MASTERS THESIS IN INNOVATION MANAGEMENT

THE DRIVERS OF ECO INNOVATION. A CIRCULAR ECONOMY PERSPECTIVE

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ABSTRACT

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Abstract

As lot of challenges facing the contemporary business, shift from traditional innovation to eco innovation is required in order for business to meet the environmental objectives as organizations must recognize the importance of environment in any aspect of innovation. The study aims to identify the drivers of eco innovation in the light of circular economy from the overview of the existing literature. The investigation of drivers of eco innovation is subjected to the one single organization, a Finnish SME.

A case study was adopted as a research methodology to find out the drivers of eco innovation in circular economy context. Conceptual model was drawn from the previous research with regards to the drivers of eco innovation and verified through the empirical investigation. The scope of research was limited to three categories of drivers of eco innovation based on general innovation theory categorization. Findings suggest that technological competencies, research and development and network and collaboration were the most dominant drivers of eco innovation and they showed a strong relationship with circular economy. The study provides a discussion regarding the drivers of eco innovation and presents the potential relationship between eco innovation and circular economy based on the empirical data.

The study is deemed as exploratory in nature, an effort towards understanding the intricate relationship between eco innovation and circular economy. The study provides relevant insights that will enable business organizations, policy makers, environmental agencies and other stakeholders to make an informed decision regarding environmental sustainability. The study also showcases the practical insights regarding the promotion of how eco innovation contributes to a transition to circular economy.

Key words
Drivers of innovation, Eco innovation, process innovation, sustainability, resource efficiency, recycling, circular economy
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1. INTRODUCTION

1.1. Background

In many countries, there has been economic stagnation due to the global financial and economic downturn. Readjusting to the green growth economy is the only way to overcome this crisis. (Nordic Workgroup, 2010). Natural resources such as discovered fossils fuels, minerals, fresh water etc will be declining in the next two decades. Also, economy tends to double due to the growth of population (population will reach 7.675 million in 2020). In other words, production of the key resources need to increase in proportion to this growth. This global transformation presents huge opportunity since new market for products and alternative ways of creating business begin to emerge (FOR A, 2011). Green growth suggests cultivating new economic growth and progression by making sure that natural resources keep producing the resources and environmental services upon which the wellbeing of human being depends.

Economies have to invest on innovation which supports sustainable growth. This sustainable growth create new business opportunities. OECD strategy of green growth (OECD, 2011) suggests that policies for green growth should trigger innovation which can then increase efficiency in terms of using natural capital which in turn create economic growth stemming from the adoption of eco activities. This dissemination of eco innovation leave positive impact on economic social and environmental improvement in both OECD and non-OECD countries (Jing & Bow, 2013). In addition, the environmental impact as a result of industrial activities is a major problem in the world. In an effort to protect the earth from environmental damage, concepts such as green image, eco innovation, eco marketing, eco production, eco management etc are increasingly being discussed. (Chen, 2007)

It is an established fact that innovation is a prime driver of economic and social progress. Innovation fosters business success for the firm enabling it to have competitive advantages. Michael Porter suggested that innovation is at the heart of economic prosperity (Porter & Van der Linde, 2006). In order for countries to incline towards more of an ecofriendly sound and progressive society, promoting innovation is a must thing which enables firms to consider finding different ways of addressing present and future environmental issues. This helps reduce energy and resource consumption while at the same time developing sustainable economic activity. This innovation is commonly known as eco-innovation (OECD, 2012). In the European Union (EU), eco innovation was considered as single most contributing factor to the
Lisbon strategy objectives for economic growth and competitiveness and also is important element of new Europe 2020 strategy (OECD, 2010)

1.2. Literature review and Research gap

As opposed to the general innovation, firms consider eco innovation to be quite uncertain and risky. Despite that fact that many institutions, regulations and policies are designed in a way that can stimulate eco innovation. However, studies shows that those institutions regulations and policies are not able to reduce the uncertainty and the risk of eco innovation. For instance, according to Ashford (1993) identified the few barriers of eco innovation such as technological barriers, consumer related barrier, financial barrier, managerial barrier etc. Empirical study to identify eco innovation barrier as evidenced by Technopolis (2008) found that demands, costs and lack of finance are some of the major barriers. Many firms are not really aware of long term opportunities due to the high costs. Another empirical study as evidenced by Rehfeld et al (2007) suggested that environmental products are much more expensive than conventional products. European commission Environmental technologies Action plan (2004) also identified the relevant barriers to eco innovation. These barriers are regulatory barriers, economic barriers ranging from higher price to higher investment, technological barriers and diffusion barriers. These barriers pose fundamental challenges to the success of eco innovation. Therefore, identifying the drivers of eco innovation could provide solution to these challenges

Various studies Oltra (2008), Vinnova (2001) & Horbach (2008) and their focus on the drivers of environmental innovation have been found. For instance, Horbach (2008) study on German firms suggest that the improvement of the technological competencies and research and development (R&D) knowledge capital triggers environmental innovation. Many literatures have attempted to analyze the drivers of eco innovation with environmental promise in country, industry and firm level (Porter and Linde, 1995; Bansal and Roth 2000; VINNOVA, 2001; Frondel, Horbach and Rennings, 2008). The study of Vinnova (2001) focused on the existing literature as to how external demand drive environmental innovation within firms. It is quite evident from the literature review that theoretical and empirical evidence for the drivers of eco innovation from resource efficiency perspective has not been addressed sufficiently in any of the previous researches which is a significant research gap.
1.3. Research framing

Empirical study as highlighted in the literature review revealed the growing challenges of eco-innovation barriers. That’s why, there needs to a shift in eco-innovation approach in order to address those challenges as industries now a days have been trying to looking at the pollution level to control the discharge as eco-innovation was mostly on discharge level traditionally. Many industries build end of pipe technology in an effort to reduce the toxicity of their discharge. However, end of pipe technology being costly, and in most cases, were inefficient in terms of reducing the pollution. That’s why, industrial interest has been shifted to adoption of more of an eco-innovation approach. Industries today are increasingly adopting eco-innovative cleaner production that significantly reduces the energy and materials used in the production process. They are looking to check the entire product life cycle and integrate different strategies such as closed loop production system that eliminates final disposal by recovering the wastes and turning them into new resources for production.

