers, manufactures or retailers. The main purpose of this thesis is to gain insight and provide research on some areas that influencing the lifecycle of PET bottles and cans, and the environmental impact that is affected, including factors from both internal and external producers.
This thesis will analyse the strategies and benefits of reverse logistics systems and policies that are placed to protect the environment regarding PET bottles and cans recycling. The effects on the impact that the PET bottle and cans have on the environment also need to be described. According to (Hernández, 2010) and (Stock J. , 2001) reverse logistics programmes highlights the objective of corporate image, as a priority goal. A company's image is a set of attributes that differentiate a product from its competitors. With the corporate strategy, in environmental marketing strategy and the company's organisational responsibility for the environmental marketing strategy in companies, (Leite, 2000).

1.2 Research objective and task

The overall objective of this research thesis is to research, introduce and utilize the reverse logistics system and how waste management, sorting and returning can provide benefits to a developing country and plan in effect the use of a suitable close loop system for the recollection of beverage containers (PET bottles/cans).

Research tasks:

- Defining reverse logistics and green logistics, and what companies can archive by implementing them.
- What are the environmental impact and economic benefits of reusing and recycling PET bottle?
- The main barriers and benefits of introducing a deposit refund system and closed-loop PET bottle recycling systems.
- Communicate the research of close loop system of PET bottle and cans and the recycling system.

1.3 Research significance

This thesis will provide the reader with more detailed understanding of reverse logistics and what are the new advancements in technological innovation available in aiding many issues of waste management. With the gathered information the readers can be sure to learn more about programmes that can make a difference in South Africa regarding waste disposal, which recycling operations, regulations, programmes, and practices can are utilised.

Benefits: Employment and educational opportunities for mostly young unemployed in South African. Initiative programmes for communities about recycling and promote environmental awareness. South Africa will gain knowledge on reverse vending machine used in Europe and

the usage of the collection system of recycling of non-returnable beverage containers. New business environment and partnership for TOMRA, many companies in South Africa and the government.

Personally: This was a potential future project, inspiration gotten by observation on the use of reverse vending machine been used in Finland on a day-to-day basis. Potential future project from TOMRA and South African waste industries. A career in Logistics as a starter and be a potential investor in waste management. This will provide improvement in remanufacturing, recycling, reducing of landfill disposal, more environmental sustainability, tackling poverty and unemployment through recycling.

1.4 Key (Terms)

Deposit based system- is an extra charge or a price on a product purchased and a discount or a repayment is returned.
Closed-loop system- the design, control, and operation of a system to maximize value creation over the entire life cycle of a product with dynamic recovery of value from different types and volumes of returns over time.
PET bottle recycling system: A system that consists of various processes in the PET bottle industry with the main target to recycle PET bottles. This includes the closed-loop PET bottle recycling system.
Reverse vending systems -are an automated way to collect, sort and handle the return of used drink containers, is a machine where people can return empty beverage containers like bottles and cans for recycling.
Recycling is the process of recovering material from waste and turning it into new products.
Green Logistics- is concerned with producing and distributing goods in a sustainable way, taking account of environmental and social factors.
Reverse logistics- is the way to increasing with the acknowledgement of the environmental impact of the movement of materials, parts, components and supplies and of the need to effectively manage them.
Reuse- is the practice of using something again, whether for its original purpose or to fulfill a different function.

2 Conceptual framework

2.1 Green Logistics

Going green is what most companies are been converting to, in respect to environmental sustainability. By going green they portray the environmentally friendly image of products, processes, systems, and technologies (Vachon & Klassen, 2006). Corporate image, competitive differentiation, cost savings, compliance to government regulation, collaboration with suppliers and improving firm performance are the key elements for the implementation of green logistics practices steadily (Carter & Dresner, 2001) (González-Benito & González-Benito, 2005) (Klassen & Vachon, 2003; McKinnon, 2012; Zhu & Sarkis, 2006)
Numerous surveys (Aberdeen Group, 2008) (Bearing Point, 2008) (eyeforTransport, 2001) show that companies globally are eager to validate their green credentials through logistics management.

Companies that practice and use green principles in their operations clearly ensures that the purchases of goods and services comes from suppliers with minimum environmental standards. According (Sbihi & Eglese, 2009), Green Supply Chain Management is an organizations activity taking into account environmental issues in order to change the environmental performance of suppliers and customers and integrating it in to the supply chain management. Green logistics activities connected with the eco-efficient management of the forward and reverse flows of products, sharing information between the point of origin and the point of consumption, with the purpose to achieve or exceed customer demand. Dr. Jean Paul Rodrigue, Dr Brian Slack & Dr Claude Comtois,(2009),Sbihi and Eglese (2007) defined green logistics as concerned with producing and distributing goods in a sustainable way, taking account of environmental and social factors. Green logistics have to be considered from end to end in the production process of products. Green logistics activities are used to measuring the environmental impact of different distribution strategies, reducing the energy usage in logistics activities, and reducing waste. Companies using these activities are provided with a competitive advantage. Going green is what many customers demand from many companies.
Shrivastava (1996) concludes that customers demand green products and packaging which are more friendly to the environment. The green logistics system must include green management, green information system, green supply, green production, green transportation, green distribution, green packaging, green distribution processing and waste recycling.

The integration of green logistics requires close cooperation from several stakeholders such as the government, the public and private companies. In simple terms green logistics can be described as a management strategy that aims at producing and distributing goods and services with less environmental damages. The importance of green supply chain starts from reducing pollution and preserving resources, and this can be achieved through supply chain management. Green Supply Chain Management is an environmental management tool which integrates environmental thinking into supply chain management. It emerges as a new systematic environmental disciple in supply chain management and has been increasingly accepted and practiced by forward thinking organization. Various operators of green logistics practices are frequently influenced the way companies observe environmental issues. Many companies therefore believe it is no longer optional to implement environmentally friendly behaviour but its compulsory to them (Andic;Yurt;& Baltacioglu, 2012). There are many reasons for logistics and supply chain enterprises to implement these green practices.

2.1.1 Benefits of greening logistics and supply chain management

Aberdeen Group (2008) (Best-in-class goals for sustainability initiatives)	
Reduce overall business costs	56%
Enhance corporate social responsibility	54%
Improve profits	48%
Reduce waste/improve disposal	43%
Improve visibility of green supply drivers	41%
Increase use of recyclables	37%
Improve fuel efficiency	35%
Reduce emissions	33%
Develop new products/Win new customers	26%
Reduce use of toxic materials	19%
Improve employee satisfaction	9%
Bearing Point (2008) (Benefits of the green supply chain)	
Improve brand image	70%
Satisfy customer requirements	62%
Differentiate from competitors	57%
Reduce logistics costs	57%
Establish a competitive advantage	47%
Optimise logistics flow	40%
Expand to new markets	38%
Optimise manufacturing	35%
Reduce manufacturing costs	32%
Other	2%

Source (Aberdeen Group, 2008)
Figure 1. Green practices implementation ,have many benefits for logistics, transportation, and organisations.

2.1.2 Structure of Green logistics

Green logistics highlights all the activities which are related to the managing of environmentally friendly forward and reverse flow of product, from beginning and to the point of consumption with a goal to meet customers' expectations. Together with reverse logistics and closed-loop supply chain management, green logistics deals with environmental management and sustainability.

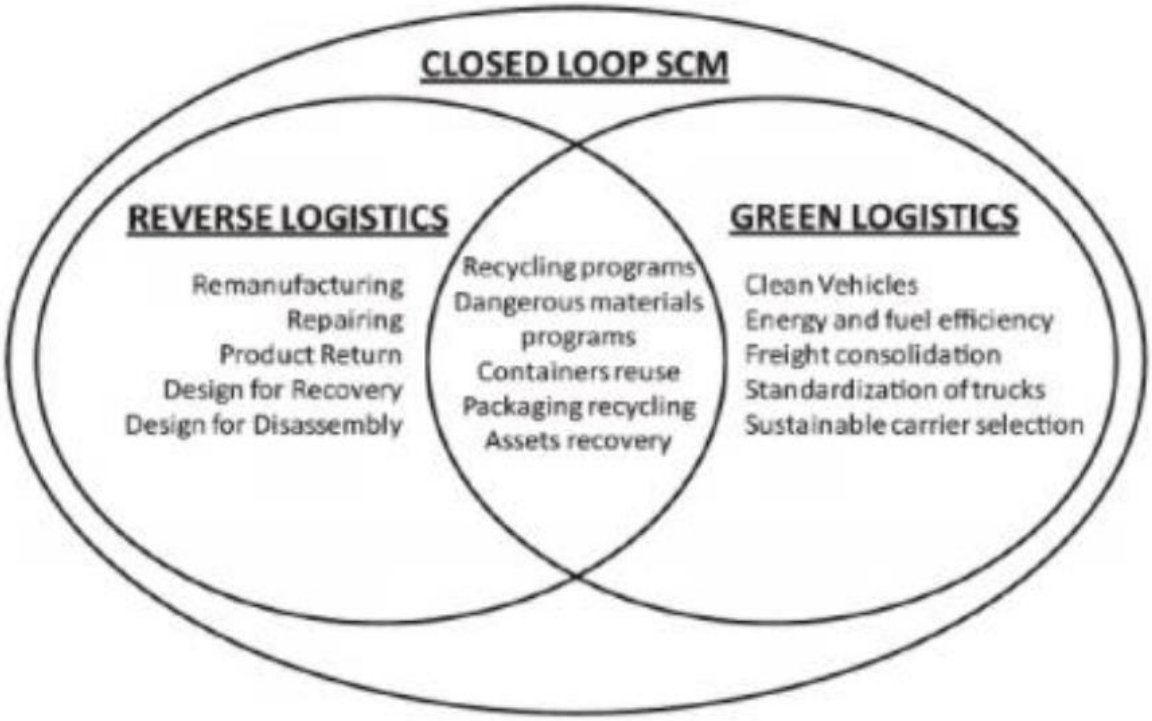


Figure 2. Green logistics and reverse logistics in close loop (Zongwei , 2011, s. 335)

(Thiell; Pablo ; Zuluaga; Montañez;& Hoof, 2011), defines the main components of the green logistics system as: green transport, green warehousing, green packaging, green logistics data collection and management, waste management and reverse logistics.

