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supply chain management of
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Irina Aurdahl

ABSTRACT

Due to increased awareness for environment in government and society, the concept of circulation economics has been on the top of discussion over the last decades. Reverse logistics as a part of this concept has a huge impact on environment. Reverse logistics covers a wide range of industries: the recycling industry has an essential role and its activities involve the reverse flow of logistical activities known as reverse logistics.

The research is delimited within recycling industry and focuses on waste handling and transportation practices adopted by dominated waste companies in Norway. Recycling and waste companies use transportation in their daily operations and a success of their business often depends on the efficient facilitation of entire transport system. Investigation of managerial perceptions around circular economy and reverse logistics concepts present the core of case studies.

I hope that readers will find the research useful and provide them with an insight into the understanding of the reverse logistics principles and how the model of circulation economics can be adapted into the daily life of individuals and organizations.

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1. INTRODUCTION

This chapter will introduce the concept of reverse logistics and focus on the problem background, statement of the problem general and specific objectives, research questions and hypothesis of the study. Finally, the chapter will examine the limitations and contributions of the study.

1.1 Background to the Study

Economic globalization as a phenomenon of the twenty first century has increased in all spheres of human life. Economic activities are coordinated by globally integrated financial and capital markets and characterized by an unprecedented degree of free and fast movement of capital around the whole globe. 'Markets economy' dominates on a global scale, reshaped economies all around the world (Boda, 2013). Globalization can be defined as a "Process which diminishes the necessity of a common and shared territorial basis for social, economic, and political activities, processes, and relations" (Scholte, in Crane, Matten 2010:19).

The largest and most progressive organizations in the world have currently discovered supply chain management (SCM) and the key role it plays as a source of competitive advantage (Miguel 2015, 56-70). This process incorporates all other activities integrated and which bring the products close to the buyers, creating customer satisfaction. Supply chain management also incorporates issues from operations in manufacturing, transportation, purchase, and physical supply into a combined package. Success in supply chain management further incorporates, integrates and harmonizes all these happenings into a seamless process. Supply chain management links and embraces all partnerships inclusive in the chain including the necessary departments involved in the organization. In an organizational environment, supply chain management is deemed to incorporate a versatile and extensive range of operational areas that stretches to all outbound and inbound activities related to organization's activities. Miguel (2015) defines supply chain management as a process that incorporates all other organizational activities connected to the transfer of goods from the stage of raw materials to the end user product.

Intrinsic to sustainability of the new economy is the concept of reverse logistics, which has become notable in the contemporary market environment due to its influences in economic and environmental sectors. It is being credited as having immense potential of reducing costs, increasing revenues and bringing in more profits to organizations. Many companies are viewing it as a strategic decision due to its presence as a point of competitive advantage (Gupta; 2013).

According to Gupta (2013) reverse logistics entails all the activities leading to products retrieval when customers require returning products to the manufacturer for any particular reason, such as repairs, end of warranty or lease. Generally, the process involves the movement of products originally attained by customers for use from the customer back to products' manufacturer who is the originator of product. For instance, the environmental concerns include global warming, landfill regions that have become saturated and even fast exhaustion of raw resources. Many governments are trying to cope with these concerns by implementing more strict environmental policies that oblige manufacturers to use a reverse logistics system when taking back returned products. On the other hand, organizations can utilize recovery alternatives such recycling and reusing. Economical concerns also involve the swiftly rising number of returns by customers particularly because of more broad-minded return regulations. Recognising this, I see a need to gain insight into the understanding of Reverse Logistics practices across the waste industry in Norway.

1.2 Statement of the Problem

Ingebrigtsen and Jakobsen (2007) suggest focusing on three sectors: economy, nature and culture, and see an important task of new economics in taking care of these three sectors. Paradigms defines as “patterns of thought, concepts, theories, methods and rules used to understand *ontology* (how the world is). As the world changes all the time, theories have to be evaluated and maybe changed accordingly” (Ingebrigtsen and Jakobsen, 2007, p.5).

Globalization has brought with it significant growth in the market economy. However, this exponential growth has also heralded certain dire consequences such as environmental problems that present new and important issues in scientific and economic world. This situation is exacerbated by the fact that the dominant paradigm based on businesses profitability appears to have prevailed over environmental concerns and held a formidable position in purview of

management and academic discourse. The need to integrate strategies and concepts that ensure a sustainable market economy has become urgent in light of the dire environmental consequences. A crucial research gap that the present study seeks to fill is in regards to management perception on the efficacy of adopting reverse logistic activities. By delineating the views of logistic managers, the study will underscore pertinent factors that influence their priorities and subsequently affect the adoption of policies and strategies that foster reverse logistic activities in organizations. It is in light of such environmental ramifications that the present study seeks to examine the role of reverse logistics activities in alleviating the problem.

Additionally, this thesis seeks to reveal what the leaders understand by the term ‘circular economy’ and how their attitudes and opinions vary across the different parts of the sector. Lastly, the thesis seeks to draw attention and increase consciousness around environment and sustainable business development. It aims to extend theoretical framework as well as contribute to better understanding of how circular economy is applied in the real-life scenario through the case studies of industrial organizations. By examining the current situation in companies, it will make it easier to map reverse logistics activities in supply chain system.

1.3 Objectives of the Study

1.3.1 General Objectives

To explore whether developing a circulation economic principles in Supply Chain Management of organizations reduce environmental damages

1.3.2 Specific Objectives

- i. Explore the perceptions of logistics managers in regards to implementation of reverse logistics in Norwegian companies.
- i. Explore the incentives and barriers to implementation of reverse logistic activities by Norwegian Companies.
- ii. Explore whether organizations in Norway have a concrete understanding of the term ‘circular economy’ .

1.4 Research Questions

- i. What are the perceptions of logistics managers in regards to implementation of reverse logistics in Norwegian companies?
- ii. What are the incentives and barriers to implementation of reverse logistic activities?
- iii. Do organizations in Norway have a concrete understanding of the term 'circular economy'?

1.5 Aim of the Study

This thesis primarily aims to examine reverse logistics activities in Norwegian organizations. Specifically, the study will examine managerial perceptions with regards to reverse logistics and how such perceptions influence implementation of reverse logistic activities in their organizations. The study will also examine incentives and barriers for implementation of reverse logistic activities, with particular emphasis on the cost perspectives associated with implementation of reverse logistic perspectives.

With the basis on theory in circulation economics, the study will examine how practices of reverse logistics belong to the concept of circulation economics. It will be interesting to identify how principles of reverse logistics can be mapped to the traditional understanding of supply chain of organizations. The research problem is inspired by ecological economics, and necessity of new paradigm in the society. It is the researcher's conviction that it is important to make a research in this area and make customers and businesses to understand that the transition from linear model toward circular model is ultimately required. Companies adopting reverse logistics model in their supply chains, will make their contribution to sustainable planet and better business performance. Additionally, the researcher's ultimate objectives is to interpret the various answers given by managers and recommend appropriate strategies that can be adopted to enhance the benefits of adopting reverse logistics in organizations.

1.6 Research Hypothesis

There is a significant relationship between perceptions of logistics managers and the successful implementation of reverse logistics activities. Empirical evidence and existing theories will be used to prove the validity of the hypothesis.

1.7 Scope and Limitations of the Study

The given thesis will be conducted in the context of circulation economics. It is based on holistic understanding of interplay between economy, nature and society. Moreover, it is limited to the concept of reverse logistics, and the timeframe when activities are performed is limited to the last five years. The research is also delineated to case studies of two companies successfully providing recycling services in Norwegian market.

The researcher anticipates that some of the respondents may not volunteer relevant information, since they may be part of the problem. Lack of reliable information may, thus limit the accuracy of study findings. To overcome this limitation, the researcher intends to infer study findings from information that will be corroborated by majority of the respondents.

THEORETICAL BACKGROUND FOR THE RESEARCH

This chapter will review relevant literature and highlight the main principles of Circulation Economics in order to establish a better knowledge of theoretical framework that will be used in the research. Furthermore, this chapter will analyze various theories and concepts related to Reverse Logistics and examine how these theories are applied in the field of circular economy and particularly in the recycling industry. The theoretical overview of Circular Economy concept will be presented.

2. THE THEORY OF ECOLOGICAL ECONOMICS

The economic subsystem has already reached or exceeded many of the planetary boundaries. There is practically nowhere on Earth where signs of the human activity are absent.

(Costanza et al. 2015)

2.1 Transition towards Ecological Economics

Ecological Economics appeals to the relationships between ecosystems and economic systems in the broadest spectrum, and represents an interdisciplinary field of study. Current problems such as sustainability, global warming, wealth distribution, natural disasters are not covered by any existing discipline, in this way ecological economics aims to extend these areas of overlap (Costanza, 1989). This area of study includes neoclassical environmental economics and ecological impact studies as subdisciplines, but also encourage new ways of thinking about the linkages between ecological and economic systems (ibid).

Economics currently plays a central role in policy decisions because it is assumed that money increases well-being of humans, which defined by Diener and Seligman as people's positive evaluations of their lives, includes positive emotions, engagement, satisfaction, and meaning (Diener and Seligman, 2004).

According to mainstream economics, known as neoclassical economics, unending economic growth is typically considered an adequate, measurable proxy for the desirable end. The traditional school of economics today assume that depends on what people want which they reveal through market transactions—by what goods and services the buy and sell. Thus, welfare to humans is increased through the ever-greater provision of goods and services, as measured by their market value (Daly and Farley, 2011).

Costanza (1989) introduce the term of “technological optimism” which inhere to most conventional economists. This line of thinking claims that energy and resource limits to growth will be eliminated as they arise by clever development and deployment of new energy. The assumption of unlimited economic growth ignores the problems of sustainability. The high rate of growth define “health” for technological optimists who also believe that all environmental problems can be fixed by new technology.

The opposite of this school, ecological economics take a different approach to the growth and development than mainstream economics. Ecological economists stand for an end to grow, where the growth defined as “an increase in throughput, which is the flow of natural resources from the environment, through the economy, and back to the environment as waste” (Daly and Farley, 2011, p.5.). The focus of ecological economists is on sustainable growth and answer such question as how we are going to deal with overpopulation, inequitable distribution, and involuntary unemployment when growth becomes uneconomic and we are at the optimum (Daly and Farley, 2011). Robert Costanza argues that ecological economics ‘addressed the relationships between ecosystems and economic systems in the broadest sense (Costanza in Shmelev, p.4)

That economy can have development without growing understands as qualitative change, realization of potential, evolution towards an improved but not larger system – an increase in the quality of goods and services (where quality is measures by the ability to increase human well-being) provided by a given throughput. The ecological economists argue that growing economy cannot continue indefinitely, as the Earth and its resources are not infinite. Such kind of “technological pessimism” assumes that technology will not be able to solve problems as humans are a part of nature and a healthy ecosystem is one that maintains a stable level (Costanza, 1989). The concept of “sustainable development”, Daly and Farley define as a

development without growth-that is, qualitative improvement in the ability to satisfy wants (needs and desires) without a quantitative increase in through.

Costanza et al. (2015, p.3) identify basic environmental problems for which we need innovative policies and management instruments. Authors emphasize these problems are all evidence that the material scale of human activity exceeds the sustainable carrying capacity of the Earth include:

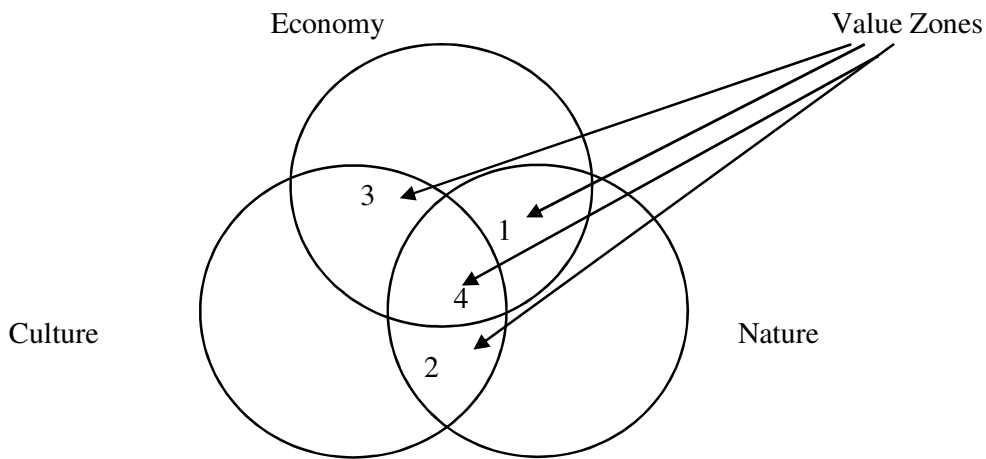
- Unsustainably large and growing human populations that exceed the carrying capacity of the Earth
- Rapidly increasing inequality within and between nations
- Highly entropy-increasing technologies that deplete the Earth of its resources and whose unassimilated wastes poison the air, the water, and the land
- Land conversion that destroys habitat, increases soil erosion, and accelerates loss of species diversity emerging transdiscipline of ecological economics.

The mentioned issues demand use of strategies based upon an economically efficient allocation of resources that adequately accounts for protecting the stock of natural capital, and actions based upon a fair distribution of resources and opportunities between present and future generations as well as among groups within the present generation. Thus, emergency transdiscipline of ecological economics for guidance in designing policies and instruments capable of dealing with these problems.

Another important element in understanding of ecological economics concerns understanding of holistic principles of the worldview. The conflict between economic profit and inherent values of nature and culture explained in lack of that kind of mind-set. Ingebritsen and Jakobsen (2007) stress the importance of holistic thinking and hermeneutic frame of reference in order to understand the interdisciplinary field of economics. Scholars describe hermeneutic tradition, where the partial description and understanding should be seen in relation to a holistic

description and understanding, which represents more than the sum of the individual parts. Furthermore, it prescribes a significant role to the interaction among economy, nature, and culture something that claims the need to find new forms of coordination, both within the economy and between the various sectors. A dominant role of economic sector over nature and culture that have a place during the 20th century something that caused problems like pollution, overconsumption of natural resources, climate change and others. Ingebritsen and Jakobsen notice that the negative effects would have been equally strong, if one of the others sectors had got a dominant role over other sectors and call for the new models for cooperation in order to establish equal priorities to different values for sustainable development (p.9). The following model (Figure 1, from Ingebrigtsen & Jakobsen, 2007) represents an arena for cooperation consisting of integrated economic actors when the actors are expected to be mutually dependent on one another (holism) (ibid, pp.7-8). Thus, such kind of value pluralism that represents an ecological economics field meets in sector 4, it shows the value zone where all the sectors meet.

Figure 1. Value zones: interaction between economy, nature and culture sectors



2.2 Circulation Economics: an organic worldview

The recent researches in the area of *circulation economics*, been of a big interest of modern scientists. Ingebrigtsen and Jakobsen (2007) introduce circulation economics as an interpretation of the new economics with both theoretical and practical implications with its important objective to find alternative methods and principles to achieve the highest level of effective use of natural resources for fulfilling human needs. Scientists precise that the economic objectives cannot be dissociated from the ecological and social context of which they are part.

According to Ingebrigtsen and Jakobsen, it is important to develop a new economic system in harmony with nature and society, inspired by an *organic worldview* in order to solve problems which mainstream competitive economics has caused. To achieve economic sustainability, “it is necessary to establish interaction between humans and nature based on nature’s basic processes, and respect for nature’s inherent value” (p. 254).

Efficient and resilient use of resources meets vital human need while being in accordance with goal of sustainable development. A circulation economics seeks to rebuild capital, whether this is financial, manufactured, human, social or natural. Organic worldview with its organic collaborating economy is a core of the circulation economics mind-set, and it is opposite to the mechanical worldview and linear thinking that characterize mainstreams economy. Whitehead (1985) argues that the world is a dynamic and consists of atoms which are integrated part of every system, and cannot be studied or understood without referring to the integrated context in which they are parts. His ‘philosophy of organism’ represents an organic understanding of reality that consists of networks and is constantly in development (Ims, Jakobsen, 2010, p.22).

An important part in circulation economics is the value of cooperation that exist on *meso* level (the whole industry) and not *micro* level (an individual firm or actor). By elevating the level of analysis from micro to the meso level, the circulation model focuses on the connections between all the actors involved instead of studying the various actors separately (ibid).

The circular processes in circulation economics are inspired by the processes in eco-systems, and grounded in the study of non-linear systems, particularly living ones. In contrast,

the traditional linear ‘take, make, dispose’ model implies resources flow through an “open-ended input/output” economy, where the value chains starts with production and ends with consumption.

Figure 2. Circulation economics (Ingebrigtsen & Jakobsen, 2007)

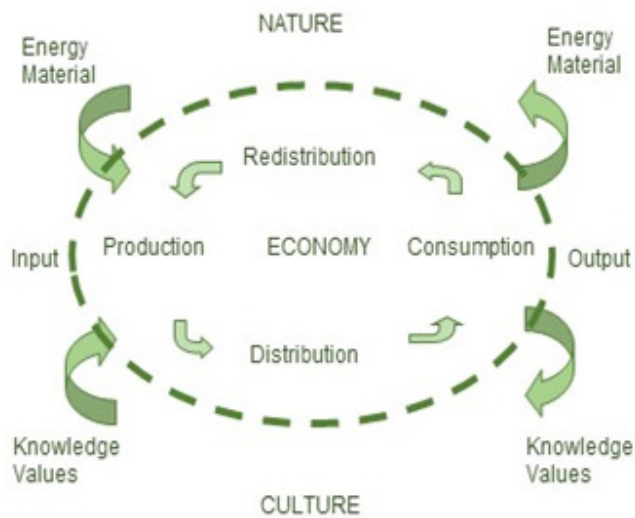


Figure 2. shows the economic cycle model where the resources brought into the economy is associated with products coming out of the economic activity. Thus, the innermost circle in the model represents the manufacturing process consisting of the provision of raw materials, production, distribution, consumption and reprocessing (redistribution). Further, the figure shows how this production cycle are in close interaction with nature that provides resources and welcomes residues and wastes from the economy. The production cycle is linked to culture as the basis of society's norms and values brings knowledge and innovation into the economy and accumulate experiences from economic activity to revitalize / refine this new knowledge. This revitalized knowledge may then in turn affect society's norms and values. Knowledge and values revitalized consequently outside the economic production system (Ingebrigtsen and Jakobsen, 2007).

2.3 A Spiritual Leadership approach

The fact that the modern basis of capitalism must be revised is supported by many scientists. Businesses today are free to choose the way they can be driven. That is why the leaders have an important role not only in decision-making and in development of their organization but their impact on surroundings and environment. Instrumental and utilitarian rationality is still the dominant perspective in the business world and academia, though the interest for new management models based on value-driven economy exist among many scholars and leaders who are aware of the limits of our planetary resources (Bouckaert & Zsolnai, 2011, s.4-5).

Thus, Sharda Nandram (2015) offers a distinctive concept of management that can be universally used in founding or transforming organizations, initiating social change or encouraging innovation. Spiritual model of leadership is an alternative approach in management, when employees want to be recognized for who they are, the whole person seen with spirit, soul, passions, talents, families, private lives, when recognition of those results in the employee wellbeing and the quality of life. It provides a purpose and meaning at work and it provides employees a sense of interconnectedness and community.