Shifting towards cleaner technology approach divorcing the end of pipe technology is imperative. Because the environmental benefits coming from cleaner technology far outweigh the benefits derived from end of pipe technology (Horbach & Rennings, 2004). Another eco-innovative approach is eco-efficiency. Eco-efficiency implies the less environmental impact as per unit of the product or service (World Business Council for Sustainable Development, 2000). Eco-efficiency reduces the energy intensity, enhances recyclability and use of renewability for instance redesign packaging and creating zero waste and so on.

In terms of sustainability, environmental reasons has received an interest in resources efficiency among business, civil society and government with three billion people likely to join global middle class by 2050 (WBCSD, 2009; McKinsey, 2011). The competition for resources are growing. Therefore, there is a need for improving the productivity of resources so that they can make significant contribution to reducing resource depletion and the threat of climate change (McKinsey, 2011; BIO IS, 2012; Tukker, 2013). That’s why, the European Union (EU) has labelled resource efficiency as one of the main agenda of its Europe 2020 strategy (EC, 2011). For this reason, many influential policy makers are advocating for creating a “lease society” (Merkies, 2012), a circular economy (Ellen McArthur Foundation, 2013), resource revolution (McKinsey, 2011). EU Lisbon Strategy (2000) is also advocating for the development and implementation of greener sustainable economy and proposed an action plan concerning eco-innovation (EC, 2011a; EIO, 2011; 2013), resource efficiency (EC, 2011c; 2014) and circular
Circular economy occupied a central place within EU agenda with commission’s circular economy action plan emphasizing the EU’s commitment and support for circular economy while at the same time recognizing its close connection with eco innovation (EC, 2017). Circular economy is dependent on embracing a systemic approach to eco innovation that create value and consider supply chains in their entirety and engages all actors involved in that chains (EC, 2016: p. 7).

It is evident from the literature review that there have been an evolution of new understanding to look at eco innovation from new perspective. Therefore, in this research, I tend to find out the drivers of eco innovation in an organization through the prism of circular economy concept, which is technically a resource efficiency view, a unique perspective which most of the empirical literature review have failed to address. The rationale behind this framing is that circular economy concept complements eco innovation and provides new solution that fits well with the adoption of eco innovation approach e.g. closed loop production system, extension of product life cycle, resource recovery, recycling, waste prevention etc. The reason why I am using this framing is because this focus will unfold a vast areas of topic with regards to how eco innovation drivers enable the transition to circular economy and usher a potential relationship between eco innovation and circular economy.

1.4. The objective of the study and research question

The study aims to have deeper understanding on the drivers of eco innovation in an organization. The focus of this research will concern circular economy concept, a guiding principle through which I will attempt to address the research gap that was found in the literature review. The purpose would be to find out the drivers of eco innovation in an organization from the perspective of circular economy.

Existing literature and current research have been highlighted with regards to eco innovation drivers and I will attempt to carry out the empirical research to have a better understanding of eco innovation in an organization with new angle, contributing further to excel innovation for environmental sustainability. The study will take into consideration one single company as case study aiming to enhance the current body of knowledge that will aid companies to develop eco innovation practice in new perspective. The main research question would be as follows:

1. What are the drivers of eco innovation in an organization from the viewpoint of circular economy?
The main research question in general gives the overall impression of the topic itself. The major key concepts are highlighted in the research question. First part of the research question for instance the drivers of eco innovation in an organization essentially formed the theoretical framework of the study and the later part of the research questions will address the circular economy perspective which is the main lens through which I will attempt to find solutions to the main research question.

The outcome of the study should contribute to enhance the existing the drivers of eco innovation and to the emerging body of knowledge with regards to circular economy and eco innovation.

1.5. The structure of the thesis

I have structured the thesis in the following ways:

First chapter introduction addresses the background of the study, explaining the reason and the context of the study.

Second chapter shortly introduces the key conceptual framework of the study such as the key concepts of eco innovation, eco innovation drivers and circular economy. Chapter 3 will address the main theoretical framework of the study. In this section, the main drivers of eco innovation in the organization will be addressed from the overview of the existing literature. Chapter 4 will address the chosen methodology of the study, data collection and analysis. Chapter 5 will shortly address the empirical result of the study from the case company. Chapter 6 will highlight the discussion section. In chapter 7, limitation and future research of the study will be presented.

2. CONCEPTUAL FRAMEWORK

2.1. Key concepts of the study

The key concepts of the study in this research are eco innovation, drivers of eco innovation and circular economy.

Eco innovation:
Eco-innovation observatory (2013) highlighted the eco innovation as such: the introduction of any new product or service, process or organizational change or marketing that reduces the consumption of natural resources (Including materials, energy, water or land) and reduce the detrimental substance throughout its lifecycle. Similarly, European commission (2007) described the eco innovation as the following: Any form of innovation directing at significant progress towards the objectives of sustainable development by reducing negative environmental impact or obtaining more efficient and reasonable use of natural resources.

Drivers of eco innovation:

Previous studies on the drivers of eco innovation was largely dominated by technology push and market pull theory (Rehfeld & Rennings, 2007) also in supply and demand side drivers (Triebswetter & Wackerbauer, 2008). Technology push in particular is necessary for the initial stage of the innovation and market factors play out in the diffusion of innovation. Both factors are imperative for the successful innovation. However, another factor appeared in the empirical studies and academic literature. Several recent studies on environmental innovation emphasize on the regulation and policy and institutional effects (Porter & Linde, 1995; Oltra, 2008; Ashfords, 2008; Horbach J, 2008). Also according to Horbach & Rennings (2007), the general innovation theory has been enhanced by the influence of the regulatory policy and categorized the drivers of eco innovation mainly in three categories demand side, supply side and regulatory and policy side drivers. In this study, I tend to capitalize on three categories of drivers of eco innovation and utilize the existing literature on the three categories of eco innovation as general framework for the theoretical background.