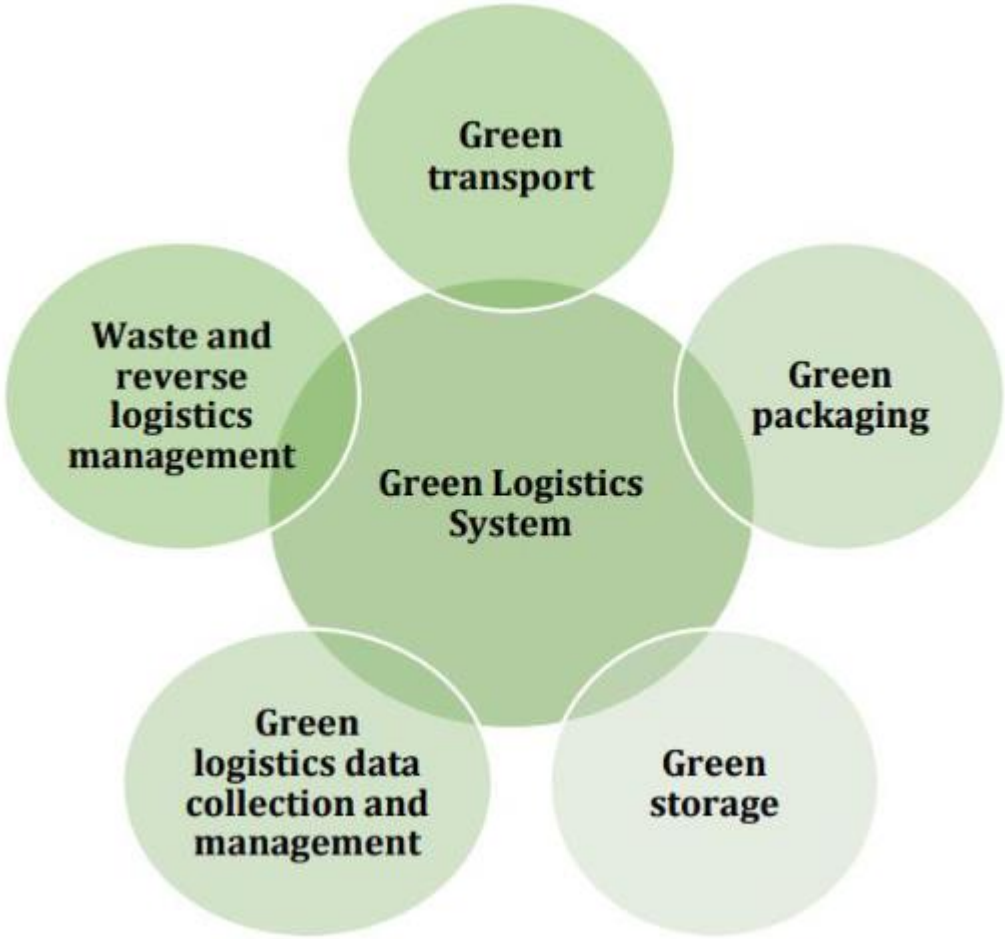


Figure 3 .Reverse logistics activities that conflict with green logistics, regarding environmental sustainability.

Benefits of green logistics

Green logistics delivers lowest cost, improves customers perception, loyalty and enhancing company's brand as the result. (Emmett & Vivek, 2010, s. 126). The implementation of green logistics provides benefits to environment, society, and economy.

Environment	Economical	Social
Reduce waste	Reduce costs	Improves quality of life
Reduse greenhouse gasses emissions	Strengthen brand image	Increase safety at work
	Benefits from the goverment	Improves working conditions
Reduce energy usage	Competitive advantage	Health benefits
Increases efficiency	Increase profit	

(Source Bohdan Andrushchak 2018)

Figure 4 . Benefits of Green logistics

2.1.3 Barriers of Green Logistics

Green logistics has the following barriers that prevent the integration of the environmentally friendly solutions into logistics operations. Canadian Center of Science and Education (2012) outline the different barriers for supporting of green tendencies as a hierarchical system.

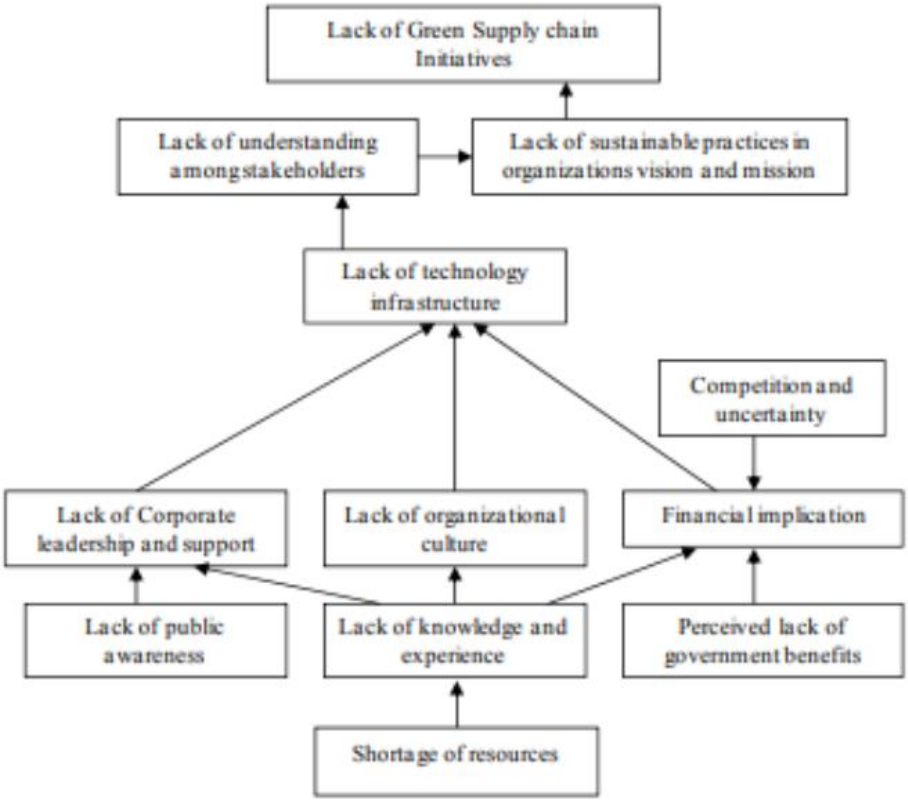


Figure 5.Hierarchical system of the barriers to green logistics (Canadian Center of Science and Education)