Laszlo Zsolnai (Pengevirke Nr 3. 2015) argues the moral basis of capitalism must be revised. Today's economic, ecological and social crisis caused by modern capitalism, which largely disconnected from the social and cultural norms of the society. As an opportunity for a better and sustainable world he suggests to use the term 'postcapitalism' where economies 'are driven by a complex balance of spiritual and material values and respect for the human condition of future generations. Zsolnai proposes to use the following definition for spirituality developed by the European SPES Forum (Spirituality in economy and society) *spirituality is people's multiform search for the deep meaning of life that interconnects them to all living beings and to 'God' or Ultimate Reality.* The concept of spirituality in business is not about the question of more business ethics, it's more about transitioning to new paradigm of business, *another type of business ethics*, developing innovative ethical ideas and practices.

Seen in the context of circulation economics, the spiritual leadership has its focus on the use of planetary resources, which perceived and managed today as competitive goods with an expected high return on investment and not as common goods with a high degree of vulnerability. Thus,

the lack of suitable management of resources leads to the tragedy of the planetary common goods, which results in ecological deterioration and climate change already such an obvious phenomenon today (Bouckaert & Zsolnai, 2011).

2.4 The term of Circular Economy

The circular economy refers to an industrial economy that is restorative, aims to rely on renewable energy; minimizes tracks, eliminates the use of toxic chemicals; and eradicates waste through careful design. Contrary to the normal definition of economics, circular economy includes a rethink of the way in which production and consumption of goods and services includes the use renewable energy as opposed to the traditional use of fossil fuels (Benton, Hazell, & Hill, 2015).

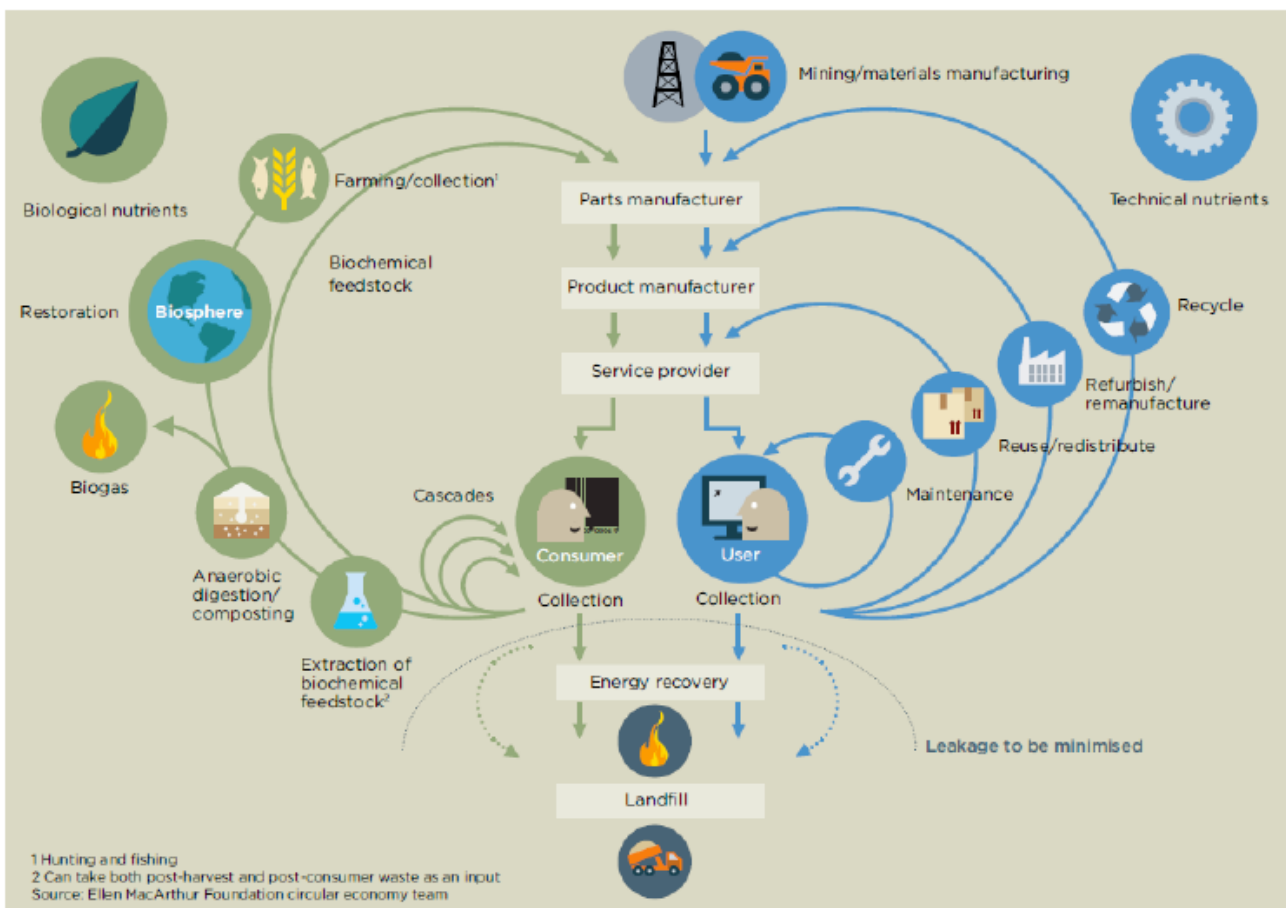
Krarup, Kiorboe and Sramkova (2015) opine in their hypothesis for circular economy, that waste is naturally designed to be redesigned and reused. Therefore, there is nothing like waste. Hence, biological units can be converted to compost and reused while man made nutrients such as polymers and alloys can be deigned to be reused with minimal energy being expended. Secondly, the diversity inherent in nature should be capitalised upon and products should be made which will be versatile for the sake of their use in the common markets. Therefore, focus should be on long-lasting products, which employ the foresight of ease of upgrade and repair rather than build things on the basis of their efficiency (ibid).

CIWM (The Chartered Institution of Wastes Management) characterize the core vision of circular economy as replacing the current linear `take, make and dispose` economy with the one in which resources circulate at high value, avoiding or reducing the need for virgin resources (CIWM Report, 2014). The more narrow aspects focus on new product lifecycle supply chains and new business models which aim to eliminate waste in the traditional sense (ibid). The circular economy model aims to:

- Design out waste
- Build resilience through diversity
- Rely on energy from renewable sources
- Think in `systems`

Altogether, the circular economy, according to Ellen MacArthur Foundation, is an industrial system that is restorative or regenerative by design. Ellen MacArthur Foundation describes circular economy as a way to re-think and re-design the methods people make stuff and illustrates processes and material flow in circular economy by the following figure (Figure 3).

Figure 3. Material flow in circular economy (From Ellen MacArthur Foundation, 2013).



The focus is on '*Designing for circularity*' and '*Re-Thinking Progress*' that explores how through a change in perspective we can re-design the way our economy works - designing products that can be 'made to be made again' and powering the system with renewable energy. It questions whether with creativity and innovation we can build a restorative economy. 'A circular economy is one that is restorative and regenerative by design, and which aims to keep products,

components and materials at their highest utility and value at all times, distinguishing between technical and biological cycles' (<https://www.ellenmacarthurfoundation.org>, 2016).

In practice, a circular economy implies **reducing waste to a minimum**. When a product reaches the end of its life, its materials are kept within the economy wherever possible. These can be productively used again and again, thereby creating further value. Measures leading towards a circular economy include reusing, repairing, refurbishing and recycling existing materials and products. What used to be considered as 'waste' can be turned into a valuable resource (European Parliament, Briefing, 2016).

In conclusion, the concept of interdependency that is espoused by circular economy finds its relevance in the concept of mutual reciprocity found in circulation economics. While circular economy seeks to have all forms in the web of economics being intertwined, circulation economics seeks to have the same but on a foundation of sustainability of the whole. The continued existence of all arms of production in a way that will ensure the comfort of each player is the concern of circulation economics. This is seen on the insistence of its proponents that all arms have to coexist; not one at a greater advantage of the other but in mutual profit.

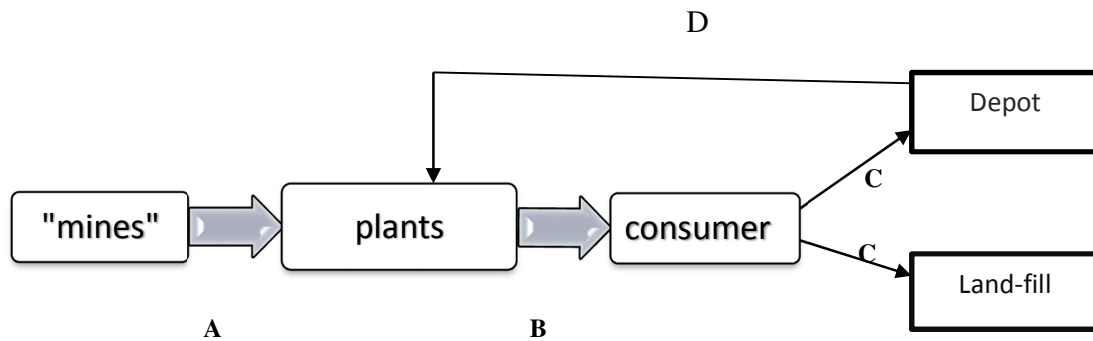
2.4.1 Recycling as a precondition for a Circular Economy

Recycling is referred to as the removal of materials from a disposed product or package so that they can be utilized as raw materials for a new product or package. A major concern is that the entire product and/or package will be sent to a landfill, if no recycling is involved. In particular, because the value of an empty soda bottle or used newspaper is frequently not obvious to either consumers or manufacturers, the incentive to recycle may be quite low. Value would accrue to such residual "product" only as a potential raw material input for a new product. In order for recyclables to have value as a potential new raw material, both supply and demand for the material have to be developed. This is where the idea of reverse logistics is of paramount importance (Wright et al., 2011).

Recycling is the way to limit resource use on the planet and a great example on circular material flow. It deserves awareness because cyclic material flow is supposed to lead to significant changes. Figure 4. illustrates a material flow when resources and materials are

recycled, returned back to the economy and used again. In this way, waste become a valuable resource again.

Figure 4. Overall View of Transportation in a material flow (from Enarsson, 2006, p.192).



According to Enarsson (2006), a transport system in a material flow can be divided in four main types of freight transportation. (A) – resources from mines, or renewable sources to production plants, (B) – products to consumers from the plants, including semi-manufactured products between plants, (C) – residue/waste from consumption to a re-cycling depot or land-fill, and (D)- recycled material from a depot back to the processing plans. Enarsson argues, that the transportation of raw material is expected to decrease in future while the transportation of waste and recycled material is expected to increase. Transportation from recycling depots back to production plants will also increase.

2.4.2 The Role of Waste Management

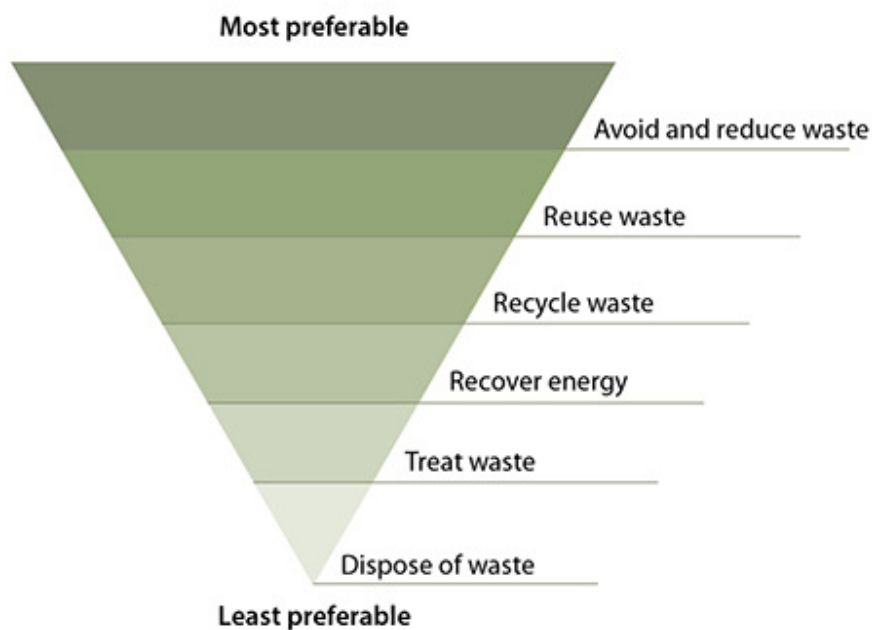
New concepts in logistics, based on environmental demands from government require a fundamental change in different aspects of business. Growing problem of handling waste make companies to choose more sustainable and green ways to control their waste, furthermore, environmental issues have moved from separate specialists into the management of organizations. It brings new challenges to companies. Having too much focus on maximizing profits and minimizing costs, operating with traditional logistics systems, companies miss a strategy based on business logistics concepts built on environmental demands. The time has

come to build a new environmental logistics strategy, thereby waste handling can be included in a business logistic system as whole, and be added as an activity at the end of the material flow (Enarsson, 2006).

The waste hierarchy (Figure 5.) illustrates a set of priorities for the efficient use of resources. The priority for waste hierarchy is:

1. **Avoidance**, including action to reduce the amount of waste generated by households, industry and all levels of government
2. **Resource recovery**, including re-use, recycling, reprocessing and energy recovery, consistent with the most efficient use of the recovered resources
3. **Disposal**, including management of all disposal options in the most environmentally responsible manner (EPA, 2015).

Figure 5. The waste Hierarchy (From Environment Protection Authority, 2015).



No doubt that the waste management industry will play a key role at the core of a circular economy. In a circular economy, materials from products at the end of their lifecycle should be

recovered through disassemble and recycling. The started transition from the ‘cradle-to-grave’ linear model, towards a resource management approach where the industry acts as a provider of raw materials and energy to the rest of the economy - ‘cradle-to-cradle’ model. However, to realize the full potential of a circular economy, it is necessary to find new forms of collaboration between different parts of the supply chain.

Clear rules, common standards and support for the use of more secondary raw materials create a safe and sustainable supply of raw materials to the industry. This helps create new jobs, supports innovation and boosts competitiveness. Improved waste management rules will reduce landfill and tipping fees. Smarter use of resources is not only good for business, but will also help protect the environment preserve essential resources for current and future generations, and create synergies for industries which most depend on it – such as tourism, agriculture and food manufacturing (European Commission, 2015).

3. THE FUNDAMENTAL AND DEVELOPMENT OF REVERSE LOGISTICS

3.1 Reverse Logistics System

Corporations that enter overseas markets and spread boundaries of the countries, affect stakeholders in direct or indirect ways. Furthermore, globalization entailed environmental problems that present new and important issues in scientific and economic world. The dominant paradigm based on businesses profitability has been holding its ingrained position in fields of managing and academic discourse. The situation has become urgent in a worldwide dimension and shows a great need to create a new paradigm in economy and business spheres forward a more `sustainable' model of human society. It gives a fundamental for creating reverse logistic system. Enarsson (2006) argues that the whole material flow, including waste handling, can be seen as a logistic cyclic system, furthermore, the reverse system must be treated as a system of its own, because 'one has to use different equipment when it comes to transportation, especially for collection system' (ibid, p.200).

Businesses today have started to realize the importance of transparency, ethical behavior, and responsibility for stakeholders' interests, values, human rights, laws, and international norms of behavior in dealing with international market. Remanufacturing, recycling, reuse, and reverse logistics have helped indeed many companies tap into new revenue streams by finding secondary markets for their products, all while reducing their overall carbon footprint. (Nikolaidis, 2013).

Reverse logistics concerns itself majorly with the transportation, planning for production and inventory administration. It is one of the components in the reverse chain of supply. The return type determines the stages occurring in reverse logistics; for example, return of leased merchandise, customer returns, repair/ warranty returns among others. Stages commonly found in all natures of returns are collection of products, sorting them out, and inspecting them. Depending on the product, the inspection stage can term a product as being at the end of its life because it is non-repairable or non-reusable; or the product can be regarded as repairable or can be refurbished due to its good condition on return.

Stanciulescu suggests using the definition made by Council of Logistics Management: *'the process of planning, implementing and controlling the efficient, cost-effective flow of raw materials, in-process consumption for the purpose of conforming to customer requirements'*. The author continues that the reverse logistics encompasses all of these activities mentioned above although they operate in reverse: *'Therefore, 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 for proper disposal'* (Stanciulescu, 2011, pp. 357-358).

The differences between forward logistics and reverse logistics Enarsson (2006) shows below in Table 1.

Table 1. Differences between Forward and Reverse Logistics (From Enarsson, 2006).

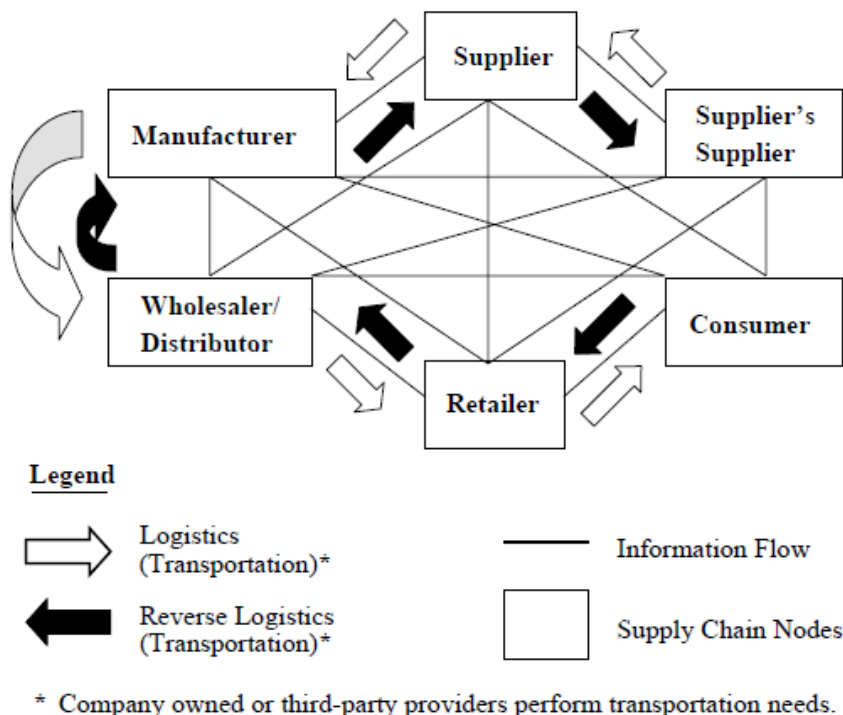
| FORWARD | REVERSE |
|---|--|
| Product quality uniform | Product quality not uniform |
| Disposition options clear | Disposition not clear |
| Routing of products unambiguous | Routing of products ambiguous |
| Forward distribution costs more easily understandable | Reverse costs less understandable |
| Pricing of products uniform | Pricing of products not uniform |
| Inventory management consistent | Inventory management not consistent |
| Product life-cycle manageable | Product life-cycle less manageable |
| Financial management issues clearer | Financial management issues unclear |
| Negotiation between parties more straightforward | Negotiation between parties less straightforward |
| Type of customer easy to identify and to market towards | Type of customer difficult to identify and to market towards |
| Visibility of process more transparent | Visibility of process less transparent |

Enarsson describes reverse logistics as a re-cycling system that has to be developed apart from vertical material work-up chain, and defines it as *'a process of moving goods from their typical final destination to some other point. The purpose is to capture value that otherwise would be lost or become unavailable, or for the proper disposal of the product'*. (ibid, p.201).