Circular economy:

Circular economy is a concept that represents a model of production and consumption system that relies on continuous reuse, recycling and the recovery of natural resources. Circular economy’ is “an industrial system that is restorative or regenerative by intention and design. It replaces the end-of-life concept with restoration, shifts towards the use of renewable energy, eliminates the use of toxic chemicals, which impair reuse, and aims for the elimination of waste through the superior design of materials, products, systems, and, within this, business models” (Ellen McArthur Foundation 2012).
2.2. Types of eco innovation

There are different types of eco innovation that offer benefit to the environmental problem and offer competitiveness for the firms. These dimensions could be of various types’ for instance technological or no technological nature or functional or operational dimension. Anderson (2008) identified 5 different types of eco innovation.

Add-on eco-innovation: (Pollution and resource handling technologies and services) these are considered to be products or services aiming to improve customer’s environmental performance. The product does not necessarily need to be environmentally friendly rather they handle environmental solution such as at the sink side (technologies or services that clean up, dilute, recycle, control, measure and transport emissions) and resource side(supply of natural resources and energy and extraction). These technologies and services are added on to current production and consumption practice which have limited systematic effect (which is cost effective).

Integrated eco innovations (cleaner technological process and cleaner products): These are integrated innovation in that they make the product or production process more eco-efficient (cleaner) than conventional or similar products or processes. Companies having invested in integrated innovation can increase competitive advantage because environmental performance of the products or processes is more eco-efficient than their competitors. Integrated innovation provide solutions to the environmental problem of the organization within the company or other organizations (e.g. public institution, families) enabling energy and resource efficiency and substitution of toxic materials, enhancing recycling. The innovation are technical in nature, however it can be organizational too. The dominant aspect of these integrated innovations is the greenness of the product. Although they might change and represent the technological continuity.

Alternative product eco-innovation (new technological paths): These innovations produce radical technological discontinuity in that they are not cleaner than similar products rather different in nature (new technological trajectory). These innovations are predicated upon new theories, capabilities and practices and might trigger radical shift from the existing production and consumption pattern to radical new production and consumption pattern. These innovation have systematic effects and the environmental dimension of these innovations lie in the product/production design alone in that it might be greener than the alternative. Examples of
these innovations are renewable energy technologies contrary to fossil fuel technologies and organic farming as opposed to traditional farming.

Macro-organizational eco-innovation (new organizational structures): These innovations offer a radical new solution in terms of efficient organization of the society which implies that new ways of managing the production and consumption at a more systemic level which also reflects the functional interplay between companies and organizations, between workplaces and families. Example of these innovations are industrial symbiosis and urban ecologies (new ways of organizing cities and technical infrastructure). These innovation are said to be organizational in nature. However they might be technical innovations too. They indicate the special dimension of eco innovation therefore requires organizational or institutional change. These innovations fall under the category of the public authorities who seek collaboration with companies for novel solutions.

General purpose eco-innovations: These innovations falls under the range of other technological innovations as they impact the economy and the innovation process significantly. Innovation researchers associated how these technologies determine the technological economical paradigm at any given time. General purpose technologies will have major impact on eco innovation therefore further research needs to be conducted. The positive and negative impacts technologies such as ICT, biotechnology and nanotechnology might have on eco innovation deserves further scrutiny.

Now from the different categories of the eco innovation, it is quite apparent that dynamics of eco innovation is very complex in nature. These dimension of eco innovation might contribute to the environmental problem and enhance the competitiveness of the company differently over times and space. Of course different eco innovation dimension influence each other and these influences might be very dynamic in different industries depending on the context.

2.3. Eco innovation in practice

The development of economic activity has been guided by growing international concern for environment such as climate change, scarcity of resources and energy security. As a result, manufacturing industries in particular have shown interest in sustainable production and have accepted new corporate social responsibility despite the growing challenges. According to Johnson & Suskewicz (2009), in order for eco industries to evolve, it requires a balance among key elements such as a technological system that is working, innovative and customized business models and a market adoption strategy coupled with favorable government policies.
In addition, reduction of greenhouse gas emissions has been one of the top most priority for OECD government with many attempting to adopt long term framework such as Kyoto Protocol in an effort to tackle global warming. Therefore, OECD countries despite facing economic crisis raising awareness for industrial effort to gain sustainable development. Many countries are pursuing new “Green new deal” or “green recovery” policy with greater investment in environmental technologies (OECD, 2008)

The companies need to adopt new environmental strategies for instance, manufacturing industry alone has been responsible for a large part of resource consumption and waste generation. According to IEA (2007), energy consumption of manufacturing industry increased by 61% from 1971 to 2004. Similarly, they are also responsible for producing carbon dioxide globally which is 36%. Especially, manufacturing industries have great potential to become a determining factor in terms of creation of sustainable society. Also, they can improve the environmental performance of the products or services by designing and implement integrated sustainable practice (OECD, 2008). Now Maxwell et al. (2006) argued that there has to be shift in the perception and understanding of the industrial production and this requires holistic approach to conducting business. According to UNEP & UNIDO (2004), dispersing pollution in less harmful way has been one of the objectives of the environmental impact of industrial production historically which has been driven in part through environmental regulation. Since industry has different treatment and control measures in order to cut the amount of emission and effluents. Until recently, its attempt to develop environmental performance has been moving towards lifecycle and integrated environmental strategies management system thinking with growing companies beginning to adopt larger environmental responsibilities throughout their entire value chains (OECD, 2008).
2.4. Perception of eco innovation from managerial perspective

Current innovation economics literature suggests that that technological development (technology push) and demand factors (market pull) are the primary drivers of innovation (Freeman & Soete, 1999). Top management is the one that initiates the environmental innovation strategy of the firm. Prather & Gundry (1995) and Tushman & O’Reilly (1997) argues that management plays a key role in terms of creating company’s expectation and norms which triggers innovation and creativity. Because concerns of top management determine how quickly firm reacts to environmental issue (Bansal, 2003). A number of other authors such as Ashford (1993) & Schmidheiny (1992) supported Bansal’s argument that firms prioritize environmental innovation strategy only when managers place a high value and concerns for the protection of environment. Also, innovation and sustainability aspect can be beneficial for the progress of the business in that they facilitate the condition for reducing cost through energy management system, reduce risks (through enhanced safety features), increase sales and profit margins, increase reputation and brand value, build up innovation capabilities by aligning personal and company values (Schaltegger, 2011).