2.2 Environmental impact and Economic benefits of reuse and recycling

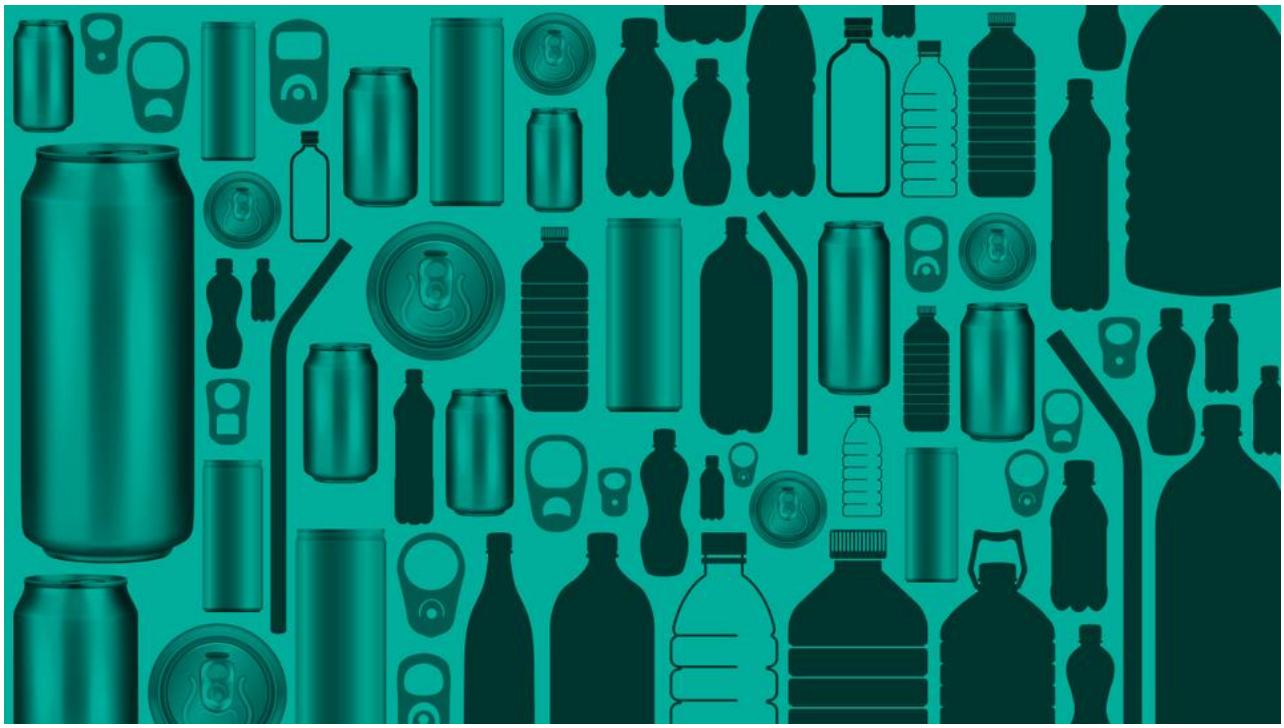
2.2.1 Environmental impact

At the moment there is a big interest about saving resources on our planet. Adapting to going green helps the environment by reducing the amount of pollution that enters the soil, water and air. A lot of waste is produced and discarded into the environment. Even though some waste is recycled, and reused, waste management remain a crucial part of every company in most countries. Waste management is the process related with minimizing, managing, monitoring, and transportation and recycling of waste. Collection of post-consumer packaging materials is mostly controlled by national or regional regulation, which must be based on sound considerations. Recycling of packaging materials has seen rapid growth over the last decades in several countries.

Technological innovation and advance systems for the collection, sorting and reprocessing of recyclable waste is being used. This has created many new opportunities for recycling, and with the combined co-operation of the public and private industry and governments, has made it possible to redirect the majority of PET bottle and cans waste from landfills to recycling.

Global warming caused by CO_2 emissions, and environmental pollution caused by waste polyethylene terephthalate (PET) disposal, are commonly considered as the two most critical environmental issues we faced today. Best practices are becoming important amongst lawmakers, consumers and amongst industries to support sustainable business practices. Recycling of PET bottle and cans is a method used for reducing environmental impact and decreasing waste discarding in landfill. (Vernuccio a. e., 2010)define eco-compatibility as, a collaboration of recycling practices, depletion of waste, reduction of harmful materials, decreasing of the use of materials, minimization of the risk of environmental pollution, energy savings in the production process and system, packaging re-use, use of ecological materials and use of recycled materials. The key challenge is how to minimise the environmental impact of packaging materials (Prendergast & Pitt, 1996).
The environmental impacts of beverage products depend on bottle characteristics and design. Packaging also plays a vital role, as it provides a major concern is the increasing amount of solid waste. The amount of packaging waste almost equals the amount of packaging on the market as it has a short existence.

PET bottles have the most advantageous environmental performance relating to production and usage. Glass bottles are considered by many studies as the most disadvantageous packaging in term of environmental significance. Recycling beverage packaging materials promotes a lower environmental impact than disposing of such materials in landfills. PET is the most used and important packaging material which is easy recycled, and it has less environmental impact. Product life cycle is covered by the whole process from extraction of raw materials, production, and distribution to use, reuse, maintenance, materials, transportation, and energy formulas is covered along with final disposal. Environmental impact involves in energy saving and less material consumption and re-use of the product life cycle. The environmental impact of PET is very favourable compared glass, aluminium, and other container materials.



(Source Wood Mackenzie)

Figure 6.PET material collection

PET is recyclable and it enhance sustainability by providing an effective and efficient possibility of recovering and reusing the energy and resources of its raw materials. The product life span on the environmental impacts of a carbonated beverages have been estimated considering four packaging options: 0.75 l glass bottles, 0.33 l aluminium cans, 0.5 and 2 l PET bottles. These life-cycle assessment studies show that the environmental impact of PET recycling systems is lower than alternative non-recycling disposal methods such as landfilling or incineration (Nakatani, 2010; Kuczenski & Geyer , 2013).

2.2.2 Economic benefits

Investmenting in recycling system and programmes will provide support to many industries and which will bring about jobs opportunities and high wages to states and communities and saves money for generators of waste. The most important link in the economic activities, is the collection of recycling of material, by investing in the local community's collection programmes, this enables the great revenue that support downstream economic activities. Private and public organisation and including the government understand that recycling support both the environmental and the economic perspective. The most important objective of recycling to the generators of waste is saving money, lowering the cost of disposal, and increasing potential revenue from sale of recyclables. This revenue generated will oversee the continuous recycling process which is seen as an economic benefit. The cost that is avoided is for the disposal amount of money that is saved because of waste not ending up in landfills.

Appropriate policy regulations must be developed to create a collaboration with policy makers, waste managers, the private sector, and financial actors. Waste management systems regulations need to be improved, to become more efficient mainly via increasing collection and recycling rates of plastic-related waste. The private sector has the responsibilities in playing a good role in managing the development of innovative business models, packaging design, materials, and technologies in line with the circular economy, that provides sustainable solutions, that provide sustainable solutions to valuate used plastics and assist in reducing plastic waste. The evolution of such solutions can provide economic opportunity for both new and existing businesses. The implementation of using a circular economy, which assist in proving recycling system, while creating economic opportunities, is used in effective strategy will fight the discarding of waste. Appropriate policy regulations must be developed to create an enabling environment.

Increasing bottle and cans recovery provides direct economic benefits including revenue obtained from selling recovered products, saving in waste collection and disposal expenditure, saving in waste management costs, provide new processing and manufacturing job opportunities and marketing recovered materials. Indirect benefits include more income and jobs created from recovered material sales revenue and income creation.

Economic Benefits

- Recovered materials sales income.
- Decreased waste collection costs.
- Decreased disposal costs.
- Less recycling collection costs.
- Decrease waste control costs.

In past cases a product life cycle was not designed for reuse and products ended up disposed in landfill. With the circular economy model products are designed for reuse from its raw material in the manufacturing process. The circular economy production of products is aimed to be sustainable for remanufacturing (Lacy & Rutqvist, 2015, ss. 4-5). Circular economy models are used as a strategic tool, it assistant in businesses and economies to move from the linear economy to the circular economy. Many companies proceed to circular economy, it requires major internal restructuring, for example, changes in strategies and supply chains. The recovery and recycling model uses the production material used in the production and consumption and provides benefits. The model provides sustainable and high-quality products because the focus is on the product itself (Lacy & Rutqvist, 2015, s. 23).

2.3 Sustainable Supply Chain Management

Sustainable Supply Chain Management aims to find a cooperation between social, environmental, and economic performance. Claiming that your “sustainable” or “green” in your operation is not sufficient anymore. Companies need to prove how actually sustainable they are, by providing sustainability reports to their clients and customers. Sustainability has become a strategic issue for many companies (Álvarez Gil , 2007; Lam & Lee, 2012). Sustainable development is considered as a critical goal for organisations due to its impact on achieving long-term competitiveness (Hart, 2015; Pfeffer, 2010) and sustainability has made firms rethink their strategies and situation in the market (Lubin & Esty, 2010; Lee & Lam, 2012).

Hubbard (2009) expressed that, close to 75 per cent of international organisations are pressured to consider sustainability issues and to develop non-financial measures of performance in addition to traditional ones. Sustainability is considered to be a combination of environmental, economic and social objectives that provides a balance between the three aspects (Elkington, 2001; Carter & Rogers, 2008; Gunasekaran & Spalanzan, 2012). The concept of sustainability is defined as a utilizing the resource to meet the needs without adjust the ability to meet future needs. Sustainable development is defined as, a development that meets the needs of the present without compromising the ability of future generations to meet their own needs (WCED, 1987). Supply chain management is the integration of these activities through improved supply chain relationships to achieve a sustainable competitive advantage.

Sustainable Supply Chain Management can be generally defined as the strategic, transparent integration and achievement of an organization's social, environmental, and economic goals in the systemic coordination of business processes for improving the long-term economic performance of the individual company and its supply chains processes. At the same time sustainable supply chain management is the management of material, information, and assets flow as well as partnership among companies in the supply chain, by aligning them with the goals from all three dimensions of sustainable development, economic, environmental, and social into account, which are acquired from customer and stakeholder requirements (Mukhopadhyay S. , 2008). Environmental and social measures need to be achieved by the representatives that function within the supply chain. By gaining competitiveness and maintaining it through meeting customer needs and related economic criteria. There are three dimensions: economic growth, environmental standard and social equity. The concept assists in operationalize sustainability where a minimum performance is to be achieved in the environmental, economic, and social dimensions (Jonathan , 2002).