He argues that in order to create an effective reverse system it is important to separate different batches of waste at sorting station. The starting point for waste handling is 'sorting at source', which includes transportation and handling sorted materials, i.e. the content of a reverse logistics system.

Figure 6. illustrates the structure of logistics systems, which includes forward logistics, reverse logistics and information flow. The differences between traditional logistics and reverse logistics are shown by black and hollow arrows within the cycle of supply chain.

Figure 6. Consumer supply chain (From Krumwiede et al., 2002)

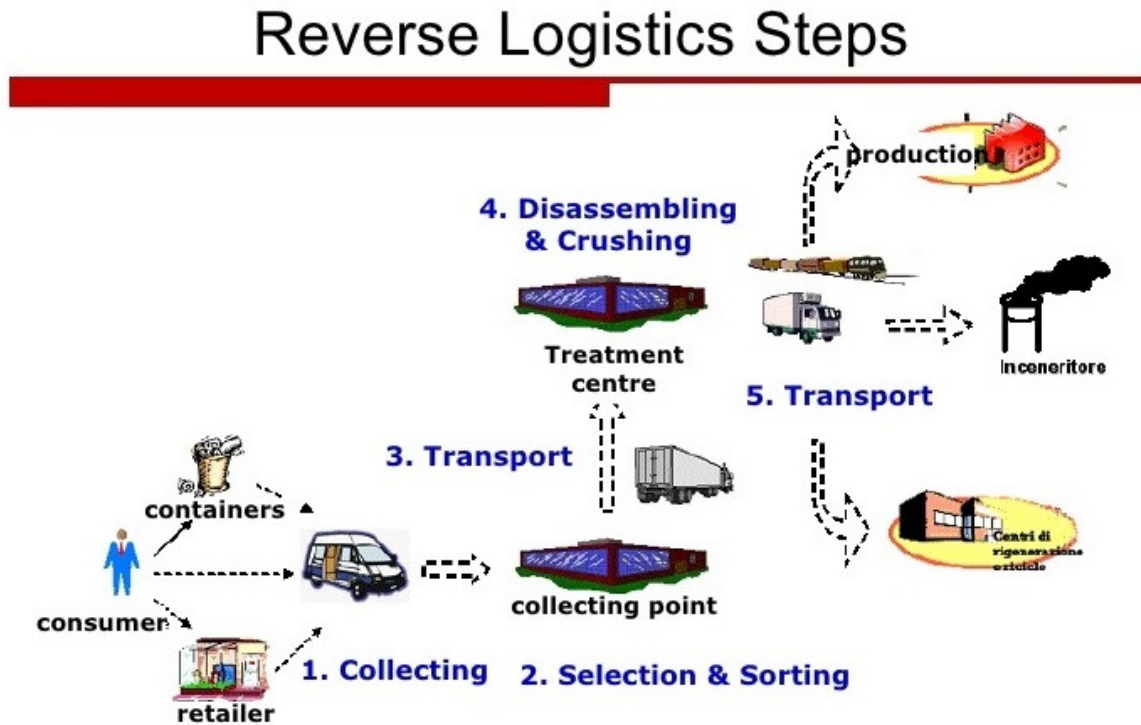


3.1.1. The third party providers

It is necessary to emphasize the role of third party reverse providers. Recycling companies get a special important role within the reverse logistics system. Providing third party services they make reverse logistics is obviously emerging as very important entity in the supply chain.

According to Minahan (in Krumwiede et al., 2002), companies who purchase reverse logistics assistance from third party providers could reduce up to 10% of their company's annual logistics costs. High-tech companies have reduced inventories along with improving field engineer productivity by as much as 40% through appropriate handling of reverse logistics. At the same time that the importance of reverse logistics is increasing, Meyer and Rosen (in Krumwiede et al., 2002) indicate that the process of reverse logistics is also becoming increasingly complicated. Many companies are unable to handle the complex networking necessary to have an efficient reverse logistics process. These companies are therefore outsourcing all or part of the reverse logistics process to third party providers. Outsourcing has provided many third party providers with a unique opportunity to enter the reverse logistics market, since they have many of the necessary resources to facilitate reverse logistics. The local municipalities are often responsible for waste collection. Today it is possible to distinguish different types of waste, for example, such waste as food with optical sorting of different colored bags. Systems of recycling stations for the receipt of all types of paper, glass, plastic and metal cover the whole Norway, and waste is collected by local third party providers for selection, sorting and further treatment. Resources and materials are then recycled to the so called secondary raw materials which will be sold to manufactures again for new production of materials. In this way, what was once considered as a waste become a valuable resource again (See Figure.7).

Figure 7. Reverse Logistics steps within the Recycling Industry



3.1.2 Closed Loop Supply Chains

Closed loop supply chains (CLSC) focus on taking back products from customers and recovering benefit by reusing the entire product, and/or some of its modules, components, and parts. This part of SC is essential when we discuss a definition of reverse logistics and have gained considerable attention in industry and academia (Nikolaidis, 2013).

Closed-loop supply chains are “supply chains where, in addition to the typical ‘forward’ flow of materials from suppliers all the way to end customers, there are flows of products back (post-consumer touch or use) to manufacturers. (Ferguson et al.2010).

Purchasing recycled content products and material helps to ‘close the loop’; creating a demand for materials recovered from recycling collection schemes. Increased demand for post-consumer recycled products strengthens and sustains local and national markets leading to

economies of scale and price reductions for finished items. Buying recycled also helps to divert reusable materials away from landfill, reducing waste disposal costs and conserving resources, particularly energy.

Closing the loop means much more than just recovering or collecting reusable materials for recycling. Encouraging manufacturers to incorporate recycled material back into their products and getting people to buy them requires significant shifts in our attitudes and behavior. The long-term ideal is to incorporate 'buying recycled' into the mainstream business agenda and into everyday consumer purchasing decisions. It is not an 'add-on' extra but a matter of good practice, both environmentally and economically. "Closed loop" recycling is basically a production process in which post-consumer waste is collected, recycled and used to make new products. This process can be as simple as using recycled aluminum to make new cans, or as complicated as weaving reclaimed plastic bottles into polyester for clothing and other products (Earth911, 2015).

3.1.3 Typology of Reverse flows

Reverse logistics requires an integrated approach to succeed (Bernon and Cullen in Wright et al, 2011). As implied by the definition, reverse logistics activities come in different forms. A list of potential reverse logistics activities is reported by Rogers and Tibben-Lembke (1999, p.10) where the activities are categorized as being related to the product itself and/or to the package in which the product comes (See Table 2).

Table 2. Common Reverse Logistics activities (From Rogers and Tibben-Lembke, 1999).

| MATERIAL | REVERSE LOGISTICS ACTIVITIES |
|-----------|---|
| Products | Return to Supplier Resell Sell via Outlet Salvage Recondition Refurbish Remanufacture Reclaim Materials Recycle Landfill |
| Packaging | Reuse Refurbish Reclaim Materials Recycle Salvage |

Logistical activities can be broken down into an interaction between traditional forward material flows and new reverse material flows (Fleischmann, 1997). These reverse flows have been termed both green logistics and reverse logistics, as well as closed loop supply chains, industrial ecology, and life-cycle assessment (LCA). The goal of these activities is to recapture waste and unwanted/unusable product. Such logistics systems may generate cost savings for companies.

Reverse flows have been classified into typologies and categorizations in different contexts as a suggestion of heterogeneity in terms of material flow in reverse logistics that requires reprocessing (Škapa, 2014). Combination of different aspects define several different reverse systems. Channel structure, coordination, and *leadership* have effect on reverse supply chain performance.

Some research in reverse flows has indicated that during every stage of a process of production reverse flows could be produced, or for that matter, from all elements of chain of value and also during and after the consumption processes. For instance, there are many tangible types of reverse flows, such as, recalling a material or merchandise deemed hazardous; commercial returns for company's by-products; returning products like containers and faulty

deliveries when they are can no longer be used or their life ends; or even adjusting stocks for the leftovers of production (ibid).

Not many researchers and authors focus a great deal on the reverse flows that are intangible. In fact, some are inclined to believe intangible flows are rare. However, reverse flows that are intangible are speculated to include elements such as finance and perhaps some aspects of information. Arguably, these reverse flows may already exist as seen in the monetary flow and information found in complaints or feedback coming from clients and returns (as seen in tangible materials).

3.1.4 Motivation for Reverse flows

Many firms engage in developing tools for reverse logistics due to its sustainability and environmental concerns. However, besides this, companies are interested with reverse logistics due to its potential of raising their benefits in different fields (Škapa, 2014). When looking at these economic benefits, tangible advantages from reverse logistics implementation include regaining value for used or secondary materials which then give valuable yields on products and new markets; utilising green materials gives an opportunity for the company to pull in customers keen on environmental conservation, as well as, enabling the company to reduce any liabilities, disposal expenses and insurance testing; products that have been returned provide specified insight regarding the effectiveness of merchandising, performance of goods, expectations of a company's clients and also profitability of the good produced. Reverse logistics are also exceptional in the gradual rise of shopping both offline and online due to existing policies like refunds on returned products, choice of the returning location and an extended time for returns to be made (ibid).

On the other hand, reverse logistics provide intangible advantages such as an better corporate image due to goodwill and philanthropic activities; feedback from clients on return flows uncertainties and new markets can be very beneficial. Returned goods come with a lot of helpful information useful to suppliers and retailers; and reverse logistics helps as well in giving opening to become aware of the opinions, satisfaction and reactions of clients and their take on returned goods.

From the above, then, reverse logistics serves a myriad of economic benefits to companies (ibid). Scientific findings conclude that most companies focus mainly in fulfilling the laid legislative obligations regarding the reverse flow reprocessing and requirements on take-backs as per the government regulations for environmental conservation. This makes reverse logistics a protective tool employed by firms to keep themselves in the loop.

Reprocessing of reverse flows determines the benefits accrued. That is, reverse flows that are tangible have a myriad of varieties depending on value recovered and environmental benefits acquired. Many of these provide different ways technologically on the course to recover any value found in the reverse flows and also, the techniques have contradictory logistical complexities (ibid). For example, recovery options like re-use and re-sale of products can bring back more value on goods as compared to incineration or even land filling. In many scenarios, retrieving, remanufacturing or repairing parts need a higher level of reverse logistics. Reverse logistics tend to have activities that are industry specific because recovery options are determined by the technical features of reverse flows and fiscal rationale.

3.2 Reverse Logistics as a component of Environmental Sustainability

Pollution and degradation of the environment has become a pressing issue for many governments and organizations worldwide. The environment is not like other services like health or education which are seen to improve as the economy grows, but, can actually become obliterated and many people, both present and future generations, suffer. There are waste products such as methane gas emanating from waste leavenings and other such like exhaust gases produced by companies in Norway which pollute the environment. Rubbish and city trash from organic materials are disposed of carelessly and end up in sewage systems, which goes to pollute water and soil.

Firms may seek to develop reverse logistics due to a sense of environmental responsibility. Environmental responsibility goes beyond the traditional drive for opportunistic profits (Andel in Wright et al, 2011). Environmental responsibility means developing strategies that protect the environment. Effective reverse logistics programs are environmentally responsible due to the proper storage, collection, disposal, and repair of products as well as the

continuous improvement approach of minimizing waste, developing green products, and reusing packaging and pallets (Blumberg in Wright et al, 2011).

Furthermore, there are some organizations who do not consider the environment beyond their costs of production by discounting the waste disposal of waste products. Ultimately, this leads to environmental degradation and puts a barrier towards sustainability and societal development. The aims of environmental protection are to reduce pollution arising from human life and production. Through circular economics, the goal is to attain accord between development and low quantity of waste products. The focus is on the technology of the production cycle, goods and services, harmonised with mode of economic growth and also considers the modes of consumption together with those of economic growth.

It is from regular logistics we get higher pollution levels. Norwegian companies may want to get back products that could be recycled. Based on the circular economy, reverse logistics looks at ways to recover and then recycle the waste products which may contaminate the environment, therefore seeking to achieve sustainable development (Pohlen & Farris II; 1992). The government can help this by enacting relevant policies as well as a stimulus system which gives direction to organizations and encourages them to move towards circular economy and reverse logistics.

Tabel 3. presents the recovery options connected to reverse logistics activities showing distinction between those that extend product life and those that extend the material life. Reverse logistics plays a critical role in accomplishing these recovery options, giving operational support from the point of origin to the point of destination.

Table 3. Differences between traditional and recoverable environment (From Guide et al. 2000)

| FACTORS | RECOVERABLE MANUFACTURING ENVIRONMENT | TRADITIONAL MANUFACTURING ENVIRONMENT |
|-----------------------------------|---|---|
| Environmental focus | Seeks to prevent postproduction waste | Environmentally conscious design and manufacturing, focus on pre-production |
| Logistics | Forward and reverse flows | Only forward How |
| | Uncertainty in timing and quantity of returns | No returns |
| | Supply-driven flows | Demand-driven flows |
| Production planning and control | Need to balance demands with returns | No such need |
| | Material recovery' uncertainly | Certainly in planned materials |
| | Stochastic routings and processing times | Fixed routings and more stable processing times |
| | Manufacturing system has three major components: disassembly, remanufacturing, and reassembly | Manufacturing system has two major components: fabrication and assembly |
| Forecasting | Forecast both core availability and end-product demand | Forecast only end products |
| | Must forecast pan requirements because material recovery rates are uncertain | No parts forecasting needed |
| Purchasing | Highly uncertain material requirements due to variable recovery rates | Material requirements deterministic |
| | Cores and parts and components, replacement parts, components | Raw materials, new parts, and components |
| Inventory' control and management | Types; cores, remanufactured pans, new pans, new and remanufactured substitute pans, original equipment manufacturerparts | Types: raw materials, work-in-process, finished goods |
| | Must track and provide accounting for all pan types | Must track and provide accounting for work-in-process and finished goods |

3.2.1 Sustainability issues

In 1987, Brundtland Commission published material regarding development and the environment. From there, the concept of sustainable development and sustainability were introduced and accepted as policies. In most cases however, research indicates that many managers, while aware of what it is, are not in agreement of what sustainability encompasses. For the purpose of this thesis, the definition used will be by Brundtland Commission in their U.N report, which identifies sustainable development to be that development which is able to attain the present's needs yet it does not compromise the capabilities of generations to come in meeting their own needs in the future (Brundtland, et.al., 1987 as cited in (Göransson and Gustafsson; 2014)). Therefore, sustainability entails present needs, wellbeing and welfare of incoming generations. The primary focus is in social events emanating from economic actions as well as natural resources that are irreplaceable. Sustainability is important because it helps in reducing lasting hazards presenting themselves as depletion of resources, product liabilities; energy costs fluctuations and waste management and pollution.

Sustainable development is understood by the scientific community as a process of harmonious economic development, satisfying principles of social justice and environmental responsibility. Sustainable development is a compromise path between economic, environmental and social goals, between the present and the future (Shmelev, 2012, p.176).

Sustainability has become a research aspect within logistics presently. Logistics have long been seen as holding important positions for organizations investing in supply chains that are sustainable. A prosperous sustainable effort is one that is equitable and has prudence. Beyond that, some studies indicate that it is today's world that sets the way for generations to come. Therefore, sustainability needs to focus on the earth's natural resources beyond the environment. To avoid depletion of raw materials, companies and logistics firms need to concern themselves with sustainability (Göransson and Gustafsson, 2014). The activities in the supply chain can accommodate several aspects of sustainability therein. Companies are required to execute sustainability programs within the economic activities, even reverse logistics. This could be within transportation of products or even pick up from return locations. The purpose of this thesis is to focus on sustainable green reverse logistics and their environmental and economic contribution.

3.2.2 Reverse logistics and Triple bottom line strategy

Any company that wants to become sustainable needs to invest in sustainable development through a focus on economic, social and environmental benefits. This constitutes the triple end result developed in 1994 by John Elkington, which he foresaw as important for companies to create sustainable actions as they seek profit (Göransson and Gustafsson; 2014). This concept founds itself on the environmental, economical and social factors or planet, profit and profit. The triple end outcome gives focus to forward logistics in the supply chain such as moving a product from the manufacturer to the client, and is the easily incorporated within green logistics.

However, this can also work for reverse logistics by working backwards through creating environmental and social programs which enable managers to execute strategic value. This way all environmental, social and also economic goals of the company can be met. Now then, equilibrium can be made with the three elements of the bottom line model (Göransson and Gustafsson; 2014). The environmental aspects, social and economic elements must be met to clearly achieve sustainable development. A company is therefore utilizing sustainable development if it combines the three factors simultaneously to gain benefits. The three aspects form a three factor bottom line.

Three concept's bottom line will be examined in order to illustrate that companies need to pay attention to not only the economical benefits, but also the social as well as the environmental dimensions as well. For a company to be sustainable, it needs to factor in the three elements (ibid). Sometimes, however, the environmentally viable decision may not be as attractive economically short-term wise. A company needs to be aware of the three elements and consider them accordingly.

Consequently, with the three elements, green logistics are being incorporated in logistics field as an objective for programs that are environmentally sustainability later on. Combined research on the environment and the economic concerns bring about green logistics. As research on the two is what most companies are focusing on, most logistical companies are focusing their attention towards green logistics to be their likely remedy to sustainable development and stability with the three elements of the bottom line model.

However, these triple end outcomes are not as easily measured, and this poses problems to managers. It is quite hard to quantitatively equate environmental aspects and social dimensions (ibid). Yet many international organizations and governments expect companies to meet their obligations for sustainable development through social, environmental and economic stability.

3.2.3. Standards

In business today, standards and uniformity are two crucial aspects in many sectors. There is need to have the best practice that can be compared and benchmarked against the very best in the industry. For proper functioning of reverse logistics, there are several guidelines and rules, written or otherwise, that govern best practice and ensure quality and uniformity.

To gauge the level of understanding of formal standards of reverse logistics, one has to look at specific industries. The press and media sector is one of the sectors that have some of the most organized standards. Almost every outlet knows that they have to support the members lower in the supply chain in matters such as unsold goods (Bernon & Cullen, 2007). When it comes to autos, many companies have very clear and formalized means of return and many managers in the industry would generally be expected to have comprehensive knowledge of them.

Online businesses face many returns from customers, some of which may be unanticipated. Given that this is a more contemporary and recent form of business, it would generally be expected that there are differences in terms of how various managers understand and view the formal requirements of reverse logistics (Falck, 2015). The most likely scenario is that many businesses will design their own reverse logistics systems and policy, even though there may be quite some similarities.

In sectors where there are formal rules and requirements regarding reverse logistics, it would generally be expected that decision makers in organizations have proper knowledge of the standards for the various sectors. Firms dealing in electronics and hazardous goods, as an example are bound by certain rules on how they handle waste (Ec.europa.eu, 2015). A manager in such a firm is therefore naturally expected to have knowledge of the workings and

requirements around reversed logistics. These and many more issues are dealt with by talking to decision makers in industry who shed more light into the subject.