2.5. Key concepts of circular economy

The European commission (2015) defines the circular economy as follows:
“Aims to maintain the value of the materials and energy used in products in the value chain for the optimal duration, thus minimizing waste and resource use. By preventing losses of value from materials flows, it creates economic opportunities and competitive advantages on a sustainable basis.”

EU action plan for circular economy defined the circular economy which European commission published in 2015. The plan drafted key strategies aiming to boost the support for the progression towards circular economy in EU. The objectives is to create more jobs, promote competitiveness and support sustainable growth (Reichel et al. 2016: p. 5). According to European Commission (2015), the action plan in particular advocates the idea of material loop and regulating the product lifecycle since circular economy constitutes the fundamental elements on production, consumption, waste management, secondary materials market, definite measures and innovation.

The principle of circular economy present an alternative to mainstream linear business model which is based on take, make and dispose model (Reicheil & De Schoenmakere, 2016: p. 9). The principles of circular economy include design out waste, build flexibility and resiliency through diversity, renewable energy, think in system and think in cascades (Ellen MacArthur Foundation, 2015b)

The linear business model depends on huge amounts of large competitive, easily available materials and energy (Ellen MacArthur Foundation, 2015b). Resources are extracted in the beginning in the linear model, then transformed into products, sold and disposed or incinerated (McDonough 2002: p. 27). This linear business model is polluting the world over and environmental in general. According to Nguyen et al. (2014) every year approximately 3.2 trillion worth of material which is about 80% used in the consumer good are not restored leading to the shortage of the raw materials. As a result costs are rising.

On the other hand, circular economy, unlike linear economy, seeks to increase the share of sustainable and recyclable resources, thus diminishing raw materials and consumption avoiding negative environmental impact. In other worlds, it creates value while eliminating waste and minimizes the use of product (European Environmental Agency, 2016).

Circular economy requires systematic change along the value chain. Policy and regulation are different for different industry. There is no single way of creating circular economy. There has to be an institutional change, cultural and social change, organizational change, technological
innovation and stable regulatory framework in order to move towards circular economy. Therefore, closer co-operation between business and government are required (van Eijk 2015: p. 3).

![Figure 2: Difference between linear and circular economy (RPS Ltd 2014)]

According to Ellen MacArthur Foundation (2016) circular economic model tends to recover the value of resources, products or materials in a way that enhance the product life cycle for maximum amount of time, then causes the materials to go back to use in continuous cycle as opposed to inducing waste, where the value of the resource is lost. Now this circular economy concept associated with the concept called Industrial ecology, cradle to cradle philosophy and natural capitalism. Industrial ecology deals with material and energy flows via industrial systems that connects different operators within the industrial ecosystem which leads to creating a closed-looped processes where waste serves as an input. Industrial ecology embraces the holistic and balanced view where the designing of the production processes takes into consideration the local ecological constrains while looking at the their global impact from the very beginning, and trying to reconfigure them so they operate so close to the living system as possible. In this way, industrial ecology focuses on the social wellbeing by emphasizing the need for the restoration of natural capital (Ellen MacArthur Foundation, 2016).

European commission revealed an action plan regarding circular economy in 2015. According to European commission (2015) the action plan contains a waste proposal which aims to establish long term vision to increase recycling in an effort to cut down landfilling but at the same time recommending proposals and initiatives to enhance waste management across member states. The circular economy action plan supports the proposal where detailed guidelines, initiatives and measures laid out that direct life cycle of the product in all stages ranging from the production to consumption to waste management to finding market for secondary raw materials (Reichel et al., 2016: p. 5)
European member states, under the waste framework directive, wish to increase the reuse and recycling rate of timber and different construction materials by increasing the landfill cost for discarding construction and demolition waste. As a result, construction processes have been improved resulting in the reduction of waste (European commission 2011: p. 89). According to EU Waste Framework Directive, the top option prevention is considered to be the favorable one and disposal at the bottom the least favorable one. The objective of this waste Hierarchy is to prevent the waste, followed by reuse, recycling, energy recovery and finally disposal as last resort.

Figure 3: European Union’s waste hierarchy (Recyctec Holding AB 2016)

2.6. Cradle to Cradle

Braungart & McDonough (2002) advocated the idea of cradle to cradle concept, a new production model which is based on circular supplies business model. The concept of cradle to cradle is deeply rooted in the nature in that the resources are circulating in a way that constantly add value to each other. The main principle of this model is ‘’waste equals food’’ (Braungart et al., 2002: p. 92). The main principle of this model is not to adopt eco efficiency approach where wastes are reduced rather to design systems in a way that outputs can be added to nutrients by other processes. And this principle can be applied to the production stages of a product and for the product as well when it reaches disposal stage in terms of emission. Now according to this model, materials and products are not diminishing but being reused which brings additional monetary value for the material, nature or people (Braungart et al., 2002: p. 93).
2.7. Resource recovery

Due to the global excessive consumption, resources are becoming more and more costly. Therefore, more and more businesses are looking for alternative way to utilize, protect, recapture and reuse the resources hidden within production output and discarded products. A lot of companies are also paying for the disposition of the waste. However, there might be profitable revenue stream, and that revenue stream might be realized in the form of materials, that could, potentially after reprocessing, be of value to another company (Lacy et al., 2015, 1298-1299; 1336). The resource recovery business concept focusing on resource repairing and recovering the value and utility of the products through recycling technologies, the aim of which is not only to recycle the product but to enhance the utility and value of the product (Ovaska, et al., 2016: p. 24.).