Figure 7. A Framework of Sustainable Supply Chain Management

For a successful implementation of a sustainable supply chain management this are the steps that many companies follow. The implementation involves the developing a sustainability plan for the business, this will assist with the establishing company goals and objectives and administer them. This will provide your company on how sustainable it is and including the supply chain part (operation, environmentally, socially, and economically). Policies for suppliers and customers must be developed, evaluate supply chain process and practises from customer feedback and with the results the supply chain with this results the supply chain part will be evaluated and take appropriate action. With growing sustainability importance, a closed-loop recycling system in which new PET bottles are produced from PET bottle waste fulfil this criterion to the highest degree (Wollny;Dehoust; Fritsche;& Weinem, 2001). & (Ulcay, 2004; Shen , 2010; Shukla; Harad;& Jawale, 2008).

A model for sustainable supply chain management (SSCM)

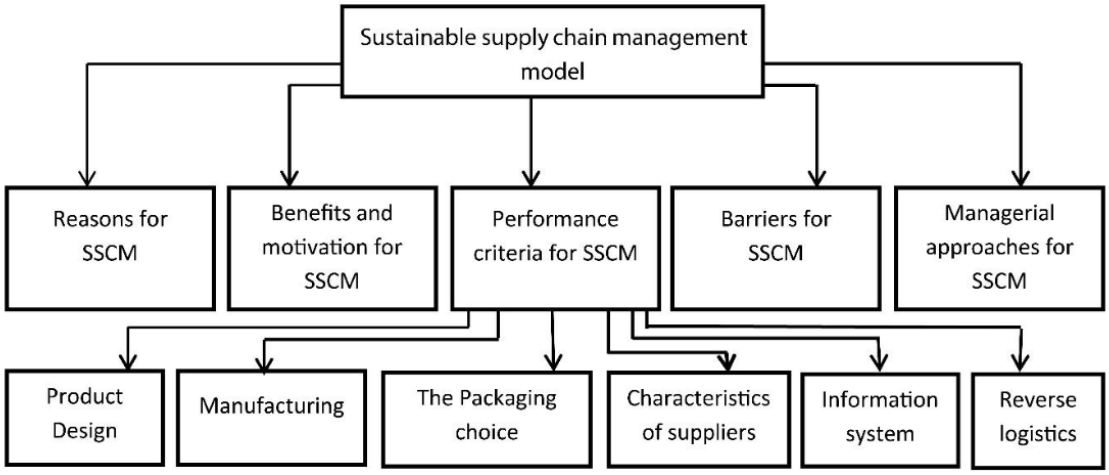


Figure 8.Generic Model scheme

(Ageron , 2012) proposed that the performance measures given must be considered in the sustainability alongside with supply chain. With this detail it forms the model more operational and allows to better estimate sustainably in the supply chain process. The objective is measuring the performance all along the supply chain. Barriers of sustainable supply chain are the financial costs, return on investment, supplier's capability, size, facilities, and company human skills. Establishing a sustainable supply chain management entails integrating all the collaborating some of the focuses in supply chain, namely product design to manufacturing, product packaging, purchasing and supplier's selection, suppliers concern involvement, suppliers' characteristics, reverse logistics, green supply chain, and lastly information system sustainability.

2.4 Legislation between South Africa and Europe

South African government and many industries have encouraged recycling with a message of "please recycling" time and time again. Landfill disposal of waste has been an obstacle that they have been tackling and improving to better the environment. The National recycling day which is on the 18 September 2020, was the day to provide the opportunity for citizens to reflect on their waste habits and to be provided with the knowledge on how to recycling and reduce their impact on waste. South Africa, recycling industry have developed drastically along the years based on economic principles. Recycling is the most crucial measures in South Africa to reduce the impact, usage, carbon dioxide emissions and the quantity of waste to be disposed off.
All the international policies, especially European policies, have been used to influence South African policies in recent years concerning the impact on the environment and plastic packaging. The Paris agreement was signed byt the South Africa government in 2016, set up by the United Nations to tackle climate change. The document signed by each country obligated to prepare, communicate and maintain successive nationally determined contributions (Adoption of the Paris Agreement, 2015).

Post-consume PET bottle collected amounts to 95 879 tonnes which inhabits 594 448 cubic metres of landfill space and creates 144 000 tonnes of carbon emissions. South African government has encouraged recycling habits to reduce waste through a “circular economy”, which promotes reuse and remanufacturing of materials. The new legislation that will impact business and consumers.

Recycling in South Africa is more guided by economic principle and in Europe is basically the responsibility of an individual in doing the right thing, environmental principle. In South Africa the local recycling services in to be financially operational to succeed on its own. As recycling is perceived as the “right thing to do” for the environment, in Europe the government subsidise the recycling services. In 2018, Europe managed a 31.1% plastics recycling rate, while South Africa achieved a 46.3% input plastics recycling rate by converting 352 000 tonnes of plastic refuse into raw materials according to Plastic SA. In respect of PET recycling, Europe use system that is automated (infrared spectrometers to sort their recyclables from non-recyclable waste) and in South Africa is facilitated manual labour and waste pickers and this provides an opportunity to recycling some of the products and materials that EU cannot, e.g., black plastics and thin packaging films (Plastics SA, 2018).

Recycling in South Africa needs to be a profitable venture as it creates jobs and supports thousands of families. Formal waste management services are only 64% of households in South Africa and the are no landfill restrictions on recyclable waste and in Europe restrictions and regulate certain recyclables from entering landfills. Despite the difference between Europe, South Africa’s recycling rates and regulation has shown massive growth and continuous improvement over the past years.

Europe	**South Africa**
Recycling is based on environmental principles	Recycling is based on financial principles
Accurate waste collection data	Accurate recycling output tonnages
Recyclable waste is obtained from Separation at Source process	Waste pickers collect recyclables from curbside and landfills
Community is involved because it is the right thing to do	Community will only do it if incentivised by money
Up to 2018, the bulk of the recyclables were shipped to third world countries	Less than 5% of collected recyclables is shipped to processors outside South Africa
Landfill restrictions for recyclables in at least 10 European countries	64% of South Africans have access to waste management
Recyclers utilise optical sorting	Manual sorting of recyclables, excluding PET bottles
Very low recycling rates for flexible packaging	PE-LD films have an output recycling rate of 35%
Black products are unrecyclable due to optical sorting	Manual sorters have no problem identifying black items
Input recycling rate in 2017 of 31.1%	Input recycling rate in 2018 of 46.3%
The average European is valuing its national heritage and lifestyle	Many South Africans live below the breadline and are fighting for survival

Figure 9.The table above shows the importance of creating sustainable recycling systems, adopted for two different countries (Adapted from Plastics SA, 2019).

2.5 Recycling of PET bottles

PET is the most recycled material used in packaging. The improvement on recycle has reach it all time highest and its part and process of waste management strategy. It contributes to reducing energy consumption and its presence in municipal wastes and extend the life cycle of PET products, when turned to its solid, it is easy to be recycled (Barboza, 2009). Globally by 2029, PET bottle collected is predicted to be at 68% (Forbes magazine). Properly disposing of the PET products provides the opportunity for reuse. The producing of products from used PET waste as raw material allows the following benefits: reduction of resources utilization, energy savings and post consumption of recycled PET.

What is PET? PET stands for polyethylene terephthalate and PET bottles are strong, colourless, lightweight, transparent, and allowing the content of the container to remain visible. The strength and lightweight are important for beverage packaging. Park & Allaby (2013, s. 742) define recycling as 'the reprocessing of discarded waste materials for reuse, which involves collection, sorting, processing, and conversion into raw materials which can be used in the production of new products. Recycling is the highest priority in waste management. PET bottle and cans recycling involves the collection of used PET bottles and cans from discarded waste, sorting, and deposit systems (BIO Intelligence Service, 2013).

The recycling process of PET bottle and cans involves the following: removing the labels and closures, shredding them and after the cleaning process will take place and quality products from the raw material can be produced. Improvements of recycling process has resulted in PET converted and manufacture new PET bottles (Welle, 2011). The recycling of material is often classified based on the product which is manufactured from the converted raw material (Ragaert, 2017).

Many products use recycled PET material, since of its slow rate decomposition, to provide economic benefits and to reduce waste. PET bottles and aluminium cans are the most used packaging material and new technological advancement for recycling have added value to the recycling industry. These materials are strong, economically affordable, and most importantly, recyclable. PET bottles are made of the material with the best characteristics for recycling, so sustainability is no longer a problem in this regard, but rather a matter of responsibility on the part of consumers.

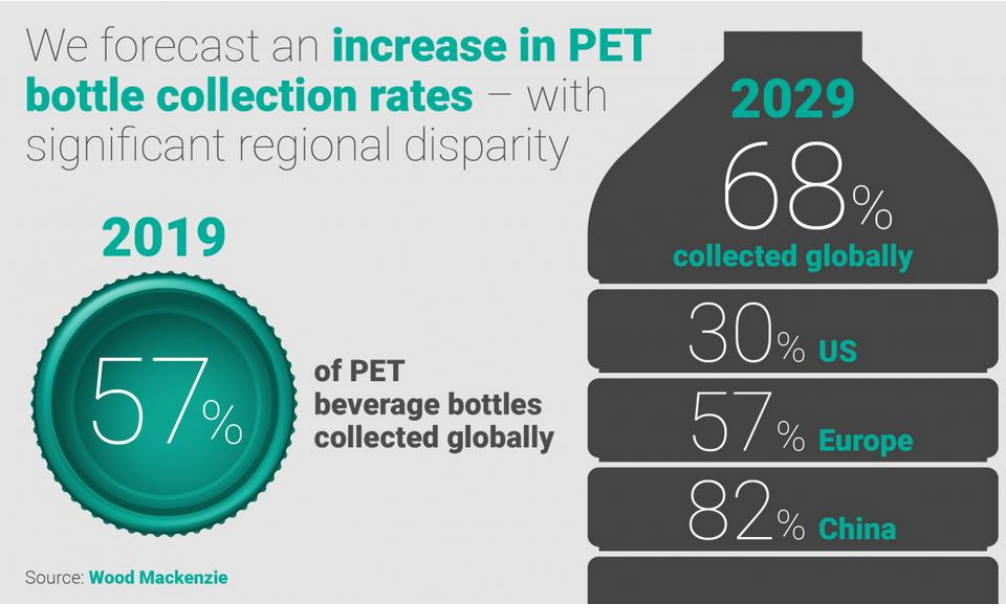


Figure 10. PET beverage bottle collected globally.