Pirlet (2013) underlines standardization contribution for reverse logistics and present structures for developing new standards. He argues for improvement of the RL framework for more efficient RL management. He defines RL as a “part of an efficient Supply Chain Management, which is defined as management of a network of interconnected businesses involved in the ultimate provision of product and service packages required by end consumers” (Nikolaidis, 2013, p. 42). Pirlet mentions standards, which concern reverse logistics field and not directly connected to it but absolutely could form the most logical structures to help improve that lack of existing standards for RL. The technical Committees standards: CEN/TC 319 “Maintenance”, CEN/TC 320 “Transport—Logistics and Services”, CEN/TC 379 “Supply Chain Management”, or ‘series formed by the ISO 2859 standards help manufacturer to assess whether consumers will find certain products acceptable’ (ibid, p.46). The scientist stresses a need of standardization and quality procedures, to ensure smooth and economical operation in RL.

Some researchers have studied RL in association with the concept of environmental management quality and corporate social responsibility quality practices. Nikolaou and Evangelinos (ibid, p.51) suggest framework for measuring the contribution of a firm to sustainable development quality within the RL context that also provides indicators for measuring RL social responsibility quality based on the triple bottom line approach.

3.2.4 Reverse logistics variable

Drawing from the emergence of sustainable development in the 1990s, the general feel was that the existing mode of economic development was crippling resources, and more so the environment. A new model was then created to preserve the environment; which saw the rise of circular economics with the objective of attaining utmost utilization of resources and reduced levels of environmental degradation. The concept of reverse logistics strives to achieve a circular economy. All through recovery, returned items reprocessing and re-integrating back to the production cycle (Fernández, 2005), is contained in reverse logistics as part of a closed system of a circular economy. Reverse logistics corrects and repackages defect and reject items of forward logistics; the circular economy is therefore built around this. A closed process ensures optimum

efficiency as well as low costs. Reverse logistics operates a platform to recover and then recycle waste products, reduce resource quantities in production, decrease costs in operating the business and achieve the satisfaction of customers. Therefore, many businesses gain enhanced competitiveness and see reverse logistics as imperative to attain a circular economy. More so, reverse logistics are seen to greatly reduce the amount of costs of materials engaged in the recycling process. Many Norwegian companies need to recycle their waste items to achieve a strong capacity and survive the competitive markets. As many resources are becoming rare, companies need to implement reverse logistics.

Reverse logistics offers increased profits and enhance production strategies by applying cost effective, traditionally under ventured resources. This framework seeks to examine the supply chain and how effectively the members have been able to implement the concept of reverse logistics as part of the chain. Businesses have to engage in this proactive innovation and incorporate operational and tactical factors to build a wholesome reverse logistics framework.

3.3 Theory of Reverse logistics and Circular economy

As early back as the 1970s, the use of linear techniques of growth and traditional application of resources had been cited as inefficient in meeting the evolving nature and concepts of reverse logistic. This was due to the increasing effects of over-production, over-exploitation, over-consumption and too much wastage without proper disposal. The result was serious problems with resources' over-use and environmental challenges (Richardson, 2001). Human survival, therefore, was considered at risk due to non-existent sustainable development in the processes of production together with consumption. Therefore, to protect the generations to come, new developments were made (Richardson, 2001). In 1990s, the theory of circular economy was advanced. Based on this theory, the existing models of production were founded on resources consumption, which many people appealed against. The view was that there was a lot of waste which is detrimental to the environment. Therefore, with circular economy, and the concept of reverse logistics; the focus is on utilizing renewable energy, reducing, keeping tabs on and getting rid of poisonous chemicals; as well as implementing friendly designs to eliminate waste.

The model of circular economy employs ecological frameworks to re-structure economic conduct as a procedure of feedback from production of raw materials to return of finished goods. Reverse logistics works with the concept of environmental psychology so as to significantly protect the environment and enhance sustainable utilization of resources. Prof. Stock, in 1992, gave a workable definition of reverse logistics to be a chain of measures and activities entailing planning, execution and controlling materials, stock, finished goods and also the subsequent information together with the flow of resources from the clients back to the manufacturer. Returning and thereafter recycling of products is part of the process of reverse logistics. Return of goods entails the return of finished goods by the consumers to the original supplier. This process could happen through commerce return, returns for repair guarantees, manufacture returns, among others; while recycling of the goods concerns the recycling of the clients' old goods and waste products, and it incorporates processes such as re-processing, reusing, recycling (Pohlen & Farris II; 1992), and other rimes, destruction.

Suffice to say, reverse logistics has been considered to be relatively novel an idea which is increasingly gaining acceptance as a source of substantial benefits and sustainable economic development. As identified earlier, it is no longer the responsibility of clients to dispose of those items, which are defective or have ended their use or other such issue, but, due to a myriad of environmental, economic and legislative factors, initial manufacturers are being charged with the roles of waste disposal through processes like recycling. Laws being recently enacted globally require all firms to take into consideration how their residual and finished items are accounted for even after a sale. The objective then, is to ensure that products gain a new or enhance lifespan through alternate application of resources that are ecologically friendly and cost effective (Škapa, 2014).

The model of reverse logistics is born in the circular economy stemming from the rise in empirical technology and a demanding standard of life for people. The upgrade and replacement of goods occurs at a high rate, which in turn produces excess waste. Due to the increased meagreness of resources and raw materials, many organizations and governments in particular are engaging systems of reverse logistics in the hope of creating a more green and environment friendly supply chain.

Reverse logistics offers a continuous harmony between profit making and environmental protection. It cannot be dissociated from sustainable development (Škapa, 2014). Implementing reverse logistics strategies does not mean that other benefits are not met. Organizations involved in remanufacturing of already existing returned products generally save much more on production costs which would have been used to generate a new product. At the same time, the effort used to recreate the returned product is less as compared to effort applied to a new product. It can then be argued that reverse logistics enables a company to increase company savings which have been traditionally acquired through means such as payroll reductions from layoffs and acquiring substandard raw materials.

The economic sector vets businesses based on profits accrued and productivity. Production capacity is seen in the difference between inputs and outcomes. A productive supply chain is one that has a systematic course of action to run the movement of materials. In normal logistics, items follow a linear path of life from cradle reflecting the manufacturer to the grave, where products are incinerated or disposed of in landfills which cause negative environmental hazards and the bottom line of the company.

3.3.1 Interrelationships between Circular Economy model and Reverse Logistics

Drawing from the emergence of sustainable development in the 1990s, the general feel was that the existing mode of economic development was crippling resources, and more so the environment. A new mode was then created to preserve the environment; which saw the rise of circular economy with the objective of attaining utmost utilization of resources and reduced levels of environmental degradation. The concept of reverse logistics strives to achieve a circular economy. All through recovery, returned items reprocessing and re-integrating back to the production cycle, is contained in reverse logistics as part of a closed system of a circular economy. Reverse logistics corrects and repackages defect and reject items of forward logistics; the circular economy is therefore built around this. A closed process ensures optimum efficiency as well as low costs.

Reverse logistics operates a platform to recover and then recycle waste products, reduce resource quantities in production, decrease costs in operating the business and achieve the satisfaction of customers. Therefore, many businesses gain enhanced competitiveness and see reverse logistics as imperative to attain a circular economy. More so, reverse logistics are seen to

greatly reduce the amount of costs of materials engaged in the recycling process. Many Norwegian companies need to recycle their waste items to achieve a strong capacity and survive the competitive markets. As many resources are becoming rare, companies need to implement reverse logistics.

3.4 Emerging trends of Reverse logistics in Norwegian companies

The management of any business concern anywhere in the world is deemed to be rational individuals, keen on maximizing profitability. Others may list maximizing shareholder wealth as their primary objectives but there is no separating the two. Supply chain management is a holistic approach that seeks to proactively oversee the process of movement of goods, services, information and financial resources from raw materials through to the final product, so as to maximize value for the customer and the business (Lambert, 2006).

As part of value addition, a firm may decide to invest in an elaborate system of reverse logistics. Government regulation or environmental regulation may also force firms to come up with measures to move products or waste from customers, effectively reversing the initial movement (Harrington, 2006). By having a mechanism for reverse logistics, a company incurs additional costs, and therein comes the crucial question; why incur the costs anyway? This question is especially relevant where firms invest in reverse logistics out of their own volition as opposed to being compelled by the law (Marlene, 2010).

The decision to invest in reverse logistics, as with most business decisions, is one taken by management. In this regard then, the sentiment or feeling of those in charge of the decision making at company level comes in very handy. It is therefore important in this case to go behind the scenes and explore the thinking behind the particular reverse logistics decisions for different firm and industries. There are the basics which might be uniform for firms global wise and those specific to countries, and in this case; Norway.

There are several factors that influence the perception of logistic managers when implementing reverse logistics decisions. Some of these factors include considerations about the nature of the products, government legislation and environmental laws, the nature of the business and industry in which the company operates among others (Harrington, 2006). For one to then understand the thinking behind the reverse logistics it is paramount to explore the various

considerations made by management teams of various companies, which in turn shapes their perception of the reverse logistics process.

The nature of product sold by the business plays a great role in how managers perceive their reverse logistics arrangements. Electric and electronic products are some of the most returned goods in the world and Norway is no exception. Products can be returned for being defective if they have warranties or they have outlived their useful lives and need to be returned for proper disposal (Harrington, 2006). Some products such as newspapers, perishables that go bad, reusable containers and reusable containers render themselves returnable by their very nature (Dethlof et al., 2008).

In terms of trends in Norway, there is a growing number of consumers returning items such as clothes, textiles and interiors (Falck, 2015). James Falck from Bring/PostNord in Norway notes some consumers have been increasingly abusing the return policy for fashion items such clothes and shoes (Postnord, 2015). For some, more so the younger consumers, they have formed a habit of ‘renting’ items. This is basically buying a dress for a party for example, and then returning it soon as the party is over (ibid). In a report on ecommerce in 2013, the firm estimated that of all items bought online, household items topped the list for the most returned items, followed closely by books and home electronics. Other notable inclusions in the list include cosmetics, computer games and home furnishings.

The nature of product is therefore an important determinant of choices and perceptions towards reverse logistics. What top managers of firms want in choosing their return policy is a situation where consumers have complete confidence in their product and a return policy acceptable to them. By understanding the life cycle of the product, companies are able to tailor their return policies appropriately. A company such as IBM as an example has a robust return policy for its used products where they offer options such as free return once the useful life of a product ends trade in with another product of for a small fee (Dethlof et al., 2008).

Governments and other regulations worldwide impose certain regulations and requirements that business entities are expected to follow. There are rules addressing disposal of electronic and hazardous waste that require companies to implement reverse logistics measures to deal with e-waste. Norway, although not part of the European Union (EU) is party an

agreement that requires the nation to cooperate with the EU on a raft of issues such as the environment and consumer protection (Eu-norway.org, 2015).

The Waste Electrical and Electrical Equipment (WEEE) directive is a raft of measures regulating disposal of waste. First enacted in 2003, it required the creation of collection centers where consumers would return their e-waste, with a revision in 2008 meant to tackle the growing amount of waste (ibid). This is just one of many regulations that force companies to come up with ways of getting their products from consumers. A logistics manager may thus be influenced by existing laws and regulations when perceiving a reverse logistics action plan for a given company. A firm would therefore want to handle such an issue in a way that maximizes value for the particular business as well as preserve its image because such concerns could adversely affect its reputation.

3.4.1 Incentives and Barriers to reverse logistic measures

While there are many incentives for businesses to develop reverse logistics measures, several bottlenecks or hurdles hinder optimal implementation of reverse logistics strategies. In a survey conducted among one hundred firms by Rogers and Tibben-Lembke (1999), managers cited not attaching as much importance to reverse logistics as other functions of the firm as the number one barrier to implementation of reverse logistics activities (Stoyanov, 2012). Many firms tend to only focus on the traditional aspects of the business such as finance and operations and completely ignore reverse logistics.

Company policy and strategic direction is another huge barrier to implementation of reverse logistics. For many firms, their main focus is production and sale of goods, which are in contrast to return and remanufacturing (Stoyanov, 2012). In essence, the companies perpetuate a policy of ‘use and throw away when it no longer works’.

Other barriers identified in the study include lack of systems, competitive issues, management inattention, and financial resources and personnel issues. Financial, as is other resources are limited in nature. While firms acknowledge the importance of reverse logistics, they are left to spread their resources on what they consider ‘priority areas,’ and for many reverse logistics is unfortunately not one of those. In addition, some of the managers believed

that implementing a proper reverse logistics mechanism for their organizations would necessarily mean contracting third parties at very prohibitive rates (ibid).

To better understand the problem, the study further sought to find out the genesis or reasons for the obstacles. Massive resource outlays, lack of the requisite knowledge and information and the need to extend the reach of existing supply chain systems were some of the factors identified as being behind the barriers (Stoyanov, 2012). Further, the respondents also mentioned the need to develop distinct systems for returns and the need to engage third parties which would inevitably mean ceding crucial company information as the other causes of the barriers.

4. METHODOLOGY

This chapter will examine the choice of method employment in the study and present a research design utilized as well. In addition, the chapter will outline the sample selection criteria, the instrument of data collection, the procedure of collecting data and the data analysis methods.

4.1. Research method

The field of reverse logistics and circular economy is still developing. The current study seeks to explain and understand knowledge that exists within this field and how such knowledge can effectively be utilized to contribute or explain existing theories of reverse logistics. The study further seeks to examine the structure of the phenomenon and expose its context. Consequently, exploratory research method was used to examine the state of the phenomena. Exploratory research method is normally regarded descriptive or preface analysis and is used to acquire an enhanced approach with regards to the consequences of a phenomena under study (Kim Lee, & Kim, 2010).

Exploratory research depends on secondary data and it is normally performed when implication of using a particular research method are not clearly stated. It thus helps in determining the most preferable data collection method in line with the research design. However, considering the fact that there is a paucity of information in the field of reverse logistics, efforts have been made to come up with relevant methods that will in turn help to shed more light on the problem under study. All the information in the desk research applied in this study was collected from books websites, articles containing special data and from journals. The literature reviews conducted on journals and empirical studies were significant to this research because techniques applied in those studies were critically analysed and implemented in the current study. The same applied to the advancement of the hypothesis, which played a dynamic role as a cardinal part of the research design.

While desk research methods are used to describe certain occurrences, they fall short of producing precise calculations, hence the need to bolster findings with primary data. Desk research was undertaken in the current study following exploratory research so as to analyze the

correlation of various variables with the hypothesis. Most importantly, the descriptive research has an advantage over other research methods because of the fact that it makes available exhaustive and precise illustration of the study. Another added advantage that the descriptive research method has is the fact that it is readily available, efficient and reliable to the researchers who apply it in exploring previous studies.

The use of a qualitative research method was considered a more feasible approach in the current study. According to Jacobsen (2005), it is appropriated to use qualitative scientific method when the problem statement does not articulate an issue exhaustively: “Unclear issues imply a need for flexible study design that can be modified during the investigation process” (p. 131 researcher’s translation). At the same time, the chosen methodical approach should be based on type of research questions selected by the researcher (ibid, p.42).

The research questions selected in this study aimed to provide credible answers to the theoretical questions and serve as a foundation for developing a new hypothesis. The researcher sought to discover new factors that could be compelling and provide a more credible justification for the study. In order to concretize the research problem and refine the hypotheses the researcher collated and analyzed information about the research phenomenon with a focus on *exploratory* type of research. Jacobsen defines such problems as a theory-and hypothesis developing. The scholar emphasize few features for the exploratory research type:

- a) to uncover a new knowledge about a problem through
- b) to find out what the phenomenon consists of, i.e. to concretize content in order to
- c) develop a theory about the phenomena which culminated in
- d) a set of hypotheses that cab be tested (ibid, p.73).

In order to contribute to new knowledge and set out baselines for the specific phenomena of the curet study, the researcher utilized descriptive type of research design. According to Adams (2007) Descriptive research design ‘is not particularly concerned with understanding why behavior is the way it is’ (p 20). Dul and Hak (2008) define theory-oriented research is aimed at contributing to the development of theory when academic community is the primary user of research finding. Though a practice-oriented research is aimed to contributing to the knowledge

of practitioners responsible for a specific practice when “members of the business community are the primary users of these research outcomes” (p.31).

Due to the little existence of theories on reverse logistics, the inductive strategy was preferred. According to et al Adams (2007), theory may be developed with inductive reasoning at the empirical level and ‘operates from the specific to the general’ (p.29).

Going “from empiricism to theory” with an open mind the researcher made an effort to contribute to new theory by collecting a relevant data and systematizing it. Jacobsen (2005) argues that an open approach is reasonable when we want to learn more about little-known phenomena, or when we seek to bring out different interpretations and understanding of it.

4.2. Research design

According to Jacobsen (2005) a research design can be classified into two dimensions. A study can go in width – extensive, or in depth -intensive, as well as the study can bear descriptive or explanatory (causal) character. There are different types of designs to suit a specific research problem. The study design comprised such study methods as case study, and small N-studies. Hence, the context of investigation adopted relied on logistic firms. And there are two highlighted conditions: firms’ logistics structure and its functions. In order to understand the behavior of companies and the operations they conduct regarding the policy of reverse logistics, it was imperative that the companies’ norms and values were first mapped during the research process.

Adams (et al 2007) posit that that the validity, reliability and generalizability of study is influenced by the quality of the information gathered and the methods used to gather this information. This is a critical aspect of the whole research process, and failure to address this issue correctly could potentially have serious consequences for any findings generated from the whole work.

4.3. Data collection

The study involved collection of qualitative data regarding existing supply chain practices. The qualitative research method involved observing and interviewing of employers. Furthermore, based on the existing theories about circular economy, reverse logistics and

empirical findings an attempt to refine hypotheses and research problem was made. This formed the basis for data analysis.

4.3.1. Primary and secondary sources

The data collection process was done in line with research design. The chosen research method was qualitative, which entailed collection of data in form of words, sentences and narratives (Jacobsen, 2005, my translation). After the research design was formalised, the process of collecting information from respondent was initiated. Adams et al argue that ‘primary sources are those in which we need to conduct a new survey for gathering information at different levels with regard to the inquiry. Secondary sources are those which are made available or have been collected for other research purposes (ibid, p. 85).

Umberto Eco characterizes primary sources regarding books:

‘..a direct source is an original edition or a critical edition of the work in question. A *translation is not a direct source*: it is instead a prosthetic like dentures or a pair of glasses. It is a means by which I gain limited access to something that lies outside my range. *An anthology is not a direct source*: it is a stew of sources, useful only for a first approach to the topic.<...> *The critical works of other authors, no matter how rich with quotations, are not direct sources*: at best, they are indirect sources’ (Eco, 2015:40).

Jacobsen (2005) observes that information which we collect for the first time and which come directly from people all a group of people is a primary data. According to that definition, the primary data in current study were interviews and observation. The researcher made attempts gain access to firms’ documentation in form of reports and organization’s own data archives, etc., in addition to that, the researcher used relevant publications and earlier researches published on the Internet.

4.3.2. Case studies

The researcher chose to conduct survey using deep interviews face-to-face and observation during the visits and document research. The focus in the current study was on industrial companies in Oslo and Akerhus region. The researcher went through a number of firms including “Romerike Avfallsforedling IKS (ROAF)” and “Norsk Gjenvinning”. The choice of the selected companies was informed by: profile of businesses, facility of access to

informants, factor of success in the market. The companies operate with quite different services. They emerged as proactive firms that have transparent profile concerning their work with environment and sustainable management mindset what is clearly stated on companies' web sites.

Carrying the interviews, the researcher sought for answers to specified research questions of a research. To accomplish this task, the researcher interviewed experts in the subject and warehouse managers and persons responsible for supply chains and reverse logistics.