More companies are reevaluating their production chains in order to find out alternative means as to how waste could be transformed into product that has value. This in and of itself begins the process of circular business and opens up opportunities for new revenue stream (Vaughn 2014, 16.). Waste is not considered as problem in the resource recovery model rather being viewed as resource and opportunity, therefore, implementation of this model will potentially eliminate waste material and enhance the value of the product because products are taken back in this model. Through this recovery process, companies can remake the product and build new products out of the discarded materials. To facilitate this process, products have to be designed in a way that can be disassembled (Lacy et al. 2015, 1309-1313; 1300-1302; 1426).
2.8. Industrial symbiosis

Industrial symbiosis is a holistic whole made of many companies in which everyone is creating value for each other through better utilization of the technology, resources, energy and services. For instance, the waste for one company might be a resource for the other and vice versa. The practice of industrial symbiosis takes place usually at manufacturing and process level and also might happen across different geographical areas (Bocken et al., 2016.)

The development of industrial symbiosis paved the way for improving product innovation/process innovation while at the same time new knowledge is created which brings new businesses. New production innovation reduces the operational costs and risk for instance environmental fines and consequently contributes to ensure stable resource security. Business are reducing costs across the entire networking by having collaborative agreement for example by communal service sharing (recycling, maintenance), waste/byproduct exchanging. Also business can create value at the same time through joint cost reductions (Bocken et al., 2016).
3. THEORETICAL FRAMEWORK

3.1. Regulatory drivers

Regulation is one of the drivers of innovation (Doran & Ryan, 2012; Horbach et al., 2012) and aids its diffusion (Wagner & Llerena, 2011). According to porter hypothesis, environmental regulation triggers innovation leading to win win opportunities whereby continuously pollution is minimized and competitiveness of the firm’s increases. That’s why regulatory policy is important. According to Williamson & Lynch-Wood (2012), both direct regulation and softer version of regulatory governance are vital in terms of inducing eco-innovation as firms act quite differently when faced with particular forms of regulation. Other scholars Kesidou & Demirel (2012) claimed that less innovative firms have more likelihood to be affected by stricter environmental regulations than those of more innovative firms. Veugelers (2012) pointed out that firms are affirmative to eco-policy demand interventions, through which government needs to exert influence internal strength of private firms, coupled with motivation by demand pull from customers and voluntary codes of conduct. According to Doran & Ryan (2012), there is no compromise or transaction between eco-innovation higher profit margins which is indicative of the fact that policy makers can contribute to the growth of greener society.

Regulation is being singled out as an important driver of innovation in some empirical studies (Brunnermeier & Cohen, 2003; Cleff & Rennings, 1999; Green et al., 1994; Rennings Zwick, 2002) which referred to as regulatory push/pull effect (Rennings 2000; del Rio Gonzalez 2009). Popp (2006) pointed out the evidence from study based on patent data from USA, Japan and Germany that national regulation by and large influences the companies’ innovation decisions.
Jacob (2005) suggested that eco innovation might be triggered by regulation adopted abroad for instance eco innovative air pollutants was introduced in Japan due to the regulation in USA. Survey from Spanish pulp and paper industry revealed that corporate image and regulatory pressure are the main determinants of adopting cleaner technology in the firm (Del Rio Gonzalez, 2005). Frondel et al.(2007) found out that policy strictness is an important driver of eco innovation as opposed to single policy instruments which Arimura et al.( 2007 ) supported arguing that green R&D facilities that face strict environmental regulation are far more likely to conduct environmental R&D because the impact the regulation has. In addition, Frondel et al. (2007) pointed out that the impact the regulation creates might be different in different field of environmental technology. However, end of pipe technologies are motivated by regulation. Also, the cost saving, environmental management system are imperative for the initiation of cleaner technologies.

Eco process innovation also falls within the broader definition of eco innovation. Eco process innovation needs to comply with market regulation and stringency (not necessarily environmentally related) in an effort to avoid higher taxes or punishment. Furthermore, ambiguity regarding future environmental regulation might influence firm’s decision about eco innovation. Cleff & Rennings (1999) found that regulatory push/pull effect drives the eco process innovation. Green et al. (1994) also identified the evidence and influence environmentally related regulations have about eco process innovations.

3.2. Demand-side drivers

Kammerer (2009) also identified the market pull factors as the drivers of eco innovation arguing that customer are the beneficiaries’ because of eco innovation resulting from market pull factors. Although Rehfeld et al.(2007) argued that demand side does not stimulate eco innovation that much. The rationale behind that is that products are more expensive while Brohmann et al. (2009) & van den Bergh (2008) argued that the consumer can stimulate innovation although there is little verification of this argument empirically. Kammerer (2009) also pointed out that customer satisfaction and benefits play an important role in eco innovation when a product provides its additional value to the customer.

Many authors identified key factors such as financing ability (Johnson & Lybecker, 2012); market demand (Horbach et al.,2012), pressure group (Yalabik & Fairchild, 2011) or industry characteristics (Peiró-Signes et al., 2011) affecting firms that has environmental orientation. Pressure group and different stakeholder has been identified as another leading force affecting
firm’s engagement in eco innovation practices. According to Guoyou et al. (2013) overseas customers plays a vital role in triggering companies to accept the strategy of green process and green product innovation despite foreign investor being identified as key factor influencing the adoption of process eco innovation.

Public pressure and customer demand are important drivers of eco innovation (Horbach, 2008). It’s not necessarily the case in general for instance, for eco innovation as opposed to general innovation, customer motivations are influenced by environmental policies such as regulation and taxes (Oltra, 2008). Other scholars also supported the similar argument to a certain extent for instance according to Belin et al (2009), demand pull factors tend to be lower for eco innovation than for innovation in general. They argued that when these factors are effective, they are usually the result of provocation by policies. Therefore, demand factors are usually associated with regulation and policy factors and their effects are not the same in every industry. One empirical study suggested that real estate and construction industry is mostly customer driven as opposed to petroleum products and metal manufacturing, therefore, their motif for environmental work also varies in accordance with customer demand. Regulation and policy pressure might be the other driver for environmental work for metal manufacturing and petroleum products (IVA, 1995).