2.5.1 Advantages of recycled PET

Post-consumer recycled PET has many advantages when it comes to sustainability. With a bottle and cap that are both recyclable, PET bottles are an ideal and sustainable packaging solution. Advantages to using recycled PET.

- PET bottles are recyclable.
- Recycled PET has a lower carbon footprint than virgin PET.
- Recycled PET is super lightweight compared to other types of packaging.
- Compared to glass, recycled PET is 85% lighter and therefore helps cut transmission costs and lower CO_2 emissions.
- Recycled PET bottles are shatterproof, providing safety in the logistical chain, retail stores and at home.
- Recycled PET is completely safe for both food and beverage packaging.

Benefits of recycling PET material

- Less amount of waste- lower amount of waste contributes to landfills when recycling.
- Lower green house gas emissions- Plastic manufacturing creates greenhouse gases.
- Lower pollution rates- the less discarding of waste in landfills, the lesser the toxin in the air.
- Saves on eenergy- recycling saves energy as well as making new plastic bottles from recycled ones, helping in reducing the amount of work and reducing the number of fossil fuels needed to burn them.
- Uses less resources- fewer natural resources is used for example oil which is limited supply.
- Saves money- A recycling facility is cheaper to run due to a lack of needing to incinerate trash or routine dumping in landfills.
- Maintains ssustainability of resources- Recycling that resources are properly sustained.
- Provides job creation- the recycling industry creates more jobs. In fact, for every waste management job, there are four in recycling.

2.5.2 Recycling aluminium beverage can

According to the Aluminium Association, aluminium is the most recycled materials on the market, it's a packaging solution that is 100 percent the highest at a recycling rate than any other beverage packaging material.

It saves more than 90% energy required to produce new aluminium. Aluminium cans for beverage packaging can also include in the deposit refund system, to reduce waste and improve efficiency of recycling program, which will increase the collection. The recycling of beverage cans can lower energy consumption and the quality of aluminium does not decrease when recycled repeatedly. There are some arguments that aluminium cans have the possibility to replace plastic bottles. PET bottle consumption is increasing globally, with every changing industry new trending brand, offer something new and exciting, to gain value chain and to improve collection, recycling and maintain more of a close loop. For example, Pepsi plan to reduce plastic waste includes ditching plastic bottles for cans because they believe that they are easier to recycle, this is a sustainable alternative to fight the disposal.

Figure 11. Cost and weight comparison

Recycling of aluminium cans provides economical, environmental and energy savings. The main benefits of recycling of aluminium cans are:

- Less aluminium discarded in landfills.
- Reduce landfill disposal fees.
- Emissions cause by greenhouse effect is lowered.
- Energy savings in relation to primary production
- Ectraction activities reduced.
- Waste reduction
- Contributes earnings for recyclers.
- Recovery of valuable material without lowering quality.

(Source: www.unican.co)

Figure 12. The flow of aluminium can recycling.

2.6 Reverse logistics systems

Reverse logistics have been a technique and a strategy that many companies have adopted to create their competitive advantage. It also allows for companies to customize their products for their customers. This provides for companies to create quality products or services than their competitors. Reverse logistics technique or strategy lowers supply cost in the supply chain. The approach of supply chain management and reverse logistics confirm that many companies recycle and reuse of the previously supplied commodities as well as learn more about the market (Dowlatshahi, 2000). Supply chain management ensures that the products flow from the point of production to the consumers is steady and maximized (Vural, , 2015, s. 262).

The reverse logistics is defined as a deal with the management of goods and services after they reach the market (Stanciulescu et al, 2011). Business Dictionary provides the following definition of reverse logistics: “Flow of unwanted material back to the companies, through its logistics system flow, for reuse, recycling, or disposal” (Business, 2016). The term reverse logistics is a process by which a manufacturing company governs the return of its products, parts and materials from the consumption sites, in order to reuse them, recover their residual value, or to dispose of them”. (Gandolfo & Sbrana, 2008, ss. 31-32).

Reverse logistics is a broad concept for supply chain system development, which aims to support closed-loop supply chains by the improving activities as product design, supply chain design, and product recovery. (Grant, 2013, s. 151). Reverse logistics combines two concepts: logistics activity and reverse process. It manages the tangible and intangible flows from the market to remanufacturing, to the distribution channel and where the shipment system will operate opposite direction unlike the normal one. (Gandolfo & Sbrana, 2008, s. 32).

Reverse logistics assist many companies to manage the systematic flow of goods, to the material flow from the manufacture to the end user. It also ensures that the flow of raw material is minimized. The management of the flow of goods from the consumer to manufacture to aid in the disposal of waste properly by companies, which will benefit communities in the quest of going green. With the intention to keep the environment clean, companies will have a proper management on waste disposal and low wastage. Reverse logistics is an important system for the reduction of materials used in forwarding flow. This system reduces backflow of unused products and also reduces the dinstruction of products as a result of overloaded when being transported (Mohamed, 2016)In some cases, reverse logistic is obscured with waste management. In reverse logistic the materials are recycled and reused but waste management involves the collection of waste materials for disposal.

Figure 13. Reverse logistics in Supply Chain Management

The reverse logistics also helps to maintain a rapid supply chain (Elmas & Erdoğmuş, 2011, s. 161). It ensures that supply chain management is assist companies to benefit from their competitive advantages. This is achieved if reverse logistics is applied to achieve sufficient information flow regarding supply chain management. Reverse logistics information helps companies to understand which goods are trending in the market and with this information proper planning will give them a competitive advantage in the market, from other potential competitors. According to Rogers and

Tibben-Lembke (1998) reverse logistics is the process of organisation, implementing, monitoring and controlling the efficient and 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. Such terms, as recycling, reuse, remanufacturing, and refurbishment relates to the concept of reverse logistics. Its main activities include, collection, sorting, evaluating, recycling, reprocessing, reuse, redistribution, and disposal of used goods, and also packaging and shipping materials from end user. The figure shows a common reverse flow.

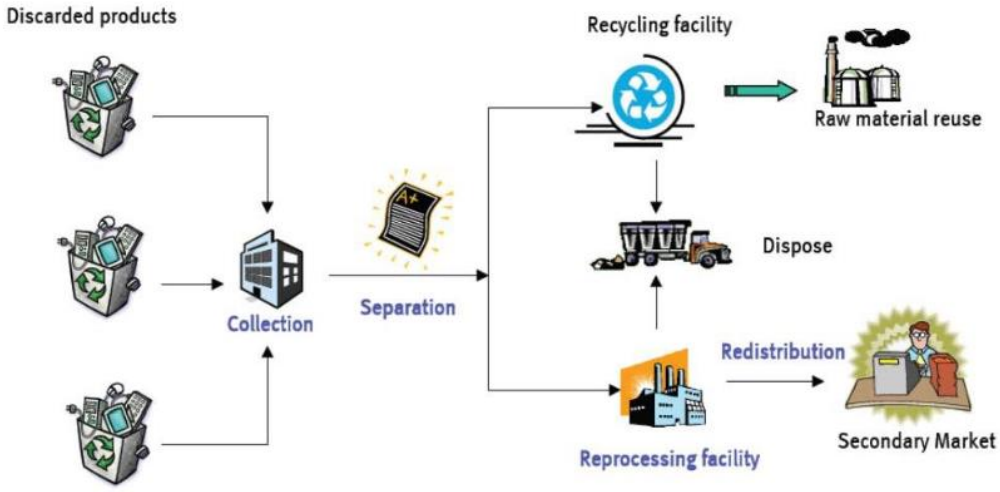


Figure 14. Reverse flow (Bajor, 2014)

The reverse flow consists of products returns and remanufacturing. Customer returns represent the fundamental element of product returns. Figures represent every part of industry and how radical the system is. The main target for companies is to manage the reverse flow efficiently (Tibben-Lembke, R., 1998, s. 6).

2.6.1 Benefits and challenges of reverse logistics

Reverse logistics is utilised as an important tool or measure that many companies have implemented its system and practices. It provides numerous advantages such as economic benefits and to boost social image of the firm. Most companies are more environmental conscious and have an understand of the successfully effective product recovery management and knowledge the benefits of effective revere logistics, can give a competitive advantage in the markets (Stock & Mulki , 2009; Govindan & Bouzon, 2018).