Jacobsen (2005) highlights weaknesses and strengths with an open interview. Such types of interview are time-consuming in conjunction of preparing and implementation, entails a big amount of data in form of text, and notes to work with. Therefore, a pre-structured form for interviews is preferred in my future research: 'pre-structured interview means that we in advance remark a few topic which we want to focus on under the interview process' (ibid, p. 144).

Case studies of elected companies provided detailed information, and firsthand experience and knowledge about organizations and its operational practices. Visits, interviews and observations were conducted with a purpose to examine reverse logistics processes.

5. DATA PRESENTATION

This chapter presents findings from the data collection process employed in the study. The data is mainly from interviews with company insiders who have knowledge of logistics and supply chain management (SCM). This was corroborated with secondary data concerning reverse logistics operations in . The primary data is qualitative, encompassing interviews which provided useful insights and perspectives into the inner workings of reverse logistics as well as other components of the SCM. This is in line with (Kim Lee, & Kim, 2010) who posit that exploratory methods as interviews help a researcher gain useful insights into the subject or phenomena under study. The findings in this study are arranged and presented according to the research objectives so as provide a systematic way of viewing the information and developing a meaningful conclusion.

5.1 Qualitative Analysis

5.1.2 Concrete understanding of Reverse logistics by organizations in Norway

From the study findings, there appears to be a concrete understanding of the notion of reverse logistics by Norwegian companies. This was confirmed by various interviewees. For instance, one of the interviewees, Jonathan Spearing (R1), who is the head of business development at Deutsche Post DHL, states that circular economy is:

‘...the idea of shifting from a linear “use-and-throw-away” economy, to the economy where the resources and energy (further - unclear). Reduce the extraction how far you go back in the production cycle’

R1 further points out that reverse logistic activities have been in existence for a long time.

‘Recovery of used machine parts and other heavy equipment, transportation of it back to remanufacturing have been going on for decades, right. Now it is been called circular but for decades it has been happening, but in the certain segments.’

A further interview with the director of production and development in ROAF (R2) also revealed that there is a general awareness of the notion of reverse logistics and its application in various companies. For instance, R2 pointed out that the proper application of RL principles

results in major financial savings. Citing his own organization that deals in recycled plastic bottles, R2 observed that:

“At ROAFs plant facility inhabitants throw away plastic bottles for about 3.5 million kroners a year - instead of delivering at stores and getting money back for it. It has so far not something pollution to do, but it says a lot about the attitudes of people. We take out more than 1000 tons of metal, knives, utensils, lots of glass.”

R2 then concludes by suggesting that recycling of waste should be a key agenda going forward in his words:

“Recommendation is to set recycling on agenda, to have a strong focus on it. Remember using waste pyramid... that reuse and material recycling is what one will work before energy recovery”.

From R2's statement, it is plausible to surmise that organizational managers in Norwegian companies have a concrete understanding of reverse logistics concepts.

Deutsche Post DHL occupies a very important position in the reverse logistics supply chain. The company's head of business development R1 confirms that the company understands the subject of reverse logistics and the intricacies around it. R1 further says the firm has an operation named Envirosolutions that deals with reverse logistics, and the products they mainly move are electronics as well as other waste products. From the interview with the manager, it is clear that the company has an eye on enabling its clients reduce their products' impact on the environment as well as helping them boost their efficiency.

Thomas Morch (R3) from Norvsk Gjenvinning also agrees that his company has thorough knowledge and know-how of the reverse logistics process and is part of the value chain. The company handles waste collected from customer and this is a clear example of a reverse logistics process because it goes in a direction opposite to the norm. Some have extended the term value chain to “value circle,” in what is an attempt to capture the whole process of circular economics as they feel value chain may only cover the linear flow of goods from production to customers only.

It is clear from the interviews with industry insiders and decision makers that Norwegian companies and their management have an understanding of reverse logistics and circular economics as a whole. This then paves way for the development of measures and processes for the reverse logistics activities and interventions. The assessment here is that the understanding transcends across the various individuals and organizations throughout the value circle.

5.1.3 Incentives and Barriers

The interviews with managers brought out the various incentives as well as barriers that the managers felt shaped the reverse logistics undertakings across the various industry players. The biggest incentive for most of the managers is the environment. The vast majority of the interviewees cited a concern for sustainability and environmental conservation as the primary reason why they invested in reverse logistics activities. This motivation was shared among the different parties that are involved in reverse logistics at various stages from transport companies, collection companies and waste recycling among others. The growing theme of environmental concern and the need to carry out business in a more sustainable manner are taking root and businesses have caught on with the drive to more sustainability.

Creation as well as preservation of value is another key driver for companies towards reverse logistics. The companies don't believe that a product is only usable once after which its value is exhausted and nothing good can come from it thereafter. They instead believe that the used up materials can be successfully converted into new raw materials and enter the value chain process once again, a process that sees creation of new value where it previously did not exist. Looking at it from the conservation perspective, when an item is used and thrown away when it would be possible to recycle it and gain further utility from the particular item, some of the item's value is deemed lost when it would have been possible to salvage it. Reverse logistics thus comes handy in this respect to prevent the loss of this value for various items such as electronics and other household refuse and waste, reentering the used items back into the value chain and kick starting an entirely new value process. Reverse logistics is thus very important for the creation and preservation of value.

While concern for the environment and sustainability are the main motivations and drivers of individuals and organizations towards reverse logistics, there is money to be made from engaging in reverse logistics. Once waste reaches a sorting facility, the company

undertakes a series of activities to separate the various components and thereafter recycle some of them as well as selling the sellable ones. The companies involved in the reverse chain would not be operational if they did not derive revenues from carrying out those activities. Transport contractors are paid for transporting different materials and components from collection points to the points of delivery as need be. Closely tied to value creation, it is clear that going sustainable is economically beneficial because there are jobs created in the process and various parties derive revenues that they would not be in a position to implement were it not for reverse logistics.

While there are clear incentives and benefits for firms and other individuals to mainstream reverse logistics, there are numerous hurdles and obstacles that prevent them from exploiting the full potential of this phenomenon. A number of the managers interviewed cited economic challenges and the nature of their company as a major challenge. For example R1 stated that :

“We are not a manufacture company.... the primary hurdler is the economic side.it’s [also] less expensive in many cases to just use new goods, in an object, right. [Therefore], it is easier from a design prospective; it is easier for the production flow management, and for an inventory management.”

Jonathon Spearing alludes to the ease with which manufacturing companies can discharge reverse logistics activities compared to other organizations.

A number of the managers interviewed also cited the lack of relevant and supporting laws and regulations as the biggest impediment in the quest to entrench the concepts of reverse logistics and recycling. For example Thomas Mørch (R3) observed that:

“... the regulations today are not adapted to the ambitions we have and consider getting, one needs a Government controlled, but also the incentive policy”

The fact that there are no guidelines that clearly elaborate what each party is supposed to do effectively forms a barrier to the development of the reverse logistics processes. Further, the failure by the government authorities to enact supporting legislation leaves reverse logistics as more of a voluntary undertaking in spite of the massive benefits that the country stands to gain

from developing the sector. The managers feel that if the government implemented the requisite laws then it would be possible to fully unlock the value that underlies reverse logistics activities.

Most of the managers felt that lack of proper legislation was the biggest hindrance to the successful enactment of reverse logistics but additionally felt that lack of awareness among consumers as well as indifference on their part may play a part in the low development of reverse logistics. In some instances, consumers stand to make money from selling their waste but they simply do not take up the option. This is simply the clearest indication of the indifference, where some of the people simply will not see the value from the initiative. In another instance, some people fail to properly sort their household waste as instructed, making it very difficult for recycling companies who have to further sort the waste even after having been sorted at the households. This happens when, as an example, individuals put some components in the wrong places, either out of ignorance or as a genuine mistake. The disappointing part for some of these managers is the lack of awareness among consumers, a problem exacerbated by inaction from the top. According to these people, it would help if authorities undertook a series of initiatives to educate the masses on the importance of sorting waste and how the reverse logistics process helps in reducing the environmental impact of their consumption.

The other important party that takes blame for the slow up take in reverse logistics is the business leaders heading various organizations in the country, more so the manufacturers. They have the power and ability to set themselves an agenda as well as targets for recycling but they have failed to effectively do that. For the various players actively involved in reverse logistics, it is next to impossible to achieve any meaningful change and results without proper support and action from the authorities, consumers, and business leaders who comprise the three crucial components of the chain. As far as industry leaders are concerned, the managers felt that their work would be much easier if they did set an agenda as well as make concerted efforts to ensure that they entrench recycling and reverse logistics part of their everyday operations. If the businesses did that then it would be much more meaningful and fulfilling to take part in backward logistics. The companies would be in a position to connect with consumers and drive the message to them of their role in advancing recycling and sustainability, promoting their sustainability footprint as well as broadening the scope for other operators such as recycling agents to broaden and expand their activities.

5.1.4 Managerial Perceptions

Perception is key to everything. As far as decision making is concerned, managers and those in positions of decision making will rely on what they perceive certain matters before making a decision on it. Most managers interviewed for this study felt that reverse logistics is a concept that is relevant to the economy today and one that needs to be fully developed. The companies thus believe that there is a lot more that needs to be doing if the country is to fully experience the full benefits of reverse logistics and circular economy.

Norway is lagging behind as far as the implementation of circular economy is concerned. A significant number of managers expressed disappointment and frustration that the country is not doing enough to entrench recycling and reverse logistics. Of more concern to the leaders is the fact that Norway is falling behind her Nordic neighbors such as Sweden in when it comes to operating sustainably and the inaction is not helping matters in any way. The leaders simply believe that there is a lot more that needs to be done, not less sustained sensitization of consumers on why they should care about issues such as proper sorting of their waste and the opportunities that come with that.

Perception shapes decisions. Most managers interviewed were of the view that there is tremendous value from reverse logistics. According to them, every single company as well as other parties such as government and regulatory agencies should seize the opportunity to grow the activities in the country and to change the attitudes and thinking of consumers and other relevant parties. For example, when R2 was asked his general perceptions concerning the concept of CE, he stated that:

“I think it's very exciting and very good that circular economy is much on focus today. Many companies have put it on their agenda.we have begun to think circular economy. It is the way to go from thinking about it to create it.”

Further, some of the managers emphasized that reverse logistics, unlike what some people chooses to believe, is not a novelty. It is a concept that has been around for a long time only that people did not see it for what it really is. The other difference from that time is that people did not recognize the immense value that circular economy presents to the nation and to the society as a whole. Managers now have a better appreciation of the importance of all the

activities that comprise reverse logistics and circular economy, paving the way for them to unlock the value that reverse logistics presents. For example, Thomas Mørch (R3) expressed the crucial role of waste products by observing that recycling of waste would in play a very important role in future:

R3: *“...waste is the solution to future resource problem. It's all about at any time make sure that the raw materials have the highest possible value, and our perspective after they come in to us that waste traditionally seen performing as great utilization rate as possible, that the raw materials are not waste, but that they live in a new value chain.”*

5.1.5 The Role of Transportation as a component of reverse logistics

The role of transports in the reverse logistics industry is captured by Jonathan Spearing (R1) who explicates that product return inevitably means that transportation for such products must be factored. He cites as an example, one of their department called the express division, which is routinely involved in reverse logistics activities:

“When our Express division goes to a customer... And they make drop-off four parcels that day, and they make pick-up three parcels. However, to us, whether not goods in the parcel were reused is of question. Is it going back to manufacture or going back to customer of our customer (...)”

Return transport

R2 also expounds further on the crucial role of transportation in reverse logistics when he introduces the concept of return transport. The implication is that transportation is an integral part of reverse logistics activities as products that are either found to be defective or in need of recycling must be transported back to the manufacturing companies. R2 explains that when waste materials are transported to a particular destination, the transport companies also undertake additional service of carrying goods meant for the local area.

R2 states that:

“...previously we have sent a lot of waste to Sweden. So when the car goes to Lidkjøping from here with waste in it, it takes many hours to get there. When it drives back to Norway to collect more, it get loaded [with] cargo back to deliver goods to the local area here.”

This alludes to the fact that transport companies not only dispose of waste but are actively involved in returning back to the local areas goods that were previously brought to the company for various reasons.

In conclusion, therefore, the analysis of primary information collected from various interviewees reveals that reverse logistics is an entrenched concept in Norwegian companies. It is further revealed that there are certain challenges that Norwegian companies face in an effort to integrate RL principles, chief amongst them being the complexity of implementing various RL concepts. However, these organizations have equally introduced a raft of strategies to address barriers stemming from implementation of RL concepts.

5.2 Secondary Data Analysis: Case Studies

5.2.1 Case 1: The Norsk Gjenvinning Group

Norsk Gjenvinning Group is a Norwegian recycling company that provides environmentally friendly services in the areas of waste management, metal recycling, hazardous waste removal, household renovation and demolition and environmental restoration. It is headquartered in Oslo and offers its services to customers in Denmark, Sweden and Britain. Its services are based on two tiers; those targeting upstream markets and those targeting downstream markets. Upstream markets include businesses, the public sector and private households which buy services from the Norsk Gjenvinning Group. Downstream markets are processing industries in Scandinavia, Europe and Asia which buy waste-based raw materials such as paper, plastics, metals and fuels (Norsk Gjenvinning Group, 2015). Among its signature products is insulating material which is made from recycled glass in conjunction with GLAVA, and the offering of dumping areas for graded waste material for use in land refills. This waste material is graded for proper utilisation and also for the prevention of contamination with unprocessed hazardous material.

Reverse logistics is engaged into by Norwegian companies like Norsk Gjenvinning Group for purely economic benefits; it is however congruent upon engaging in recycling that care for the environment will be a central pillar of the business. Through recycling, Norsk Gjenvinning Group produces new material for the market and also offers services hitherto unavailable to the market; especially when they engage in waste management and environmental

restoration. As such reverse logistics enables Norsk Gjenvinning Group to engage with environmental conservation groups as they seek viable projects to engage in; identify and reduce costs accruing from disposal and other liabilities incurred during the recycling process (Škapa, 2014).

Reverse logistics also provides an avenue for other benefits which include increased positive corporate image due to endeavours to conserve the environment, increased funding from philanthropic entities seeking partnership towards ensuring a better environment and fresh input concerning possible new markets. On these, Norsk Gjenvinning Group finds new frontiers in its business engagements especially at these times when environmental conservation is prime agenda. It has benefitted in having its markets increase globally with the Far East being its newest market addition (Norsk Gjenvinning Group , 2015).

In order to fully understand reverse logistics it would be best to see it in the prism of sustainability. According to the Brundtland Commission, sustainable development is that development that is inherent in being able to attain today's needs yet does not compromise the ability of future generations from achieving theirs (Brundtland, et al.,1987 as cited in (Goransson and Gustafsson; 2014). For this Norsk Gjenvinning Group based their business on sustainability of the environment when they formed the company. It is on this tenet that Norsk Gjenvinning Group has grown over the years to be a revolutionary recycling company (Norsk Gjenvinning Group , 2015).

Sustainability is best seen in the operations of Norsk Gjenvinning Group in their synthesis of coffee capsules from Nespresso and the manufacture of insulation material in conjunction with GLAVA. In the synthesis of coffee capsules from Nespresso, Norsk Gjenvinning Group ensures that the coffee capsules are used to produce biogas while the aluminium is forwarded to Hydro Holmstrand for further processing. As for the glass, it is used to produce insulation material from glass articles such as bottles and broken window panes which have been thrown away with the trash. Thus, by having a processing factory in Norway, Norsk Gjenvinning Group has ensured that glass which had to be imported from Finland at a high cost is now locally produced hence lowering the production costs (Norsk Gjenvinning Group , 2015).

Much as these steps are being taken, it is impossible to work for tomorrow using yesterday's laws. Therefore there has been legislation which has been crafted and passed in order to the efficacy of the recycling programs and also provide legal backing for their achievement. For these, the Norwegian government has put in place various laws which not only enable companies like Norsk Gjenvinning Group to exist and flourish, but also places at the door of other companies the responsibility of ensuring that recycled material is used in their business affairs. This way companies like Norsk Gjenvinning Group not only find a market for their goods but the environment is conserved through other measures aimed at lessening pollution and environmental degradation.

It can be surmised that reverse logistics is slowly becoming the new way of ensuring not only the maximisation of profits but also the creation of new frontiers in service and goods production. As opined by Lambert, such proactive measures include movement of goods and services, transmission of information about the goods and also the transfer of financial resources necessary for the realisation of these goods and services. With correct foresight of the envisaged final product, the profits might be maximized through engaging in reverse logistics (Lambert, 2006). It will be seen from the above that Norwegian companies, and in particular, the Norsk Gjenvinning Group, have engaged themselves in reverse logistics and have not only realised the intended ideas but also created employment and contributed in a big way to the global aim of environmental conservation.

5.2.2 Case 2: Romerike Avfallsforedling (ROAF)

Romerike Avfallsforedling IKS (ROAF) is a Norwegian recycling company that provides household waste collection solutions to several municipalities in Norway. It is responsible for the collection of waste for over 190, 000 inhabitants and it also provides the collection of hazardous waste and also landfill services. It has an ecological park which comprises of ROAF administration, the Skedsmo recycling centre, and the Boler landfill. Other than these, ROAF provides environmental education to four classes in the municipalities it derives its hinterland. It also has a fund from which clubs, associations and organisation are funded from profits from ROAF businesses (ROAF, 2015). ROAF handles domestic waste such as electronic waste, CFC-based refrigeration, glass and metal packaging, garden waste, paper and cardboard, metals, and

various forms of plastics. Some of these articles, such as electronic waste, paper and cardboard and complex iron are received free; the rest attract some payments which are catalogued and intended to encourage recycling. On the other hand, hazardous and construction waste attract charges which are paid for by the entity delivering; if the person delivering the hazardous waste is employed he has to pay for the treatment charges.

Reverse logistics is engaged into by Norwegian companies like ROAF for the purposes of proving a viable and proper manner in which waste from everyday living can have an avenue for disposal. It is also worthy of note that upon engaging in recycling, one of the core benefits is that the environment will receive due care and hence longevity of the species that call earth home. Through recycling, ROAF produces an avenue for handling hazardous material and also ensures that the living environment is free from pollutants which would poison the lives of the inhabitants other than making their environment inhospitable. In this manner, ROAF can be said to engage in reverse logistics as its interaction with environmental conservation groups provides solutions against pollution and aids identifying and reducing costs accruing from disposal and other liabilities incurred during the recycling process (Škapa, 2014).

Reverse logistics also provides an avenue for other benefits which include increased positive corporate representation following its endeavors to provide the young with relevant education on environmental conservation. Further benefits are achieved as the different groups funded from its profits find increasing ways to engage waste management. This serves as a double edged sword; on the one hand it provides crucial funding which ensures the continuity of the groups and also provides new ideas for free from the sponsored groups. The alternative, going for paid professionals in environmental conservation, would be expensive. Further to these ROAF is able to inspire the constructors of new buildings to include modern sanitation and other allied works in their residential projects. This ensures that ROAF is able to reach every private citizen at his home with the message of environmental conservation (ROAF, 2015).

Reverse logistics is best seen through the prism of sustainability. According to the Brundtland Commission, sustainable development is that development that is inherent in being able to attain today's needs yet does not compromise the ability of future generations from achieving theirs (Brundtland, et al., 1987 as cited in (Goransson and Gustafsson; 2014). For this, ROAF based their business on sustainability of the environment when they formed the company.