Customer demand, market demand and other demand trigger eco innovation. However, reaction of the companies or industry to that demand and pressure from outside may not necessarily be the same. For instance, Kemp (2000) explained that mature sectors of high volume show behaviors that have positive correlation with environmental monitoring, regulation, process control which can effectively improve the efficiency and show rigidity to demand and pressure. Smaller firms are more reactive to pressure and demand as opposed to larger firms. It is obvious that firm’s response to the pressure and demand are not the same for all sectors. However, larger firms are adaptive and respond strategically to adopt and advance their present strategy on the basis of existing and future demand. The study of Triebswetter et al. (2008) pointed out that both internal and external factors drive eco innovation for the firm. They also suggested that it is not just the regulatory pressure but also competitive advantages, technological lead, cost pressure, customer pressure also drive eco innovation.

Porter & Linde (1995) found that world demand is shifting towards the direction of low pollution and products that are energy efficient. Therefore, environmental demand factor is an important issue for the diffusion of eco innovation. For instance, Ugaglia et al., (2008) argued that demand side is essential in the diffusion of eco innovation and many demand side factors influence the
way firms behave and react to eco innovation. Market related drivers such as market share increases, customer pressures, competition are important drivers for environmental related activities (Green et al., 1994). Competitors and their environmental performance influence managers to adopt eco innovation in order to uplift their own environmental reputation and standard and keep pace with the competitors (Hermosilla et al., 2009). Competition helps the companies to practice eco innovation. Also, firm’s network, knowledge and co-operation might help it to achieve the capability of the eco innovation (Technopolis 2008).

In other empirical study of Green et al (1994) indicates that external pressure and market pressure are the drivers of product and process eco innovation. These pressures many come from different actors such as retailers, whole seller, competitors, expanding market etc. Therefore, the reactions of the consumers to new product act as enabler for innovation (Beise & renings, 2005: p. 77). Also, the study of Florida (1996) showed that pressure from customer is more important than green product market and environmental organization in that former triggers eco innovation than the later

3.3. Supply side drivers

As opposed to the alternative production processes, eco innovation develops services and products which is responsible for the causation of positive externalities on environment (Rennings, 2000). However, at the firm level they are motivated internally and technological competencies within the enterprise are therefore the key drivers of eco-process innovation. Many environmental drivers of eco-process innovation might exist. However, environmental process innovation are categorized into two broad technologies: clean technologies and end of pipe technologies. EOP technologies are such instruments that are added at the end of production process in an effort to convert primary emission into substance easier to deal with without having to make any change in the production process. Cleaner technologies, on the other hand, demands lessening of total waste and pollution and significant changes in the entire production process. In addition, the main difference between EOP and cleaner innovation can be linked to incremental and radical innovation. Both of them require expenditure of capital. However, the EOP (incremental) might not necessarily reduce the production cost per unit. Clean technologies, however, foster production process efficiency through the reduction of consumption level of materials and energy. Consequently firms can increase its productivity and competitiveness (Del Rio, 2005).
Among other process innovations, managerial capabilities and technological competencies normally build up environmental and non-environmental process innovation. Firm’s tangible and intangible assets such as skills, know-how, relations with other firms and all other assets in the firms are key consideration for process innovation. Particularly, environmentally conscious and trained human capital for instance managers and employees facilitates environmental process innovation. Also, the process innovation is also facilitated by the significance of technical knowledge which is gathered from other external sources such as suppliers, independent users, universities, joint ventures and other affiliated firms. Horbach et al. (2012) argues that material and energy related eco-process innovation are positively influenced by cooperation with universities, agencies, research institution.

Also, efficient use of energy and materials are important driver for environmental process innovations (Green et al., 1994; Rennings, 2000). The outcome of the eco process innovation is that it increases the eco efficiency. The essence of the eco innovation efficiency are predicated upon the idea of lessening of input that are essential (e.g. energy and material). In this respect, Cleff & Rennings (1999) argue that eco innovators place relatively higher emphasis to cost savings as opposed to other types of innovators. Eco process innovations and recycling (cleaner and EOP technologies) inspire cost savings to the firms. Apart from the importance of supply side, processes that are environmentally friendly are positively associated with the reputation and image of the firm (Rennings & Zwick, 2002). Also, adoption of ecofriendly processes is a precondition for potential eco product innovation for firms.

Along the line of managerial capabilities, corporate social responsibility is also another motivating factor for firms to adopt and implement eco innovation (Kesidou & Demirel, 2012). Sense of accountability and awareness motivate the manager’s behavior, attitudes which positively impact integrative capability (Chinander, 2001). Also, corporate commitment is very important, the rational being that, environmental issues might have an impact on the firms aligning their practices with the expectation of the society to ensure the legitimacy of their businesses in which legitimacy is conformed to the social norms, values and expectation (Palazzo & Scherer, 2006). As a result, CSR policy adoption is an indicative of the fact that firms are committed to green issues and enhancing the reputation and positive green image of the company.

Technological competency is regarded one of the key factor for innovation. Firm’s organizational capabilities and technological competencies are important means of eco innovation (Doran & Ryan, 2012) which is supported by other scholars. For instance Horbach
argued that technology drivers’ triggers innovation in the development phase. According to (Baumol, 2002; Paivitt, 1984), technological capabilities play a vital role in triggering innovation. These competencies include the physical ability and knowledge capital of firms to develop new products or processes. Research suggests that firms with advanced innovation capabilities also secure long term future innovation success as Baumol labelled these path dependencies with such ‘’ innovation breeds innovation’’ (Baumol, 2002). To put it another way, the available technological possibilities enhance integrative capability of the firm.