Larsen, and more (2007, s. 295) have recognize five methods to motivate reverse logistics can have a positive impact on profitability:

- Increased revenues for secondary market
- Unsold products are offered new products (remanufacturing)
- Company consideration to social and environmental responsibility
- Low operational cost from recycled and reused products
- Higher asset turnover due to better proper management of inventory return

Reverse logistics of challenges

Reverse logistics system has its own challenges, according to Larsen, and more. (2007, ss. 295-297) these are the challenges:

- Large variety of quantity and timing of product returns
- Large variations in timing, quality, and quantity of product returns
- Lack of proper procedures for product returns
- Market value is minimized because of product return delay.
- Lack of ability to evaluate, inspect and dispose of returns.
- Lack of performance measurement

Rescheduling (preponement) is one of the strategies to reverse logistics. Preponement provides accessibility sorting, reduce time delays, disposition, promote rapid collection and deconstruct rather than delayed process and product differentiation. With cannibalization some of the products are repacked and returned to a primary market at the same price and other to be sold in secondary markets.

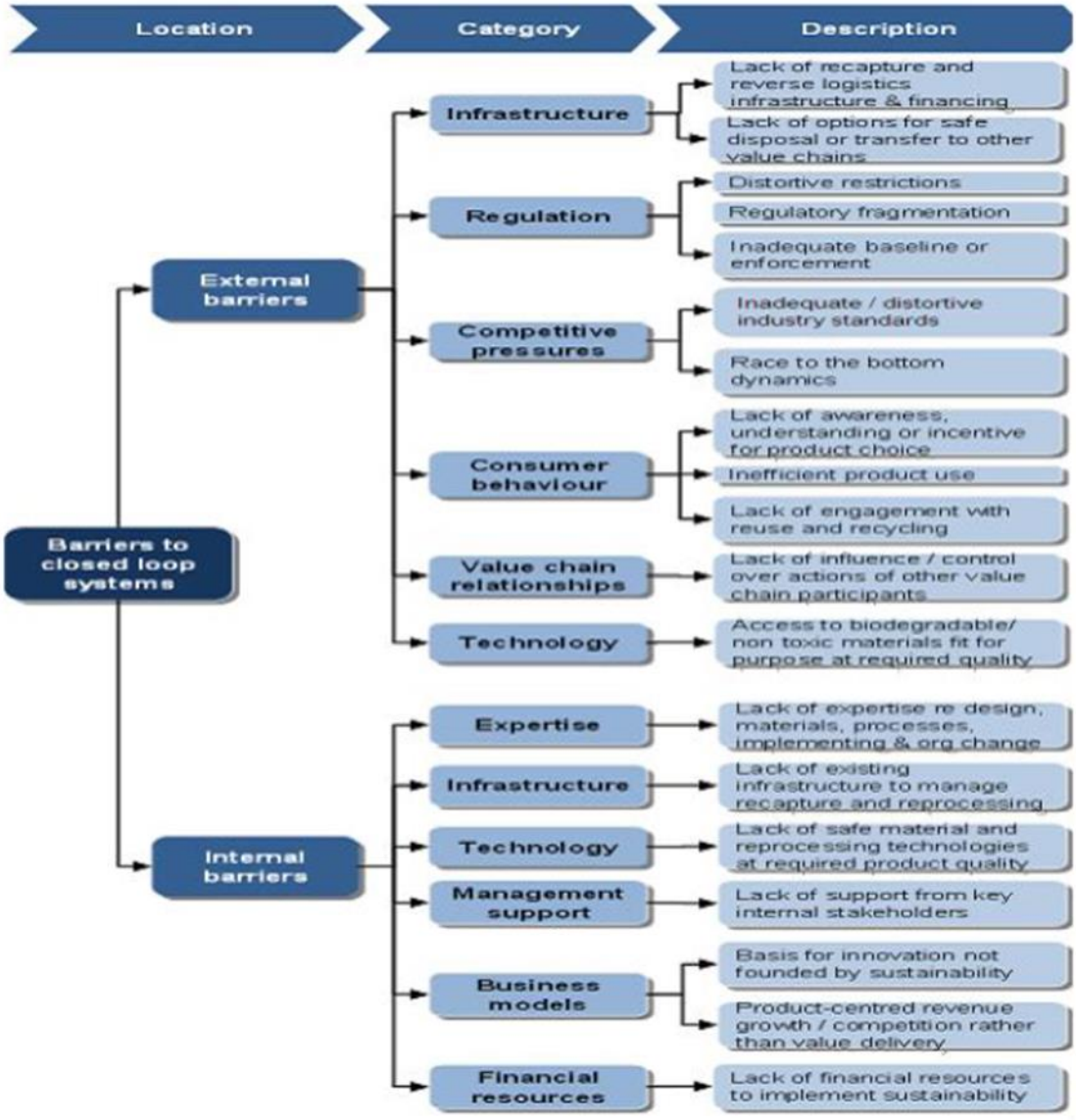
2.7 Close loop system

Many companies have taken advantage of advance waste technology that has been provided for them over the past years. With this opportunity they have been able save cost, provided better products with less impact on the environment and being able to meet government regulation. A closed loop system is a continuous process that recovers material for recycling, reproduction, and remanufacturing. It is a vital system which involves a life cycle of a product and the effectiveness of customer participation. Closed-loop supply chain management is defined as “the design, control, and operation of a system to maximize value creation over the entire life cycle of a product with dynamic recovery of value from different types and volumes of returns over time” (Guide & Wassenhove, 2006.).The main strategies of closed loop system are to establish a no zero waste by remanufacturing and its focus is to reuse, recycled post-consumed material from the same application (Savaskan , 2001; Shen , 2010).

Closed loop recycling system it is a solution level that provides the minimization of consumption of natural resources and sustain the environment. It demands high quality material, extensive processing and cleaning is required before post-consumer PET can be combined with virgin polymer and incorporated into new containers. For PET bottle and cans to be recycled, a closed loop PET recycling system is utilised. The recycling of PET bottle and cans system consists of various processes, bottle and cans collectors, recyclers, retail shops, manufacturer, and bottle filler. The main benefits of closed loop system is that material can be recycled indefinitely without any degradation, it provides cost saving features and focuses on resource sustainability.

2.7.1 Barriers to close loop system.

The World Economic Forum (2009) described the forms of barriers and challenges that can affect close supply chains.



(Source World economic forum (2009)

Figure 15. Challenges of closed loop system

There are additional challenges facets in recycling PET bottle and cans and some can emerge during recycling process. These includes, cheaper adhesive applications must be completed when recycling PET, discolouration of PET occurs through label adhesive, without dried completely moisture can cause degradation when reprocessing and due to high volume of bottle costs can be high during collection.

Several factor that proves that close loop system is more complex than traditional supply chain. (Akçalı, & Çetinkaya, , 2011)

- Forecast of the demand and the return of the product must be integrated into replenishment decisions.
- The correspondence to the demand and return system must be established.
- Two different lead times will occur, the manufacturing lead time and the remanufacturing lead time.
- Products returned with be inconsistent in quality and resulting in random yield in the remanufacturing process.

2.8 Introduction of Reverse vending machine: Deposit refund system

Most packaging becomes trash because we have gotten used to it. This leads to many urban landfills discarding of waste without many negative and vile effect to our health from the environment. With the help of modern recycling techniques and methods, trash has become the most valuable source of living for many. Many developing countries have dedicated themselves and have provided organisation in trying to reduce waste in many urban populations. the stronger driving force for waste increases is the high rate of urban population growth Urbanization need not necessarily be a problem.

In fact, in the developing world, it has been the engine of economic and social development of their cities. (Akçalı, & Çetinkaya, , 2011)Habitat (1996), notes that Urbanization has helped such cities attain stronger and more stable economies in the past few decades. Hardoy et al (2001) argue that '[these] environmental problems become particularly serious where there is a rapid expansion in urban population and production with little or no consideration either for the environmental implications or for the political and institutional framework that is needed to ensure such environmental problems are addressed for most cities of developing countries. Specific to waste, (Schubeler, 1996) suggests that 'solid waste generation and demand for waste collection service generally increase with economic development'.
Deposit-refund systems (hereafter referred to as "deposit systems") are a combination of a product charge (the deposit) and a subsidy for recycling or proper disposal (the refund).

Manufacturers or vendors of products that are subject to deposits incur additional costs in handling returned products, but these costs are often partially offset by the interest earned on deposits, unclaimed deposits, and sales of collected used products.

In a deposit-refund system, consumers pay deposits that are added to the price and receive refunds when they return the used products. This system is one of the economic instruments used for environmental protection. It combines taxes and subsidies to prevent and promote material recovery. Consumers of deposit-refund goods have an incentive to return used products and receive refunds, and a high recovery rate can be attained with low Monitoring costs. Furthermore, since refunds are compensated from deposits, funds for a deposit-refund system are smaller than those for a system offering subsidies for returned used products.