This is seen in its initiatives to not only provide a clean environment through alternative waste disposal solutions to the domestic dweller, but also to commercial entities as they seek disposal of their waste. Central to these is the provision of landfills which use construction waste to provide land which can be used for industrial or even domestic purposes. It also provides solutions for the disposal of hazardous matter which left unattended as is norm in other countries in the world leads to environmental degradation through contaminating water sources, soil and the air (ROAF, 2015).

Sustainability is core to reverse logistics; to ROAF it means a steady and constant supply of recyclable material from the various players in the municipalities they serve. In order to ensure this, ROAF has put in place sorting mechanism at each basic point of collection; homes. Hence refuse is sorted before leaving the home of the customer in designated groupings and also in pre-marked plastic bags. As for the construction material, it also has to be not only sorted according to type but also packaged in a manner that will ensure the ability to instantly recycle without engaging in sorting. Mostly this is due to the bulky nature of some of the refuse in the form of construction waste which is used in landfill. This separation helps in providing ready raw material or the various products they have; food waste is used to produce biogas and bio-fertilisers; recycled plastics are used to fashion building materials and office furniture; while residual waste is converted into energy which is used domestically in heating and electricity. Glass and metal packaging are recycled while paper and cardboard are used as raw material for producing more paper (ROAF, 2015).

In order to achieve the mandate for a better future, ROAF is governed by pieces of legislature and municipal by-laws which ensure not only the smooth operations of ROAF, but also the legality of their core activities. Permits are provided for all activities in the ROAF Environmental Park which not only ensures the safety of the participants but also ensures the safety of the equipment at the industrial park. Others include licenses and certificates, sanitation regulations and modalities to report waste disposal.

6. CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

Reverse logistics is a concept that has been around for years but only in the last few years have people really gotten to appreciate the true potential and value that it presents. Business leaders are very optimistic about the development of the circular value concept and are of the belief that many more of their colleagues have to buy into it if the country is to experience any meaningful and sustained success with this important concept. There is clearly a lot of value to be realized, only if the decision makers are bold enough to make the calls to invest the time and processes in reverse logistics.

Business leaders in Norway are right to be disappointed with the slow progress the country is making in developing its circular economy. The idea is yet to be institutionalized in the country, leaving those carrying out related activities to be doing something just equivalent to charity. Other countries, most notably Sweden, have taken major leaps towards implementing circular economy in their countries, leaving Norway to fall further down the pecking order. Norway is thus clearly falling further away from her peers and the situation does not look too rosy.

Many leaders in business now have an understanding of reverse logistics and what it entails. Decision makers dealing with activities that are part of reverse logistics encourage other businesses particularly those in electronics to consider putting in place measures to recover their products at the end of their useful life because the end of a product's life does not mean the complete loss of its value. A significant number, driven by the realization of the enormous potential that this concept presents have gone ahead to make significant investments towards the same and are reaping the benefits. The hindrance comes with the lack of knowledge on the part of the consumers and some of the businesses as well as inaction and indifference from authorities regarding the subject.

6.2 Recommendation

Norway has got a long way to go in implementing and mainstreaming reverse logistics as part of her way of doing things. The following recommendations will provide a way forward for

individuals as well as government agencies and authorities on what they need to do so as to advance their reverse logistics operations.

- i. Government action.** The government and other authorities should heed the requests by the various business leaders to come up with policy measures and a framework that support the development and entrenchment of circular economics. The authorities must develop a supporting environment that will ensure that companies as well as individual consumers change their attitudes and thinking towards reverse logistics activities. The first step in making meaningful change begins with changing people's mentality and mindsets and only then is it possible to achieve results that are truly sustainable.
- ii. Consumer sensitization.** Closely tied to the first point is the need for different stakeholders to come up with ways and means to educate and sensitize consumers on their role in the entire process and the need for them to do certain things such as the need to separate household waste properly.
- iii. Promoting awareness among businesses.** The biggest challenge that hinders businesses from unlocking the potential and full value from reverse logistics is failure to fully appreciate the range of benefits to gain as result of implementing circular economics. The change of the view and perceptions as well as having a better appreciation of the process of reversing the flow of goods. On a more positive note though, there are people and businesses that have already seen the light and gone ahead to establish operations around the backward logistics value chain, helping other firms to reduce their environmental impact among a host of other benefits. These people understand that there is a lot to gain as a result of going for sustainability and the more people get like them the easier it will be to grow reverse logistics.

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APPENDIX 1. INTERVIEW GUIDE FOR MANAGERS (ENGLISH)

Company name:

Date:

Background Information about the respondent.

1. Name (Optional):
2. Rank in the organization:
3. Prior educational and professional background:
4. Duration of time/experience in the field of logistic industry:

Managerial perceptions concerning Circular Economy (CE) and Reverse Logistic (RL) activities in organization.

1. How familiar do you feel with the term Circular Economy and, in short, what does it mean for your company?
2. How the concept of CE can be applied to your organisation?
3. What do you consider to be the main hurdles to developing the CE for your company?
4. What would help your organisation to develop a CE approach within your company in future?
5. What would you say are the perceived benefits of a CE to your supply chain management system?
6. How does your firm manage Waste Collection Systems?
7. What is your opinion regarding the relevance of RL in organizations?
8. Are there any common goals or models adapted to improve recycling initiatives ?
9. What would you say is the major challenge facing Reverse Logistics in Supply Chain of your organisation?
10. To what extent can you say that circular economy and in general reverse logistics have positively influenced the process of restorative and renewable environmental processes?

11. Compared to the traditional supply chain management, would you say that RL has improved customer experience in regards to time, money and flexibility?

12. In your view, is reverse logistics an unnecessary expense or cost saving for a company? Please, explain.

13. Based on the process of supply chain management, how do you think the process of RL will benefit your organization in the future?

14. From your experience, what recommendations would you give to other managers in relation to execution of CE and RL principles?

APPENDIX 2. INTERVIEW GUIDE FOR MANAGERS (NORSK)

Bakgrunnsinformasjon om respondenten.

1. Navnet (valgfritt):
2. Rolle i bedriften:
3. Utdanning og faglig bakgrunn:
4. Erfaring innen gjenvinningsbransjen:

Ledernes oppfatninger av Sirkulær Økonomi og Reversert Logistikk (RL).

1. Hvor kjent føler du deg med begrepet Reversert Logistikk? Hva kjennetegner RL?
2. Hvordan praktiseres RL i din bedrift?
3. Hvordan, etter din mening, Sirkulær Økonomi og Reversert Logistikk henger sammen?
4. Hva er de årsakene til at produkter returneres? Er det målt på noen måter? (Dersom aktuelt for din bedrift)
5. Hva er din mening om relevansen av Reversert Logistikk for deres kunder? (Fordeler/ulempene for samarbeidspartnere)
6. Hvordan tilpasser og håndterer deres bedrift endringer i sin logistikkjeden for å møte varierende bedrift- og kundekrav?
7. Sammenlignet med den tradisjonelle Supply Chain, vil du si at Reversert Logistikk har forbedret kundeopplevelse i forhold til tid, driftskostnader og fleksibilitet? Vennligst, forklar.
8. Hvor synlig er deres supply chain for kunder? Kan de følge opp prosesser?
9. Kan du fortelle litt om effektiviseringstiltak i deres logistikkjeden for å minimere påvirkningen av miljømessige hensyn?
10. Etter din mening, hva er de største utfordringene i Supply Chain Management i dag?
11. I hvilken grad kan du si at Reversert Logistikk har bidratt til at aktører i næringslivet og forbrukere tar hensyn til miljø når de leverer retur?
12. Hva er ditt syn på de firmaene og forbrukere som ikke benytter seg av returløsninger? Hva hindrer dem fra å gjøre det?
13. Fra din erfaring, hvilke anbefalinger vil du gi til lederne i andre bransjer i forbindelse med returløsningene?

APPENDIX 3.

Interview nr.1.

Norsk

Intervjuguide for ledere

Firma: Norsk Gjenvinning

Dato: 23.10.2015.

Bakgrunnsinformasjon about respondent.

1. Navn (valgfritt): Thomas Mørch
2. Rolle i bedriften: Head of Business Development - Strategy & Sustainability at Norsk Gjenvinning
3. Utdanning og faglig bakgrunn: Skema Business School , France. Management.
4. Erfaring innen gjenvinningsbransjen: 2 år

Ledernes oppfatninger om Sirkulær Økonomi.

- *Hvor kjent føler du deg med begrepet sirkulær økonomi og hva handler sirkulær økonomi om for NG?*

Det føler jeg meg veldig komfortabel med. Vår ambisjon er å være ledende i gjenvinningsbransjen innenfor CE, men også i et større perspektiv å være ledende i Norge innenfor CE. For oss så handler det om visjonen vår egentlig, som er at avfall er løsningen på fremtidens ressursproblem. Det handler om til enhver tid sørge for at råvarene har høyest mulig verdi, og i vårt perspektiv etter at de kommer inn til oss at avfallet tradisjonelt sett oppnår så stor utnyttelsesgrad som mulig, at råvarene ikke blir avfall, men at de lever i en ny verdikjede. Vi fokuserer mest på den tekniske biten i CE, finnes også den biologiske biten i CE, vi fokuserer mindre på biologiske produkter. Men vi har veldig store volumer med trevirke som avfall, som er retur tre, hvor utnyttelsen i dag er energi gjenvinning det vil si forbrenning. Og der er det et helt konkret område hvor vi har ambisjoner om å løfte verdien om å utnytte det bedre.

- *Er teknologien da et nøkkel til bedre bærekraft?*

Både og. Tror ikke det er det viktigste. Jeg tror de vi kaller prosessinnovasjon er viktigere. Det handler om samarbeid på tvers av verdikjeden, eller verdisirkelen som vi liker å kalle det, hvor man samler

aktører fra hele verdikjeden for å se hvordan man kan utnytte ressursene bedre. Ofte kan det hende man trenger teknologi for å få det til, men enda oftere trenger man ikke det. Man må bare skru sammen kjente ting på en ny måte.

- *Hvem er deres kunder?*

Vi har 40000 kunder, mange forskjellige, men primær så er det næringslivet (ROAF – husholdninger). Vi drive lite med husholdningsavfall, vi gjør det med anbud på veiene av kommune, det står for ca 6-7% av omsetningen vår. Resten er fra næringslivet. Det er alltid fra de største bedriftene i Norge til enkelt personer som skal ha en konteiner hjemme hos seg også. Så hele spekteret er på en måte vår kundegruppe og vi leverer tjenester innenfor gjenvinning i alle retninger (...).

- *Hva anser du for å være de viktigste hindringene til å bruke og utvikle sirkulær økonomi modellen for NG?*

Det er sikkert flere ting. En ting er at regelverket i dag ikke er tilpasset de ambisjonene vi har og anser komme, man trenger en myndighetsstyrt, men også incentivet regelverk. Men det er ikke det viktigste. Det viktigste tror jeg er at å kalle næringslivet få øyene opp for potensialet i å utnytte materialer på en mer sirkulær måte. Alt annet er økonomi. Alt annet like så vil man kunne ha lavere innkjøpskost på avfallsbaserte råvarer, man også vil ha positive effekter i forhold til miljø og klima som er **viktig reelt sett**, men også viktig for omdømme til selskapet. Det er et mind-set og forståelse. Jeg tror at gjenvinningsbransjen har veldig mye å gå på i forhold til å være relevant og god samarbeidspartner for å få dette til å skje. Det er på mange områder trengtes det endringer, men man utvikle sirkulære forretningsmodeller.

- *Hvilke tiltak planlegger NG i sin fremtid etter som de miljømessige reglene strammes? Hvordan tror du overgangen til en sirkulær økonomi blir for andre bedrifter dersom regjering kommer med strengere regelverk?*

Vi har høye ambisjoner for økt materialgjenvinningsgrad for avfallet som vi tar inn. Ambisjoner om å utvikle rådgivningskonsepter for å sørge at de sirkulære forretningsmodeller implementeres. Vi har ambisjoner i forhold til eget foravtrykk, vi er en av Norges største logistikkbedrifter, kjører egne biler innenfor logistikk, redusere eget fotavtrykk som handler om en overgang fra fossil til fornybar energi, eller fornybar drivstoff. Det handler også om *compliance* som er et viktig tema i denne bransjen og

historikken viser at ..hva skal jeg si...at mange tar snarveier da. Det er ekstremt viktig for utviklingen at man må ha et strengt regelverk som følges og at det kontrolleres, og at det kommer sanksjoner hvis man ikke følger det. Gjør man ikke det så er det innovasjonshemmende og det hindrer utvikling. Hele fokus på *compliance* å gjøre ting i henhold til regelverk – masse å gå på i Norge, og det er også et veldig viktig element i bærekraftarbeidet vårt da. Vi deler bærekraft i tre: det er eget fotavtrykk, det er sirkulære forretningsmodeller og det er en *compliance*.

- *Så du ville ikke sagt at Norge er ledende på dette feltet?*

Absolutt nei. Norge er for defensive. Vi er ganske gode på tradisjonell kildesortering, gjenvinning og løsninger spesielt for forbrukere, men ifh. sirkulære forretningsmodeller er vi langt fra ledende. Sverige er definitivt foran oss.

Ledernes oppfatninger av Reversert Logistikk

NG er også et godt eksempel på Reversert Logistikk i praksis. Dere håndterer retur av varer, arbeider med å hente inn igjen verdier og håndterer resirkuleringsprosesser for trygg kasting av kunders varer.

- *Hvordan, etter din mening, Sirkulær Økonomi og Reversert Logistikk henger sammen for avfallsbransjen?*

Retur transport som vi kaller det bruker vi stort sett på all eksport internt i Norden der vi transporterer med bil. Det er da biler fyller med varer og kjøres tomme tilbake fyller vi da med avfall. Det samme gjør vi, men i mindre grad også Nord-Sør og Vest-Øst. Det handler om bedre ressurs utnyttelse, lavere klimautslipp, det handler om mindre logistikk og fotavtrykk. Handler også om lavere kostnader rett og slett for å sørge for at disse avfallsbaserte materialene utnyttes på en best mulig måte. Logistikk innenfor gjenvinning er en veldig stor andel av kostnadsbilde så det er ekstremt viktig å være kostnadseffektiv på logistikk for å kunne være bra på det andre. Vi er langt fra i mål når det kommer til å utnytte returtransport. Vi ser for eksempel, hvordan vi kan utnytte ikke bare returtransport og logistikk, men også kundenes interne logistikk i deres selskaper. De kjører også tomme i samme retning.

- *Hvordan tilpasser og håndterer NG endringer i sin logistikk kjeden for å møte varierende bedrift- og kundekrav? Hva er din mening om relevansen av Reversert Logistikk for deres kunder?*

En del kunder er opptatt av at vi har en effektiv og miljømessig god transport, de som er mest ambisiøse kunder. Men de fleste bryr seg ikke så mye om det. De fleste vil bare bli kvitt et problem. Det er slik at alle som besitte avfall (næringslivs kunder), har et ansvar for sluttdisponeringen av det de gir fra seg som betyr at de må kunne kreve av de gjenvinningsaktørene de bruker en storvarighet av det som skjer i hele verdikjeden, ikke sant. Og det gjør de mest profesjonelle de som er opptatt av det. En grunn til at dem er opptatt av det, det viktigste, er kanskje omdømme-risiko at avfallet havner på avveier, hos barn i Asia, for eksempel. Men de fleste bryr seg ikke bortsett fra de mest profesjonelle selskapene.

- *Hva er ditt syn på de firmaene og forbrukere som ikke benytter seg av kildesortering? Hva hindrer dem fra å gjøre det?*

Da må jeg trekke fram to ting: den ene er designfasen, hvordan man lager produkter, 'design for recycling', ikke sant. Hvordan du setter sammen produkter slik at du kan utnytte råvarene når du er ferdig med å bruke den som det var. Det er veldig viktig. Jeg har ikke noe akademisk bakgrunn for å si det, men jeg har hørt fra flere steder at 70% av produktenes miljøavtrykk eller påvirkning fast settes i design fasen. Så, hvordan du kan få folk og bedrifter bry seg om dette så tror jeg at man må gjøre mer enn i dag, hva man skal gjøre – det holder ikke fordi veldig mange har ikke kunnskap og tillit til det hva som kommer til å skje. Så du må fortelle hva som skjer etter man har sortert og hvorfor er det viktig. Jeg tror at man må ha mer positivt ladet budskap rundt problematikken for å vekke forståelsen. Det er vanskelig fordi mange gidder ikke å forholde seg til det i det hele tatt fordi dette er ikke viktig, men hvordan å knekke den koden med et positivt budskap rundt sortering er veldig viktig.

- *Fra din erfaring, hvilke anbefalingene vil du gi til lederne i andre bransjer i forbindelse med returløsningene?*

Samarbeid. Snakk med de som deltar i verdikjeden for de produktene eller prosessene man driver med. Finn ut hva vi kan gjøre noe sammen. Bort fra kunde, leverandør, krangel om pris, til å sette seg rundt bordet og samle verdikjeden, og se hvordan man kan utvikle forretningsmodeller, hvordan utnytte hverandres avfall. Vi liker å tro at gjenvinningsbransjen er en nøkkel – spider in the web- for å få dette til å fungere.

Interview nr.2.

Norsk

Intervjuguide for ledere

Firma: Norsk Gjenvinning

Dato: 16.12.2015.

Bakgrunnsinformasjon about respondent.

1. Navn (valgfritt): -
2. Rolle i bedriften: logistikk og drift ansvarlig innenfor restavfall, Downstream division
3. Utdanning og faglig bakgrunn: Mastergrad i Økonomi og administrasjon
4. Erfaring innen gjenvinningsbransjen: 4 år

Ledernes oppfatninger om Sirkulær Økonomi.

- *Kan du fortelle om Norsk Gjenvinning sine logistikkprosesser og løsninger?*

Downstream Division håndterer alt av produktene ut av alle gjenvinningsanleggene på restavfall. Der vi har muligheter har vi lokale anlegg som vi leverer til og det er lokale transportører som transporterer det. Der er det ikke retur transport, men ordinær transport.

Det er inntil 100.000 tonn. Av det så går det mesteparten på working floor type lastebiler eller kapeller konteiner. Alt vi kjører til Sverige og andre langdistanser from Stavanger mot Oslo og så videre da går det på retur transport. Der er det store internasjonale selskapene som frakter import varer til Norge for å levere. Betaler ofte 70 til 80% av hele transportprisen. Så betaler en liten del til transportselskapene for å kjøre avfall i biler som ellers hadde gått tomme fra Norge til Sverige.

Vi kjøper transport av de store selskapene for å få fraktet varer fra Norge til Sverige. Det er de som er interessert for å få fylt opp bilene sine tilbake til Sverige. De kjører med avfall fra oss tilbake da.

- *Hva slags avfall er det?*

Det er restavfall, næringsavfall, trevirke, også matavfall – det er de tingene jeg har ansvaret for.

- *Hvor leveres det avfallet?*

Til forbrenningsanlegg for å lage energi, vi har kommunale verk som brenner søppel for oss for å skape fjernvarme, organisk avfall går til biogass produksjon. Trevirke går til energi gjenvinning, det er retur tre – tre som ellers går i søpla. Kundene kan ha en konteiner liggende hos seg, så kan den bli hentet av oss,

kjørt på et gjenvinninganlegg, tømt der. Og så blir det sortert og Downstream tar over her når det blir en ren sortert fraksjon.