There is no clear unanimous agreement whether or not technological competences triggers eco innovation (Diaz-Garcia et al., 2015). However, Blum-Kusterer & Hussain (2001) noticed that sustainability improvement and eco change might result from the adoption of new technology. This argument is supported by number of authors for instance Segarra-Ona et al. (2011) observed that eco orientation of the firms is predicated on the innovative activity (patents) and expenditure on technology acquisition. Horbach (2008) argued that improvement of technological competences (knowledge capital) by R&D facilitates environmental innovation. However, other authors Cainelli et al. (2011) argued just the opposite suggesting that R&D has very little to do with eco innovation adoption other than foreign ownership or networking.

In addition, it is not the green innovation rather conventional innovation is triggered through technological competencies such as R&D and human capital (Cuerva et al., 2014). Moreover, environmental innovations can be obtained through technological and managerial capabilities and through the technical knowledge derived from external sources (Horbach 2008; Triguero et al., 2013). Cohen & levinthal (1990) argued that firms ability to take the value of external information, to incorporate it and apply it to its innovation capacity is predicated upon firms absorptive capacity, a view that is supported by Modejar-Jimenez et al (2013) adding that absorptive capacity of the firms will enable them to perceive the potential of eco innovations and develop them.

Other factors such as firms size have an influence on eco innovation (Rehfeld et al., 2007), a claimed that is supported by Wagner (2008) suggesting that firms size has positively affect eco innovation. The premise is that firm with small size firm has obstacle in terms of its skills, resources, technological capabilities than larger firms which is why small firm are less likely to be innovative while the larger firms are more related with eco innovation (Hermosilla, 2009). However, smaller firms are less likely to be environmentally harmful than their larger
counterpart. Connell & Flynn (1999) pointed out that bigger firms go for eco innovation through external and internal pressure while smaller firms by and large by external pressure.

Eco innovation is also determined by supply factors. Horbach (2008) suggests that development of technologies and knowledge capital supported by R&D initiate the condition for eco innovation. Canon de Francia et al. (2007) points out similar argument suggesting that technical knowledge within a firm balances its burden when it comes to the demands of new environmental regulation. Other innovations such as organizational innovations are important driver of product and process innovations in that organizational innovation requires change the way new organizational methods are implemented, firms’ new business practice and external relationship (OECD & Eurostat, 2005). One such example is that environmental management system.

EMS triggers eco innovation. For instance, Environmental Management System (EMS) can be known as environmental organizational innovation (Rennings et al., 2006) which Khanna et al (2009), Rehfeld et al (2007), Rennings et al (2006) and Wagner (2008) supported arguing further that environmental management system is vital for eco process and eco product innovation. Also, Wagner (2008) argued that environmental management system (EMS) is one of the important driver for eco innovation, which helps boost reputation and image of the company (OECD, 2009). Also, according to Wagner (2008), environmental management system are positively associated with process innovations. However, his study cannot suggest the fact that EMS is associated with positive product innovation.

In addition, organization having environmental capabilities considers EMS as one of the important driver for product and process innovation (Blind, 2012; Rennings et al., 2006; Wagner, 2008). The rationale being, it allows the firms to build the capabilities organization require and practices such as resource reduction, recycling, pollution prevention, eco product design which tend to enhance and promote process innovation toward environmental quality ensuring eco efficiency. The bottom line is this, certified EMS plays an important role for triggering eco innovation by allowing companies to set up environmental objectives and programs regulating management structure and provide environmental related information to achieve them (Melnyk et al., 2003) thus paving the way for eco innovation to flourish in the firm.

In addition, collaboration and potential networking with other firms, institutions, authorities, research institutes is considered vital for adoption of eco innovation (Cainelli et al.,2011;
Klewitz and Hansen, 2013; Petruzzelli et al., 2011). According to Wong (2013), knowledge sharing affects firms achieving green requirement positively. According to Halila & Rundquist (2011), successful innovation is supported by a network with diverse competences, however, eco innovators tend to use network for mitigating technological problem while other innovators considers network to be of helpful for financing and marketing. Therefore, different companies use networking and collaboration for different purposes depending on the objective of the companies. For instance, Triguero et al. (2013) suggest that entrepreneurs giving priority to alliance with research institute, agencies and universities are far more likely to instigate all types of eco-innovations.

There are other factors of eco innovations. For instances, those firms that want to build organizational capability in the field of eco product designing/sourcing and energy efficiency, pollution control are far more likely to eco innovate (Doran & Ryan, 2012) while others such as Kemp and Foxon (2007) argued that firms that are more innovative and more knowledgeable are the ones that has the capacity to turn these factors into environmental innovation. Supply chain management, research and development, technological improvement, corporate citizenship, productivity increases, relationship with end user are found to be most important driving factor for eco innovation (Florida, 1996). The study also revealed that dominant drivers for eco innovations are top management, R&D staff, suppliers, customers, environmental organizations, distributor, consultant, engineer and other stakeholders.

Also, the capacity for innovation (e.g. human capital accumulation, potential know-how) trigger innovation. Also, technological capabilities which is developed by R&D investment and training of the employees through education are some of the important driving factors for eco innovation (Horbach, 2008) a view that is supported by Triebswetter & Wackerbauer(2008) arguing further that technological lead drives to eco innovation. In addition, firms requires skills for innovation so that they can develop or adopt them which is why these significant skills are the function of R&D. Also, relationship and networking set the foundation for technological capabilities and competencies for the development and adoption of eco innovation (Hermosilla et al., 2009)

Until recently, firms shows eagerness about the company image through eco innovation. Firms making eco innovation visible have a significant positive impact on customers, stakeholders and investor. In addition, business leaders attempt to declare their position as eco innovator which might influence others to emulate. This argument is supported by a number of other studies that suggest that corporate image of the company is more significant than its
environmental aspects and product or services for eco innovation (Technopolis, 2008). This view is enhanced by Rohracher (2006, p.58) claiming that firm image and brand value is much more valuable than customer or regulatory demands.