The major concern is deposit refund because of several benefits attached to it and as a tool for cleaning up the environment. The public is familiar with deposit refund systems because of their wide use for beverage containers. In this system, a deposit is paid on a soft drink or beer can or bottle. When pollution is avoided by returning the containers, a refund follows (OECD, 2005). Deposit refund systems are appropriate where the policy objective is to encourage proper. disposal, encourage re-use or recycling, or discourage use altogether (Menell, 1990).
One challenge to recover packaging is the collection after the usage. Manufacturers and retailers are obliged to charge deposits on packaging. The deposit-refund scheme is are configuration of waste collection. It involves the participation of consumers, because they are economically influenced to bring back their packaging at collection points. If they do not bring them back, consumers lose the money of the deposit. In Finland, collection points take the shape of reverse-vending machines, socio-technical innovation provided by Tomra. These machines become a key element to the deposit-refund scheme. They have the advantages to automatically sort, shred and store returned packaging, as well as calculate and refund consumers' deposit. The reverse-vending machine does not sort, shred, and store every type of packaging, yet. How can we expand the usage of the reverse-vending machine to reduce packaging pollution?

We first look at the cycle between the involved parties, then the relevance of the scheme and lastly its efficiency. The deposit-refund scheme involves five actors: producer, retailer, consumer, operator, and recycler. The producer pays the operator for its service which includes the deposit and the services charges to collect packaging.

Then, the retailer pays the same deposit to the producer. The consumer pays this deposit to the retailer. A full refund is granted to the consumer if they bring back the packaging. Otherwise, the money of the deposit will go to back to the operator. Operators' role is to collect and sell packaging to a recycler. The recycler transforms used packaging into reusable materials to create new products. The relation between the five actors is further illustrated in the figure below (ibid)

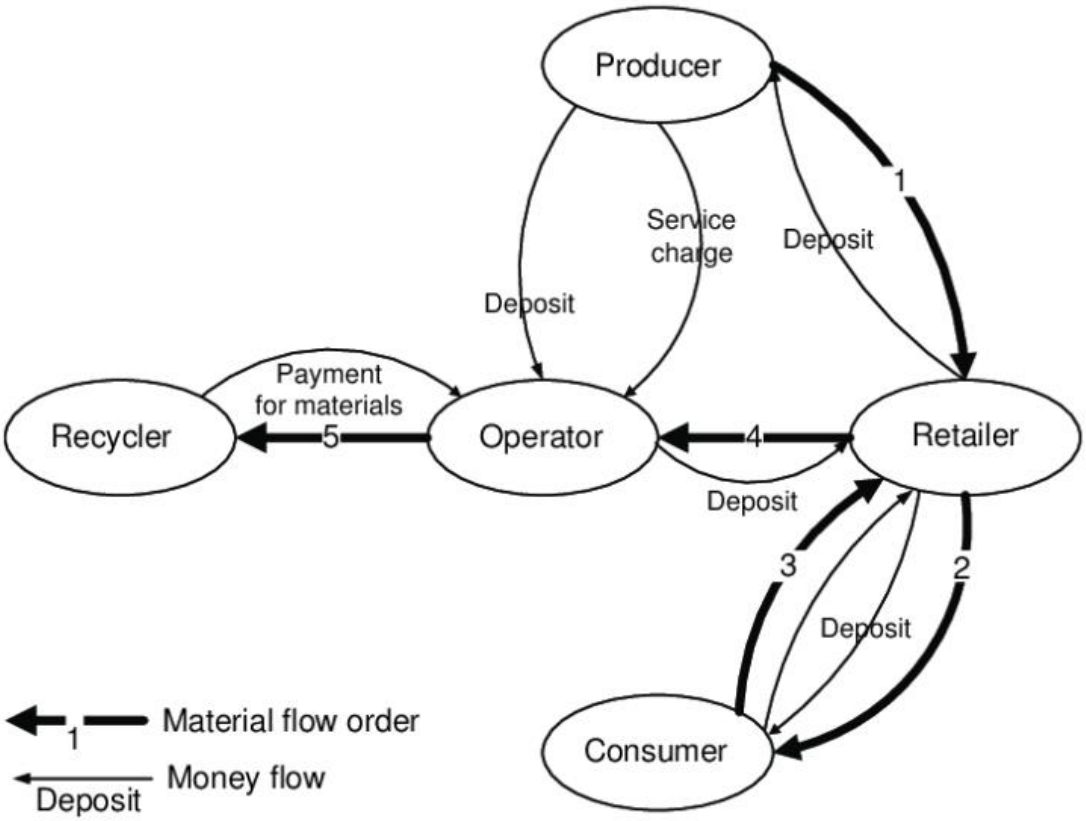


Figure 16.The simplified scheme of material and money flows of deposit-refund system

Benefits of Introducing Reverse vending machine.

Deposit refund system:

Possible Benefits of Deposit Refund Schemes DRSs are reported, in the literature, to have a range of possible environmental benefits. The key ones mentioned in the literature are:

1. Increasing the recycling of containers covered by deposits (for refill or recycling)
2. Reducing the extent of littering
3. Increasing the use of / reducing the extent of decline in the use of refillable
4. Avoiding harmful chemicals being mobilised in the environment (usually not in beverage schemes, e.g., lead acid batteries, or pesticides).

2.9 Benefits and challenges of Reverse vending machine

The challenges faced in the implementation of the deposit refund system in the management of glass bottle waste were as follows:

Low empty bottles return rates.

Many broken bottles

More time for recordkeeping

Poor access to the suppliers of replacement bottles

Transport costs and less storage space for empty bottles

Time is required for receiving bottles and sorting bottles.

Business money is lost in collecting deposits and paying refunds.

Drink remains in empty bottles attract pests.

The cost of creating a structure to monitor and enforce.

Theft of stored bottles from the vendor's shops

Deposit refund system provides technological advancement and bottling, and distribution becomes more focused. PET bottle and glass containers are reused became restored by one-way beverage containers (Container Recycling Institute, 2016). Numerous literature displays that the environmental effectiveness of deposit-refund systems, reduces the amount of waste disposal, accomplish high collection rate to increase recycling (Fullerton & Kinnaman, 1993).(Fullerton & Kinnaman, 1993; Sigman, 1995; Palmera;Sigman;& Walls) .According to Walls, (2011) contrary to Pigouvian taxes on disposal which can encourage households and firms to dump waste illegally, deposit refund systems can curb this issue by providing refunds to consumers once they return the waste product. Moreover, it is easier to implement a deposit refund system, than a direct tax on litter disposal. This is because it is harder for consumers to evade an upstream deposit on product sales (Walls, 2011; Don & Kinnaman, 1995).

Deposit refund systems also facilitate high recycling rates. For instance, one-way beverage packaging which are collected separately within a deposit refund scope can be more easily recycled due to targeted sorting of packaging waste (PricewaterhouseCoopers, 2011).
Consequently, high collection rates often correspond with recycling rates, and reduce the use of virgin materials in the production of new products, thereby minimising resource consumption and the associated environmental impacts. Deposit refund systems can either be voluntary, or mandatory programme forced by the government (Opschoor & Turner, 1994). A main objective of setting up a deposit refund system is to design a collection system, to facilitate high recycling rate and to promote the system of reverse logistics. Deposit refund systems provide the availability of technologic innovation, co-operation between industries. The consumers perception is the deciding factor in the collection rate about the return of the products, and their point of view about the steps of returning, economic incentives, characteristics of returned product, time to store discarded products and time to return (Tasaki;Numata;Matsumoto;& & Tojo, 2010)

The system or mechanism for the collection and recycling of products in deposit-refund schemes vary from country to country, as well as EPR schemes. The collection and recycling mechanism in European Union (EU), are voluntary industry initiatives to mandatory schemes imposed by the government. The transfer of responsibility from municipal officials and to producers in all industries is complex for waste collection, treatment, and recycling (Kunz;Atalay;& Mayers, 2014).
The producer responsibility in the deposit refund system also varies, and in some other systems, producers carry the financial responsibility with cooperation with public authorities or carry full or partial organisation responsibility in the process (European Commission, 2014)
In countries like Taiwan, Korea, and Hungary governments charge fees or taxes to producers and pay for waste collection and recycling as with (Kunz;Atalay;& Mayers, 2014).

3 Case study company: Reverse logistics in action

3.1 Tomra-Close loop system- current trends

Tomra Systems ASA is a Norwegian multinational corporation active in the field of instrumentation for recycling solutions, it was founded by the two brothers Tore and Petter Planke in 1972. It started out with the design, manufacturing, and sale of reverse vending machines (RVMs) for automated collection of used beverage containers. The company is the largest Reverse Vending Machine (RVM) producer globally and leading sensor-based machines for sorting and recycling. In addition to RVMs, TOMRA manufactures compactors, material recovery, and sorting machinery. With over 70,000 RVMs installed worldwide, TOMRA is the leading provider in the industry. TOMRA is the world leading expert in reverse vending providers.

Figure 17. TOMRA R1&T9 (Prisma&K.Market)

TOMRA has introduces the TOMRA R1&T9 in Finland which is of its first new market. It is a multi-feed reverse vending solution, launched at some supermarkets that are well known in Finland, K-Citymarket, Tammisto in Vantaa was the first to install the new TOMRA R1 and later in Prisma in Helsinki. TOMRA R1 and T9 is modified for larger supermarkets and return locations receiving high volumes of beverage containers and it provides mess-free recycling and saves time and energy. Recyclers can pour or insert a whole bag of over 100 empty beverage containers into a reverse vending machine in one go, rather than the old style by inserting them one at a time.