- *Kjører Norsk Gjenvinning Downstream egen transport?*

Nei, i Downstream eier vi ingen biler selv, vi kjøper ut i markedet av de andre transportselskapene. Vi kjøper på spotmarkedet eller vi gjør avtaler. Vi vet at de skal kjøre 10 biler i uka inntil Norge med elektronikk og da kjøper vi kapasiteten tilbake til Sverige med avtaler. Vi booker biler fra uke til uke, men har også noen faste avtaler. Vi har ikke noen offentlige anbud ute, men transportørene gir oss forskjellige pris de tar for å kjøre og vi velger deretter.

- *Jeg skjønner. Man kan ikke se at er deres biler, det er ingen NG logo på dem, ikke sant?*

Riktig. Det er andre sine selskapene sine logo som regel.

- *Hva er deres mål når det gjelder transport system?*

Mål er å være bærekraftige, vi skal basere oss på lange distanser på retur transport. Det er billige enn vanlig transport også er det det at vi fyller opp biler som ellers ville gått tomme da så du slipper tomkjøring. Vi har avtaler med alle våre transportører og da går det på HMS, KS, sosial dumping, at sjåførene skal få riktig betalt alle de tingene der er viktig for oss, vi går ikke kun etter pris. Billig retur transport, men at *compliance* er overhold riktig.

- *Hvilke utfordringer ser du på det området?*

For eksempel, spesielt med sosial dumping. De som kommer til Norge og kjører for NG skal følge norske lover, miljødirektoratet sine lover, de må ha riktige papirer, løyvene. Lovverket er den største utfordringen på den siden.

- *Hva er ditt syn på norsk regelverk og krav?*

Vi bruker vel euroklasse 5 på nesten alt vi kjører med. Lastebilene klassifisert hvor miljøvennlige de er. Vi stiller minimumskrav når vi gjør avtaler om transport.

- *Hvordan eller vil du karakterisere logistikk prosesser i NG? Noen forbedringsområder?*

Vi er bærekraftige og bruker retur transport på 90% av langkjøringen. Så bilene kjører med våre varer istedenfor at de kjører tomme og lager utslipp unødvendig. Vi jobber stadig vekk med mange typer løsninger som skal være til det bedre for miljø. At man tar ut alle typer fraksjoner som kan gjenvinnes

Hvordan, etter din mening, Sirkulær Økonomi og Reversert Logistikk henger sammen for avfallsbransjen?

Jeg har ikke for store meninger om det, dessverre.

- *Hva vet du om begrepet Sirkulær Økonomi?*

Ikke noe spesielt...

- *Hva er ditt syn på de firmaene og forbrukere som ikke benytter seg av kildesortering? Hva hindrer dem fra å gjøre det?*

Jeg synes at i det samfunnet vi lever i nå at alle burde tenke miljø og bruke energi på å gjøre de riktige tingene i forhold til gjenvinning og kildesortering, ikke bare tenke økonomi. Jeg som jobber i en gjenvinningsbedrift synes at gjenvinning er veldig viktig. (...) Vi i NG jobber aktivt med å informere og engasjere folk og bedrifter til kildesortering. Når vi kildesorterer reduseres mengden restavfall.

- *Hvordan tror du overgangen til en sirkulær økonomi blir for Norge?*

Hovedutfordringene er at man i en presset økonomisk situasjon i verden, det er tøft om dagen. Det gjelder økonomi. Det må være riktige initiativer for å drive med sortering. Man har fokus på å bli belønnet på et eller annet vis, og at de kundene som kjøper produkter stiller mer krav til de selskapene de kjøper av. Det må straffe seg å ikke gjøre det.

Interview nr.3.

Norsk

Intervjuguide for ledere

Firma: Norsk Gjenvinning

Dato: 16.11.2015

Bakgrunnsinformasjon om respondent.

5. Navn (valgfritt): ---
6. Rolle i bedriften: Leder i Upstream Division
7. Utdanning og faglig bakgrunn: Siviløkonom, Master i ledelse
8. Erfaring innen gjenvinningsbransjen: 3 år

Ledernes oppfatninger om Sirkulær Økonomi og Reversert logistikk.

- *Kan du fortelle litt om Norsk Gjenvinning sine logistikkprosesser og løsninger?*

Vår bedrift så har vi delt logistikk inn i flere områder. En del logistisk flyt skjer på produksjonsanlegget vårt. Også har vi logistikken som skjer ute på vei, transporten. Den har vi delt i to igjen i oppstrøm i nedstrøm. Det vil si inntil anlegg, og ut av anlegg. Oppstrømslogistikken - all innhenting av avfall fra kunde til oss. Det vil si å hente varene inn og eventuelt frakte de mellom våre anlegg, ikke til sluttkunde, mellom våre anlegg. Fra vårt anlegg og til vår sluttkunde - ut på verdensmarkedet eller hvor den skal havne hen: til forbrenning, eller deponi også videre, det er det vi kaller nedstrøm. Det er annen divisjon hos oss - Norsk Gjenvinning Downstream. De er avfallstradere, de selger det ferdig sorterte avfallet ut til sluttkunde.

- *Selges det da som råvarer?*

Mye av det går igjen i en loopet. Vi har materialgjenvinning på 90% av det som hentet inn, det blir sortert og gjenvunnet. Papir, plast, metaller, trevirke også videre, det går i egne løp og blir solgt til kunde, eller vi betaler kunde for å ta imot siden det har så liten verdi. Det er billigere for oss å betale for det enn å deponere, eller å forbrenne. For eksempel, metaller, har en positiv verdi. Etter at vi har sortert det og skapt verdi selger vi det. Andre varer betaler kundene oss for å ta restavfall. Det er en problem vare, ikke så lett å sortere, da får vi betalt for å ta den. Vi sorterer, selger noe, betaler andre for å ta imot noe. For eksempel, det som går til forbrenning, varmegjenvinning, da betaler vi penger for å få levere der. Det er allikevel den billigste løsningen for det kan brukes til forbrenning.

I min del av logistikk kjeden - Upstream, det er veldig liten grad av det. Det vil si at vi jobber selv med hvordan utnytte transport mest mulig effektivt. Når vi har en kunde som har leid en konteiner av oss som står ute hos

han og han fyller den med varer så kjører vi i liten grad tom ut dit for å hente den igjen. Enten så har vi med en konteiner som vi setter av hos en kunde på veien, eller hos samme kunde mens vi tar den andre med oss hjem igjen. Her kan man si det er en slags rundreise problematikk.

- *Her må det være veldig viktig med god planlegging?*

Ja nettopp. Vi har jo et kjørekontor som har en sentral planleggingsfunksjon som prøver å lage effektive ruter. Vi har mange typer biler som kan hente og sette ut konteinere. Vi har løftebil, den løfter konteinere på lasteplan, vi har krokobil som drar store tunge konteinere opp på lasteplan, og vi har komprimatorbiler - de bilene som henter husholdningsavfall. Da tømmer de bare bøtten opp i, setter den fra seg, pakker sammen søppel. Når vi lager ruter tenker vi spesielt på det - hvilke kunder har varer som vi kan komprimere for å få mest mulig på bilen, for at det blir tyngst mulig i forhold til det som er lov, det er beste økonomien.

- *Hva slags kunder har dere?*

Vi har fire divisjoner: næringslivskunder, jern- og metall, farlig avfallshåndtering - industri, også har vi renovasjon. Som ROAF kontrakten kjøres av Norsk Gjenvinning på veien av kommunene på Romerike. Det var en anbudsprosess som vi er vunnet og vi eier ikke avfallet der, bare kjører og henter det, og leverer der kommunene vil ha det, også er vi ferdig med jobben. Våre sjåførere kjører rutene kun som en transport, ren taxikjøring for kommunene. Mens på alle de andre oppdragene vi har med plast, metall, ute hos industrien og næringslivet overtar vi eie retten til avfallet. Da betaler vi, eller får vi betalt. Det tar mye tid for å få mest mulig verdi, må gjøre det profesjonelt. Vi ser også nedstrøm gjennom den andre logistikk avdelingen som finner kunder fra verdensmarkedet: noe går til Kina eller India, noe går til Sverige til en forbrenningsanlegg.

- *Hvilke hindringer møter dere i deres samarbeid med andre aktører?*

På noen av disse fraksjonene har vi kvoter. Vi har eksport tillatelser og kan eksportere så og så mye, får lov å oppbevare så og så mye på anleggene før man shipper det bort. Det kan være hindringer som kanskje ikke er så effektiv som det burde være. Også det at noen varer må vi frakte utrolig langt, det er ikke hensiktsmessig. Jeg vet at nabolandet vårt Sverige de sorterer mye avfall til forbrenningsanlegget. I mange tilfeller kan vi ikke levere der fordi det er andre som her de avtalene. Så det kommer kanskje varer fra Irland med båt til Sverige. Mens vi må kjøre forbi Sverige og til Tyskland. Hvis du tenker på den globale økonomien da så er det ikke en smart måte å gjøre det på. Også er de private interesser er ikke de samme som de offentlige interessene, ofte er det pris som styrer dette her. Hvis Irland enten har en bedre pris eller høyere kvalitet, avfallet er bedre sortert og vareslagene er «renere» så kan det hende at de er mer attraktive enn vi er, hvis reglene krever renere sortering for eksempel.

- *Hva mener du om reglene for sortering her i Norge? Hvordan opplever du at regelverket er anlagt? Ser du noen svakheter?*

Det reglene ligger nok på andre områder som eksport. Innenfor den delen som jeg er ansvarlig for, er det veldig enkelt - hente små enheter opp til 40 kubikk meter, det er ikke så mye, det går på en lastebil. Eneste hindringen vi har her er for så vidt å kjøre videre tidsbestemmelser for bilene, det er vektbegrensninger på bilene. For eks, i Sverige kan man kjøre tyngre biler enn i Norge fordi veiene er av bedre standard og de er bygd for å kjøre

tyngre kjøretøy. Vi kan laste opp til cirka 30 tonn på bil og lastevekt, men i Sverige er i hvert fall 10 tonn mer.

- *Er det noen krav i forhold til CO2 utslipp?*

Her i Norge her vi lite lovpålagte krav. Vi kjører ganske moderne flåte, men vi er ikke truet til å gjøre det. Det er ofte ut ifra egen økonomi, eller et ønske om å ha et karbon fotavtrykk som er lite. I enkelte tilfeller kommer anbudsprosess fra kommune og fylke for de stiller strenge krav at dere skal ha for eksempel seks kategorier kjøretøy som har lave utslipp, eller skal kjøre på gass eller alternative drivstoff. Nå er det A generasjon biodrivstoff syntetisk diesel som brukes nå. Det er kommet en avgiftsendring som gjør at det produktet kan konkurrere ganske bra med klassiske diesel. Det finnes eget regelverk der...Det er laget av hydrogeniserte vegetabiliske oljer, det er slakteri avfall altså bioavfall blandet med noen planteoljer som er palme og soya også videre.

- *Da kan det hende at det blir helt nye krav til kjøretøy da?*

Det kan godt hende at det blir. Nå har det akkurat vært Zero-konferansen for to uker siden, det er en miljø konferanse hvor det deltar bedrifter som forplikter seg å vurdere disse drivstoffene. (...)Teste ut det drivstoffet og moderne kjøretøy er klarert for det. Rundt 20 andre firmaer også underskrev å begynne å teste det.

- *Kan du fortelle litt om effektiviseringstiltak i deres logistikkjeden for minimere påvirkningen av miljømessige hensyn?*

Vi er på mange måter foregangsbedrift i Norge, vi er stort, vi er en markedsleder og vi føler derfor at vi har et stort sosialt ansvar da. Og som den største så pålegger vi oss mange hindringer som gjør at det ikke så lett for oss å konkurrere fordi vår kvalitet skal være høy, vi bruke mye penger på å etterleve standard. De andre i bransjen, de er litt mindre, og kommer etter oss, de bruker ikke så mye investeringer på den standarten som vi gjør. De pengene de ikke bruker på det, de kan de bruke på å konkurrere med oss. Samfunnet er ikke tjent på det. Samfunnet er tjent på at noen legger lista høyt, at noen jobber med å holde sin sti ren, ikke sant. Så det er en ulempe. Men vi prøver så godt vi kan å være mest attraktive spesielt overfor offentlige kunder: kommuner, fylker, stat fordi de har en del lovpålagte krav som politikerne med å utforme. Det er krav som å kjøpe alternative drivstoff, å kjøre med kjøretøy som har lavere karbon utslipp enn andre, med nye motorer også videre. Det er noen hindringer. For å være attraktive hos kunden gjør vi en del justeringer i teknologi for å styre bilene bedre, lage smarte ruter som gjør at vi ikke behøver å stoppe for å tømme noe som ikke er fullt. Vi jobber med sensurer i beholderne, når vi planlegger ruta så vet vi hvor mye avfall det er i beholderen. Vi skal ha en rute som består av 5-6 punkter da, da vet vi hvilke containere som er for eksempel, noen er 70% full, noen er bare 30% full, noen er 92% full. Da vet vi det når vi planlegger rutene, tar de som er fulle eller står nærmest hverandre, så tar vi de som må tømmes først. De som ikke blir fulle før om noen uker tar vi ikke enda - vi ser på historikk også. Tar vi det kanskje på neste rute om en uke. Da har vi kjørt kortere distanse, spart for miljø for karbonutslipp, og tjent penger for oss selv på å gjøre det mer effektivt. Kjører ikke mer enn vi må, nothing else.. Det er en vinn-vinn. Det er en prosjekt vi jobber med nå.

- *Hva er ditt syn på de firmaene og forbrukere som ikke benytter seg av returløsninger? Hva hindrer dem fra å gjøre det?*

De fleste av våre kunder de er ikke bevisst hvilken risiko de har i å være avfallseier. De har generert et avfall som skal håndteres og de tar det alt for lett på i hvilken grad det skal resirkuleres og blir gjenvunnet. Det er råvarer, det er ikke avfall, ressurser. Og jeg som mange andre i denne bedriften her vi er veldig stolte at det er 100% rent som gjelder. Vi har kommet til et punkt når vi bruker ressursene om igjen og ikke bruker jomfruelige materialer hele tiden.

Interview nr.4.

Norsk

Intervjuguide for ledere

Firma: ROAF

Dato: 16.10.2015.

Bakgrunnsinformasjon om respondent.

5. Navn (valgfritt): Øivind Brevik
6. Rolle i bedriften: Adm. direktør
7. Utdanning og faglig bakgrunn: Master i Økologi
8. Erfaring innen gjenvinningsbransjen: 18 år

Ledernes oppfatninger om Sirkulær Økonomi.

- *Hvor kjent føler du deg med begrepet Sirkulær Økonomi? Hvordan praktiseres disse prinsippene i ROAF?*

Jeg er ikke kjempe kjent med det enda fordi det er et relativt nytt begrep i bransjen, men det betyr jo ikke at jeg ikke har tenkt CE. Forskjellen fra lineær økonomi er at ting skal gå i kretsløp, og bransjen har brukt begrepet kretsløpstankegang i mange mange år, men nå er det også koblet til med det økonomi begrepet da. At du skal få utnyttet råvarer, alle varer har jo resurser i seg gang etter gang etter gang, at du da bygger en slags økonomi rundt det. Jeg begynner å bli bekvem og kjent med det. Mine personlige meninger sammenfaller med organisasjonens meninger, det henger sammen. Jeg har et eksempel her på ROAF hvor vi virkelig benytter matavfall til å danne biogass som renovasjonsbilene benytter for å samle matavfall, istedenfor å kjøre på diesel.

- *Etter din mening, hva er de største utfordringene for å utvikle Sirkulær Økonomi for ROAF?*

Hindringene i bedriften er kanskje ikke så veldig mange. Det er å få inn holdninger til at alt vi driver med skal få best mulig kvalitet. Ulike avfallstyper skal ha best mulig kvalitet for at det skal kunne utnyttes på en best mulig måte. I prinsippet kunne vi jo ha blandet alt, men da blir det enten bare til

deponi eller bare til energiutnyttelse. Og da snakker vi om lineær økonomi, der stopper det opp. Da dette å få ting bort ifra energiutnyttelse til material gjenvinning – da skaper du CE.

Kunnskap er viktig. Kompetanse om viktigheten om å få innbyggerne og de besøkende kundene til å sortere riktig på gjenvinningsstasjonene. Også få de ansatte til å bli gode ambassadører og markedsførere om hvor viktig det er å sortere matavfall i grønne poser. Skape gode holdninger er viktig.

- *Hva videre kan hjelpe organisasjonen i denne prosessen?*

Det er informasjon, masse informasjon. Også for alle ansatte å forstå hva vi holder på med. Vi har mange ansatte som er spesialisert innen sine fagfelt, også har dem møter andre fagfelt kanskje bare en gang. De har ikke fått helhetstankegangen på alt det vi driver på med henger sammen. Hver gang jeg går på et treningssenter som jeg trener på, så skjer det at alle som jobber der kaster avfall i samme beholder..til og med papp. Så alle ansatte der har liten kompetanse på det, vaktmester kanskje har liten kompetanse på det. Men det selskapet som tar imot det de bryr seg ikke mye, da det er et privat selskap og de tjener så mye penger på det.....Da blir det lineær økonomi. Det er noen som taper mye på det og noen som tjener mye på det. I en CE så får du litt mindre fortjeneste på flere ledd, men også mye mindre tap på andre ledd.

- *Hvorfor kildesorterer ikke folk?*

Noen gidder ikke, noen tror ikke at det er nytte, også er det noen som til og med boikotter det.

- *Hvilke positive mulighetene et grønt skifte fører med seg?*

Gode holdninger skaper gode relasjoner på mange måter. Men ikke minst miljø og klima påvirkninger, blir lavere skade på klima og miljø. Da skjer ting på en sirkulær riktig måte, det er en ren økologi her. Andre ting er å skape arbeidsplasser. Når det blir færre plasser på miljøskadelige områder, blir det flere plasser på miljøriktige områder.

- *Hvilke tiltak planlegger ROAF i sin fremtid etter som de miljømessige reglene strammes?*

Vi ha ganske mange tiltak blant annet mer kildesortering, flere henteordninger. I dag er det sånn at innbyggerne må bringe glass og metall for eksempel, til retur punkt som kan være en kilometer unna der dem bor, men vi ønsker å tilby alle innbyggerne, husstandene en beholder ved siden av mat- og restavfallet, og papirbeholderen, sånn at viljen til å sorte glass- og metallavfallet blir større. Vi vil tilrettelegge, det blir enklere rett og slett. Vi vil endre til holdningsskapende ting, motiverende løsninger. Hente ordning for tekstiler – istedenfor at de

må dra til konteinere, for eksempel. Hente og bestillingsordninger med sms, for eksempel, kan sende en sms for å hente farlig avfall. Kan bli mer utvikling på det.

Vi har en verden mest moderne sorteringsanlegg her. Og vi er veldig opptatt av at kvaliteten skal være veldig god på det som sorteres her. Det var for å nå materialgjenvinningsmål, samtidig som vi kjørte den mest miljøriktige. Det koster litt mer til å begynne, men jeg tror det vil lønne seg i lengden for miljø og dor lommebok. Det henger sammen.

- *Den påbegynte overgangen til sirkulær økonomi bringer med seg nye muligheter, men også nye utfordringer. Etter din mening, hvilke utfordringer ser du generelt for næringslivet og forbrukere?*

Det vil være varierende. Noen bedrifter har kommet ganske langt, men det er helst vanlige kontor bedrifter, som sorterer papir, for eksempel. Papirinnsamlingen har vi hatt i 20-30 år. Men for små bedrifter som tenker bare på å overleve, de må endre en del sine rutiner og holdninger. Hvis det kommer lovpålagte krav så går det kanskje bra.

Ledernes oppfatninger om Reversert Logistikk.

- *Hvordan, etter din mening, Sirkulær Økonomi og Reversert Logistikk henger sammen for avfallsbransjen?*

Det handler om transport bransjen. Vi har et eksempel, på at restavfallet fra gjenvinningsstasjonene våre, det blir lastet opp i konteinere, som biler fra Oslo kommune etter at de har tømt aske fra forbrenningsanleggene. Oslo kommune kjører til deponi som ligger på Romerike. De kjører med tomme biler tilbake. De bytter dem konteinere med fulle konteinere som kjører tilbake. Da får du utviklet logistikken på en best mulig måte. Vi tenker retur transport hele tiden, utnytte kapasiteten på biler. Det er vanskelig å utnytte tomme biler, de stopper hver hundre meter og fylles mer og mer opp. Så kjører dem tilbake til sorteringsanlegget og starter på ny runde igjen. Viktig at dem utnytter ruter. Vi har noe som heter nedgravde løsninger i brønner. Der er det sånn at på bunnen av de brønnene monteres nivåmålere dom mål hvor full konteiner er. Den konteiner, brønn er på 5 kubikk, så varsler den elektronisk at nå er det bare en kubikk igjen, da kan søppel hentes om to dager. Det blir også mer og mer teknologi.

- *Hva er din mening om relevansen av Reversert Logistikk for deres kunder?*

Det er litt vanskelig i avfallsbransjen å realisere i forhold til våre kunder. Eksempelvis, hvis en

kunde kjører til gjenvinningsstasjon med full tilhenger, så ønsker vi at samme kunde skal ta med seg kompost jord fra oss av god kvalitet, som han kjøper til sin hage og kjører da fra oss med full tilhenger, istedenfor å kjøre innom Plantasjen for å kjøpe torv kompost der som er utvunnet på en torvmyr. Når den torvas og tas ut så frigjøres det metan gas, så det er best å la det torvet ligge fordi det binder karbon.

ROAF plassert veldig sentralt i Norge, men det er verre i distrikter. Vi ser alltid på muligheter å returnere andre varer med tomme biler.

- *Samarbeider dere mye med kundene?*

Vi er en del konkurranse utsatt her også. Det er så korte avstander hos oss på det vi har ansvar for. Hvis vi sender restavfall for eksempel til Sverige er det litt vesentlig at hvis den bilen som skal hente restavfallet her tar med seg andre varer fra Sverige på vei til Norge. Men det styrer ikke vi, det er satt ut til andre selskaper som styrer det – Leminor, Rekom, Norsk Gjenvinning. Den tenker nok logistikk fordi det må de. Jo mer man transporten jo lavere blir prisen per tonn.

- *Sammenlignet med den tradisjonelle logistikk, vil du si at Reversert Logistikk har forbedret kundeopplevelse i forhold til tid, driftskostnader og fleksibilitet?*

Innbyggere veldig få hva vi gjør egentlig. Dem er bare opptatt av at avfallsbeholderen som står utenfor inngangsdøra deres skal tømmes en gang i uka. Dem er ikke så veldig opptatt hva det benyttes til, 10-15 prosent er kanskje interessert i det. Så det er nok holdninger, forståelse og kunnskap som må skapes i mye større grad.

- *På deres nettside presiseres det at befolkninger er blitt mye flinkere til å sortere matavfall, for eksempel, ikke sant?*

Det stemmer, men det er fortsatt mange som ikke er gjort det, tipper på at 30-40% ikke har begynt å bruke de grønne mat posene, og de har ikke varslet oss om det en gang at de ikke bruker det. Men vi har store forhåpninger om de store massene av folk, de fleste vet at tjenesten skal gjøres, dem betaler for det, og dem bryr seg ikke så mye om hva det skal brukes til.

- *Hvor synlig er ROAF sine prosesser for kunder?*

Det er ikke så veldig synlig, men vi underviser fjerde klassinger, og dem underviser vi opp her på ROAF. Dem får også omvisning på hva vi faktisk gjør, dem er da gode ambassadører til sine foresatte, foreldre. Noen ganger i året inviterer vi alle innbyggerne til å komme hit og se. Og da er det fem stykker som takker ja av 190 000 innbyggere. Det er ikke så mange som orker å bruke ettermiddag for å se hvordan det ser ut. Vi har ca 200 000 besøk på gjenvinningsstasjonene i året. Her er det mange som er flinke til å kjøre og sortere sin hage avfall for eksempel.

- *Hva er ditt syn på de firmaene og forbrukere som ikke benytter seg av kildesortering? Hva hindrer dem fra å gjøre det?*

Jeg synes at dem er latte, jeg kan bruke et begrepet som «vondt i viljen sin». Dem forneker at det er faktisk nytte enten av kunnskapsmangel, eller fordi dem ikke vil vite. Dem bare gjør som dem alltid har gjort før. For eksempel, etter et besøk på vårt sorteringsanlegget 99% av dem som har vært kritiske blir veldig positive etterpå, mens 1 % som blir kritiske etterpå også. Selv om de ser med egne øyene så tror dem ikke at det nytter.

- *Hva er din konklusjon, er det fortsatt langt vei å gå for Norge når det gjelder CE og kildesortering?*

Det er veldig lang vei å gå. Hvis man kildesorterer alt da blir det veldig lite restavfall. Hvis alle hadde sortert nøye sin avfall, så hadde vi fått kvanta sprang på resultater. Det tar tid. Jeg har en tro på at menneskene skal endre seg, men resten av verden kommer veldig kort. Til og med USA tar meste parten på deponi. Dem som ligger lengst frem er Nord Europa og Vest Europa. Jo lengre fra Nord Europa og Vest Europa jo dårligere er løsninger. Kanskje bortsett fra land som New Zealand, Japan, Canada, Australia. I Kina foregår det kvanta sprang, der skjer det utviklinger kjempe hurtig. De ser at hvis dem ikke gjør noe så forgifter dem sin egen befolkning på grunn av mye forurensning.

Interview nr.5.

Norsk

Intervjuguide for ledere

Firma: ROAF

Dato:

Bakgrunnsinformasjon om respondent.

9. Navn (valgfritt): Tom Roger Fossum
10. Rolle i bedriften: Avdelingsdirektør for produksjon og utvikling (PUT)
11. Utdanning og faglig bakgrunn: Agronom
12. Erfaring innen gjenvinningsbransjen: 18 år

Ledernes oppfatninger om Sirkulær Økonomi.

- *Kan du fortelle litt om ROAF sine logistikkprosesser og løsninger?*

PUT inkluderer 7 deponier, sorteringsanlegg, vekt, verksted.

ROAF er en stor bedrift med logistikk i alle forskjellige ledd. Med tanke på avfall og det vi sender av gårde mye logistikk der i forhold til forbrenning, gjenvinning. Mye av det går på kontrakter. Vi stiller krav i kunngjøringene våre. Er det noen som vinner kontrakten og så legger man opp en logistikk sammen med de som får oppdraget. Mye av logistikk jobben gjøres ikke hos oss, men hos de transportørene som får oppdragene på det som er med avfallstransport å gjøre.

Men vi har mange avfallsbrønner for renovasjon, avfall sug, så vi begynner å ta tilbake noe i egen regi. Der er det mye logistikk og vi planlegger og kartlegger rutene selv. Men det er vi helt i start fasen på. Meste parten av renovasjon er outsourcet, og andre som gjør jobben for oss. Når vi kunngjør kontrakten fra kommuner, det går ut på konkurranse, og så vil da «RenoNorden», «Norsk Gjenvinning» og andre levere tilbud til oss på hvor mye de tar for å gjøre den jobben. Og da har vi stilt krav at bil skal være blå, med ROAF logo sånn at innbyggerne ser at det er Roaf som kommer og henter avfall.

Vi har noen biler selv som tømmer avfallsbrønner og avfall sug i hovedsak.

- *Hva er deres mål når det gjelder transport?*

Roaf er en miljøbedrift så vi ønsker å generere minst mulig transport, vi stiller krav til motorer, når vi skal bestille transport oppdrag så ønsker vi at det skal være relativt ny teknologi på motor sånn at det er minst mulig utslipp. De skal også kjøre med så fulle lass som mulig.

- *Kan du utdype?*

For eksempel, når vi skal ha avsetning på avfall til forbrenning, husholdningsavfall, så går vi ut i markedet for det, og da får vi inn pris på behandling og transport samtidig. Vi innhenter en pris for å få levert varen til forbrenning, og da transport er en del av det. De fleste sorger for at man har retur transport for å få så billig transport som mulig. Hvis ikke så kan det bli vanskelig å vinne anbud.

- *Hva mener du med retur transport?*

For eksempel, tidligere har vi sendt mye av avfall til Sverige. Så når bilen går til Lidköping med avfall herfra så bruker den mange timer for å komme dit. Når den skal tilbake til Norge for å hente mer, så tar den med seg last tilbake for å levere i nærrområde her. Bilene skal ikke kjøre tomme. Retur transport det er noe selskapene jobber mye for, og det er viktig når vi velger den som skal kjøre for oss. Men det er ikke vi som sitter og finpusser logistikken på det. Vi velger ut ifra kriteriene, vi stiller krav i kunngjøringene som er satt opp på forhold.

Renovasjonsbilene hos oss kjører på biogass – det er et krav vi har stilt. Biogassen de kjører på fremstilles av matavfall som leveres av innbyggerne, da går det i et kretsløp.

- *Har dere næringskunder eller bare private husholdninger?*

Jo, næringskundene har vi og. Avfallet går til deponi – landfill. Det er forbudt å deponere organisk avfall. Det som deponeres er oljeforurensede masser, betong, aske fra forbrenningsanlegg sånne ting. Næringskunder kommer til oss og tømmer en vare og drar tomme tilbake. Så for oss er det ingen logistikk rundt det.

Renovasjon bilene kjører til næringskunder slike som skoler og barnehager, små pizza kiosker. Det får ikke egne biler, men ligger i ruta.

Sorteringsanlegget sorterer nesten 40 000 tonn i året av husholdningsavfall. Den sorterer grønne matposer, 7 plastfraksjoner, 2 metallfraksjoner, papir, 10 fraksjoner kommer ut av det. Alle de fraksjonene blir transportert ut. 7 av dem blir presset i firkant paller – all plasten, papiret og metaller, ikke magnetiske, blir presset i paller, satt på lager og når det er nok å sende av gårde et lass da bestiller vi transport. Det selges som råvarer som gir oss inntekt. Mye går til Tyskland, noe går til Sverige og Norge. Da forholder vi oss til børns og markedssvingninger.

- *Hvilke varer eksporterer Roaf mest i dag?*

Plast eksporteres mest til Tyskland og Sverige. Papir går til Sverige. Papir har egen beholder hos innbyggerne, men anlegget sorterer det ut fra restavfall også. Men vi ønsker at folk bruker beholderen for å sortere hjemme. For da blir papir kvaliteten mye bedre og vi for bedre priser for den også. Vi ser at

mange kaster papir sammen med restavfall. Det har vi mulighet til å ta ut på anlegget, men kvalitet og pris blir dårligere. Vi sorterer ut over 1000 tonn papir fra restavfall. Vi har da mye kontakter med transporterer og toll når vi skal eksportere avfall. Det er ikke så enkelt som når vi eksporterer en ren vare, vi har utfordringer med det.

-Hvor kjent føler du deg med begrepet sirkulær økonomi og hva handler sirkulær økonomi om for din organisasjon?

Jeg synes det er veldig spennende og veldig bra at sirkulær økonomi er mye fokus på i dag. Mange bedrifter har satt det på dagsorden sin. Vi er nok veldig start gruppe på det enda, men vi har begynt å tenke sirkulær økonomi. Det er vei å gå fra å tenke på det til å skape det.

- Ligger det mye utfordringer der for Roaf?

Jeg føler ikke at jeg kan nok om sirkulær økonomi enda til å mene så mye om det. Utfordringer vil det bli, men jeg tror at det må til.

- Hva er ditt syn på de bedriftene som ikke tenker sirkulær økonomi og ikke benytter seg av retur løsninger.

Det gjør at din relasjonsgebyr blir dyrere så de som bor i Skedsmo må betale mer, fordi andre ikke gidder å gjøre jobben sin. Sånne ting irriterer meg både som Roaf ansatt og som privat person. Noen har feil holdninger i forhold til avfall.

- Du mener at det hadde vært billigere om alt avfall har vært sortert riktig?

Ta et eksempel som pant. På anlegget vårt så kaster innbyggerne pant for cirka 3,5 millioner kroner i året - i stedet for å pante. Det har for så vidt ikke noe med forurensingen å gjøre, men det sier mye om holdninger til folk. Vi tar ut over 1000 tonn metall, kniver, bestikk, masse glass. Det er helt gratis å levere sånne ting til gjenvinningsstasjoner. Det finnes mye informasjon og tips på internett om hvordan man kan sortere.

- Fra din erfaring, hvilke anbefalingene vil du gi til lederne i andre bransjer i forbindelse med returløsningene?

Anbefaling er å sette kildesortering på dagsorden, ha fokus på det. Bruke avfallspyramiden og ta ansvar for de valgene man tar. Avfallspyramiden sier at ombruk og material gjenvinning er det man skal jobbe for før energigjenvinning. Man må ikke tenke bare «økonomi» - det er ikke alltid det henger sammen med miljø. Se på pyramiden og ikke bare tenke egen profitt og penger, men tenke langsiktig.

Interview nr.6.

English

Interview guide for managers

Company: Deutsche Post DHL (telephone interview in English)

Date:15.10.2015

Background Information

1. Name (Optional): Jonathan Spearing
2. Rank in the organization? Head of Customer Solutions and Business Development. Corporate Shared Value | GoGreen
3. Educational and professional background? Management
4. Experience in the field of logistic industry --

Managerial perceptions concerning Circular Economy (CE) and Reverse Logistic (RL) activities in organization.

- *How familiar do you feel with the term Circular Economy and, in short, what does it mean for DHL?*

We feel very familiar with this term. We have been doing CE and RL solutions for customers for number of years now around the electronic waste, within electronic industry but also other industries. We have a division in our organization called the Envirosolutions (...). They dedicated to doing produce a responsibility, waste recovery and RL solutions. This is something our organization has had a substantial experience with. Of course, we know the engagement of the Ellen McArthur foundation (...)

- *What do you understand by the concept of CE?*

Well, the idea of shifting from a linear "use-and-throw-away" economy, to the economy where the resources and energy (*further - unclear*). Reduce the extraction how far you go back in the production cycle.

- *What do you consider the main hurdles to developing the CE for your organization?*

We are not a manufacture company for those are the primary hurdler is the economic side. At this point, it is still, in many cases, less expensive to exterminate that complex, but it's also less expensive in many cases to just use new goods, in an object, right. Therefore, it is easier from a design prospective; it is easier for the production flow management, and for an inventory management. It is also even easier from the prospective of giving a customer a value proposition. To me the economic case followed by a complexity of managing circular economy activities are the two big main hurdles.

- *What would help your organization to prepare for or develop a CE approach within your organization?*

Our org is the service provider so, for us, we provide CE and RL solutions. It's not about Deutsche Post DHL moving, its more operational circular. We are not a manufacture company, we don't manufacture cars or electronic or so. For us, we perform a service, we don't recover a service after goods, right?

It's about we have better enabling per customer, a manufacturing customers to move circular and then for us to be able to provide them with the solutions that are necessary for them to do that, in a cost effect of manner.

When our Express division going to a customer, right? And they make drop-off four parcels that day, and they make pick-up three parcels. However, to us, whether not goods in the parcel were reused is of question. Is it going back to manufacture or going back to customer of our customer (...)

We move what customers want us to move. We suggest them solutions to do that depending on specification of the customer – does it have to be fast and secure, does it have to be unexpansive, is it national or is it domestic, is it large, is it small. We move it according to specifications of the goods for customers. Our job in a CE is to enable our customer to move circular because our own operation are primarily service processes.

- *What would you say are the perceived benefits of a CE to mainstream supply chain management system?*

First of all, RL has been around for a long time. Recovery of used machine parts and other heavy equipment, transportation of it back to remanufacturing have been going on for decades, right. Now it is been called circular but for a decades it has been happening, but in the certain segments.

IBM, for example, have been recovering main part for twenty years, right. We support our customers with those types of activity – recovery of parts, remanufacturing of defective goods so it goes back to the market – that’s nothing new. The difference from earlier areas of activities today, is a desire to recovery end-of –life-goods. You need to find someone to collect the goods from the end users, you need to console, sort them, you need to move them to certain location to sort what’s going to go recycling or remanufacturing (...). You dealing with large quantity, portfolio of products which you producing

- *What are the most common reasons why products are being returned? Has it been measured in some way?*

Yes, our customers, absolutely. In order to run recovery we measure every component we can of it in order to enable our customer to understand what’s come back and what’s been done with what, and how much everything costs, it’s normal procedure. It is published on our website, general statistic and information.

The question one has to ask is not what section, what segments, but what the characteristics that sense to do that activities. I will tell you what segments are naturally there. The economic value – it costs to pick up something, it costs to bring it back, to sort it, to process it, so you need to have enough economic value that come out of that, that justifies that activity, right. It can be very low value when it comes back sometimes, and can be retreated as recycle, basically, and may be repurposed. And then if you are talking the opposite and taking an MR machine at the hospital, that might have been there for 5, 10 years, it’s still a perfectly good a MR machine, right. It might have need a modernization, clean up refurbishment or a few parts replaced, and it’s sold back into the market, to a hospital that may be can’t afford a brand new one. So you have to see that are characteristics of goods, it’s value, how you handle it and how you doing it, right?

- *Are there any common goals or models adapted to improve returns in DHL?*

Since we not a manufacture, we don’t produce items. We recovery on behalf of our customers. You know the concept of the material passport. Is a very good idea. Manufactures struggle to know what the parts are. They know what’s in their own goods, but the recycling community does not necessary knows

what in the goods of manufactures. Material passports, things like that can be helpful, better collections skills and services (...) the economic case for circular economy needs better understanding for everybody involved – for the government to make legislation, for the companies that manufacture products that would be recovered, for the logistics providers that will enable the process...for the public to better understand the motivation behind the collection skins why they work where they work.

- *Based on the process of supply chain management, how do you think the process of RL will benefit your organization in the future?*

The more companies move circular, the more they need our services. Someone physically has to move those goods, has to pick them up, has to bring them back. For us, the growth in CE, remanufacturing, recovering, recycling, think sort of...that people want to preserve more value in that case logistic services will make more sense.

- *Do you have any plans for developing of the CE and RL, and what opportunities regarding that do you see for DHL in future?*

What I can tell you, is that we see that there will be an increasing demand for RL and producer responsibility related services. We will improve and expand our services that suit our customers' needs.

- *From your experience, what recommendations would you give to other managers in relation to execution of RL principles?*

I would say there is no one side of CE, that they need to look at the product they want to recover. Even in the same company different products classes, and products family will have different RL and CE solutions apply to. And they need to look at those product characteristics and other objectives and match those up to the solutions suitable for those products. So its not a one side at all, it's going to be a wide process.