3.2 Palpa-Reverse logistics- operations

The Finnish bottle return system was created in 1950, Palpa manages the return systems of beverage packages and it is the largest in Finland to operate this system. Their duties include the collection, recycling and/or reuse of the packages belonging to their systems. Palpa in addition manages the administration of the deposits in their return systems, the development of their systems and the communications concerning their operations. Palpa is owned by franchising groups and breweries. The operations are monitored by the Pirkanmaa Centre for Economic Development, Transport and the Environment.

Finland uses a deposit-based return system for beverage packages, most material used for beverage containers are PET bottle and cans, which are clear and are collected in the using this system. Suomen palautuspakkaus Oy (PALPA) manages and develops the return systems, which is a close loop system for recycling material. The return rate is of 90% for PET bottles 39 manufacture new bottles and other packaging materials. The membership of Palpa it includes all manufactures and importers of beverage packages and there is a membership fee that is paid on each recycling system, it cost members an individual return system for each packaging types (glass bottle, aluminium cans, plastics bottles). A member should register their products in the recycling system, responsible for the deposit and other markings on their beverage packaging, monthly sales to Palpa.

Palpas duties are:

Deliver the membership information to Pirkanmaa Centre for Economic Development

Transport and environmental tax benefits

Updates the product information in the reverse vending machines.

Collects the members' deposit and recycling fees.

Ensures that the packages are recycled.

3.3 Petco

PETCO (PET Recycling Company NPC) was established in 2004, with an objective to improving the management and recycling of post-consumer PET products. They have changed the industry of local PET recycling and created for many income opportunities and reduced CO_2 emissions. PETCO is financed by a voluntary recycling levy paid by converters on PET resin purchased. PETCO also receives grants from brand owners, resin producers and retailers. Working with many levels of Government and other private companies to assure them of the PET Industry's continued support of the concept of Extended Producer Responsibility, and to actively improve the way that waste is managed, reducing the amount of waste that goes to landfill, boosting the Green Economy and sustaining green growth.

The CEO of Petco announced that the company is recycling more than half of all post-consumer PET bottles and more bottles are recycled that be discarded in landfills. A total of 90,000 metric tons of PET are collected for recycling annually in South Africa. The company has invested in the collection infrastructure allowing it 55% rate to recycle nationally. Petco has created more that 60,000 income opportunities for small and micro-collectors, to improve people life for the better Petco recycling partner Extrupet which operates in Cape town and plant in Johannesburg which with bottle-to-bottle production, where recycling of PET plastics bottles are used to remanufacture new bottle or recycling into other products.

Petco, organisations, and other individuals in South Africa, to collaborate in educating, uplifting communities, re-evaluating recycling packaging, revenue streams SMMEs to boost the circular economy and the environment. Many South Africans are collecting waste to recycle, for a profit and to create jobs. The national polyethylene terephthalate (PET) Extended Producer Responsibility body, PETCO are recognising 13 individuals and organisations for their impact on sustainability according to circular economy. Winners are awarded according to the recycling material into pallets made from 97% recycled PET.

3.4 Mpact

Mpact recycling has been operating for more than 50 years in many major centres in South Africa. They are the largest paper and plastics packaging and recyclers of PET in Southern Africa. The recovered paper material is supplied to the Mpact Group's paper mills for the manufacturing of recycled-based carton board and container board, which is sold to the South African packaging industry. Mpact strategy is to focus on sustainability through job creation, financial interest and environmental preservation.

Mpact delivered a strong financial performance from its operations for the year ended of December 31, 2020. New developments of innovation for fresh produce punnets, made from paper based and are used in many retail outlets in South Africa from Mpact. They have also working on new ways to meet customer packaging needs with award-winning innovation to improve their operations that contribute to the circular economy. It focuses on closing loop in plastics and paper packaging through recycling.

4 Methodology

Research methodology is defined as a direct way of structuring a person's idea and actions in terms of research (Jonker & Pennink B.W, 2010). A method used to recognize, select, process, and analyse information about a specific topic. Management research, it refers to the way of learning and studying in social point. Research methodology depends on information gathered from review of literatures of selected articles from academic conferences, journals, research websites, textbooks, and articles.

The empirical study on reverse logics and other core system associated with the study are discussed based on the data collected and analyses. The research questions were formulated to provide insight and on the research topic and provides information to the existing findings on close loop system and recycling PET bottle and cans.

Literature review and earlier research related to the research questions were comprehensively searched and studied to identify new trends on the field. A conceptual framework was developed to explain the research question in detail. Reverse logistics have provided a comprehensive information on the various field that affect a company on going green, providing environmentally impacts of using recycling PET material and economic benefits. Three recycling companies were selected, and their websites have been used by the selected as an area of study. The case companies 'website information on return policies is used as primary data since the same information is given to their respective customers in an exactly same form. A unified measuring scale was carefully designed to analyse the return policies to determine the possibility of using the policies in securing customer loyalty. Exploratory research is particularly appropriate if the exact nature of a problem is unclear (Saunders, 2014). It aids the understanding of the initial problem, which support and assist the ability to find solutions on the research question. This thesis provides exploratory research on going green, providing products with environmental impact, to analyse the closed-loop PET bottle and recycling system, and the implementation reverse logistics system, through literature review in the industries.

Research Purpose

The research purpose is divided between descriptive, or exploratory. The aim of an explanatory purpose goes beyond that and looks at how different variables are connected (Saunders, 2014).

5 Discussion and Conclusion

The main objective of this research was to answer the question: what is reverse logistics, what is a close loop system and how companies can implement green and reverse logistics concepts to improve the environmental sustainability? Literature review has provided many methods, systems, and practices of implementing of the reverse logistics and green logistics approach into the companies' structure. Green and reverse logistics are refining concepts that aims at supporting many arears with different activities and operations. Recycling of PET is important to assist in reduce the degrading of the natural resources and to enhance or strengthen its sustainability by reverse logistics. By recycling PET, the impact of reducing landfill waste of PET bottle and cans, is to assesses the environmental and economic aspects.

A decrease in the amount of waste can be achieved, with the proper design of packaging of products which will assist in the correct disposal of returned goods and recycling material would be easy. Companies must adopt green logistics principles to benefit for the environment and themselves, and government should establish proper regulations that will provide more benefits for going green, such benefits as tax reduction and financial support, economic benefits such cost reduction and profit increase, competitive advantage resulting in new markets opportunities and product innovations, which will result in a more positive customer perception. Recycling of PET has advanced throughout the years, with the help of technological advancement and systems for the collection, sorting and reprocessing of recyclable PET material are creating new opportunities for recycling. With the collaboration from the public, industry, and government it may be possible for products to be recycled and waste be reduced from landfills in the near future.

The procedure of collection and recycling, provides companies with the reduction of production cost and less resource are used in the remanufacturing new products. They are many practices of reverse logistics, which involve remanufacturing of products, retuning of defective goods, recycling, and reuse of products. In sustainable supply chains, environmental and social measures need to be achieved, while competitiveness would be maintained through meeting customer needs and economic standards. The most common barriers in developing countries like South Africa, it's a need to properly implementation of a better recycling system, more involvement from top management, lack of costs, lack of information system and absence of governmental legislations and support.

Suggestion for future research

Reverse logistics provides a great development plan for recycling system and programmes. An opportunity in South Africa to learn and invest on new regulations and technology and implement and advance in new solutions for the local sector and the environment. Better improvements for the collects and recycling of PET bottle and cans in South Africa and a more participation on public and private industry may provide a progressive recycling process that will work along with a close loop system. The objective is to make recommendations on how to improve waste management network in Pretoria, South Africa, and to provide information and potentially introduce a closed loop system (Reverse vending machines) which will sort and return nonreturnable packaging at the point of purchase. And to propose different stakeholders interested in the investment of the proposed system.

Recommendations for the future improvements of PET bottle and cans:

- Government policies and regulations on the discarding of waste Rate of return on PET bottle and cans
- Impact of PET recycling on environmental sustainability
- Ensure governments enforce coherent system design at a local level.
- Consider all facets of the system when designing PET packaging.
- Different expertise designers and exchange of data, to develop sustainable products.

List of Figures

Figure 1. Green practices implementation ,have many benefits for logistics, transportation, and organisations. 9
Figure 2. Green logistics and reverse logistics in close loop (Zongwei , 2011, s. 335)..... 10
Figure 3 .Reverse logistics activities that conflict with green logistics, regarding environmental sustainability. 11
Figure 4 . Benefits of Green logistics..... 11
Figure 5.Hierarchical system of the barriers to green logistics (Canadian Center of Science and Education)..... 12
Figure 6.PET material collection..... 14
Figure 7. A Framework of Sustainable Supply Chain Management..... 17
Figure 8.Generic Model scheme 18
Figure 9.The table above shows the importance of creating sustainable recycling systems, adopted for two different countries (Adapted from Plastics SA, 2019). 19
Figure 10. PET beverage bottle collected globally..... 21
Figure 11. Cost and weight comparison 22
Figure 12. The flow of aluminium can recycling. 23
Figure 13. Reverse logistics in Supply Chain Management..... 24
Figure 14. Reverse flow (Bajor, 2014)..... 25
Figure 15. Challenges of closed loop system 28
Figure 16.The simplified scheme of material and money flows of deposit-refund system 31
Figure 17. TOMRA R1&T9 (Prisma&K.Market) 34

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