Diaz-Garcia et al. (2015) argued that firms’ capabilities and resources are also important determinant factors for eco innovation. The argument they put forward is that proper environmental managerial system and its implementation might allow firm to minimize its environmental impact and enhance its operational efficiency. One such example of firm capabilities is to have ISO14001 certification which is useful in terms of increasing the positive effect of environmental management system on environmental R&D and end of pipeline technologies (Demirel & Kesidou 2011). Also, Leenders & Chandra (2013) argued that Quality Management System referred to as voluntary scheme certifications can facilitate the adoption of eco innovations. Development of eco innovations are also encouraged through both managerial and organizational capabilities (Horbach 2008; Kesidou & Demirel 2012). For instance, the activities of company related to training, information and diffusion of information also stimulate the development of eco innovation (Mondejar-Jimenez et al., 2013). Firms’ capabilities by and large also depends on the eco orientation of the firm. Chand & Chen (2013) argued that organizational green identity facilitate the development of eco innovation.

Cost saving also is an important factor for eco innovation. For instance, Porter & Linde (1995) pointed out that the innovation that offsets the cost saving through the reduction of resource inefficiency triggers eco innovation. Their argument is that productivity is increased by monitoring, better resource utilization, and waste minimization and these are the driving forces that influence eco innovation. Also, Green et al (1994) identify cost saving, networking and collaboration and commitment on the personal level induce eco innovation.
Figure 6: The conceptual model of drivers of eco innovation
4. METHODOLOGY

The methodology is an indispensable part of any research. It is very important to employ proper methods in order to find a solution to a particular problem. Proper application of chosen methodological approach might lead to a greater conclusion that research seek to achieve. In this respect, I would like to employ proper methodological approach that would be relevant to the study. Now the case study approach is my chosen method. I have justified why I have chosen case study as preferred option for this with theoretical reasoning. In the methodology section, there would be systemic discussion of the essential elements of the methodological approach for instance the discussion about qualitative case study method and data collection process would be discussed

4.1. Case study

Contextual based empirical sources are key components for case study research (Tellis 1997). Because case study examines the phenomenon in real life context in which it is difficult to quantify the boundaries between phenomenon and the context. In other words, boundaries are not clear or evident. In addition, case study also encourage using multiple sources of evidence. Cases study is an investigation established in specific time and space which is carried out through intensive data collection by having various sources of evidence (Creswell 1998, p. 61). According to Eriksson & Kovalainen (2008, p. 115), the objective of the case study is to examine the case in respect to social, cultural, historical and economic perspective. Moreover, there are many ways of doing social science research and case study is one of them. Because it is aiming to gather essential data for a particular case under investigation. It is according to Yin (1993, p. 5) an attempt to answer to the questions of ‘why’ and ‘how’. Case study could be of different types such as explanatory, descriptive or exploratory (Yin 2003: p. 5).

Eriksson & Kovalainen (2008, p. 19-20) argued that intensive case study deals with individuals and attempts to explain the single case by presenting a highly substantial or contextualized description. Intensive case study is associated with altering research design, thus offering enhanced understanding and extensive explanation of the case by the researcher in more narrative way, a view supported by Dyer & Wilkins(1991) suggesting that the objective of intensive case study is to produce a narrative worth hearing. This narrative view is also supported by Eriksson & Kovalainen (2008, p. 120) in which they offer the reasons. The main
reasons they argued is to focus on the experiences, perceptions, relationship, sense making, interaction and viewpoints of those who are involved in the study.

Yin (2003) argued that case study is particular method when the phenomenon under study has positive correlation with its context, in other words, phenomenon is not so much different than its context. However, the context and interaction of phenomenon might vary for a variety of reasons. For instance, in this case study, it would be interesting to see how firm interact with market for eco innovation in circular economy context. This context specific phenomenon can be better understood through the use of case study. Apparently, case study method presents a different set of driving forces that affect a particular situation. The case study in this research would produce its research objectives, aims, queries through interviews, analysis of existing reports and projects and available materials, interaction and observation.

Case study research design encompasses intensive and details analysis of a single case study (Bryman & Bell, 2007). My objective is to find out the drivers of eco innovation of the firm in the context of circular economy. Therefore, I would be focusing more on the understanding the phenomenon of the case Company X. According to Bryman & Bell (2007), a case study could be a single organization, person, location or event. The common characteristic of case studies is predicated upon the integrated power to study a phenomenon to attempt to make sound inference through combining the interpretation of research. Therefore, in my case study case, the research design of single case study does not necessarily depend on the sample size, rather requires the dynamic interpretation of the chosen case company.

In terms of the theoretical perspective above, in my opinion, it is quite reasonable that single case study is quite relevant for my research problem and research objective. I would like to find out as mentioned in the research objective, the drivers of eco innovation in circular economy context. Therefore, I aim to conduct the single case study research on a Finnish Textile company Company X in an effort to find out the drivers of eco innovation in the light of circular economy. Despite single case having limitations, my understanding is that, comprehensive analysis of the company would bring about satisfactory result.

4.2. Primary data collection

I have chosen the qualitative case study as the most preferable option. The reason is, it enables me to have a deeper understanding of the intricate complexities of the chosen phenomenon. For the purpose of the research, I will be collecting both primary and secondary data. I will
collect data through in-depth interviews. Structures of the interview will be open ended, unstructured mostly. However, observation during the interview will be taken into consideration to collect data as well

### 4.3. Interviews

Robson (2002, p. 270) identified different forms of interviews for data collection process. This process requires a researcher and a participant. These forms of interviews are unstructured, semi structured, informal, focus groups etc. Semi structured interview considered to be a guided interview through which one can collect qualitative data. Because it restricts the questions to a certain extent while giving reasonable space and scope to the respondent to express his opinion, or thoughts on a particular topic. It is also kind of an open ended structure or two way communication process or interaction. Questions type in semi structured interview might be effective in terms of answering ‘what’ or ‘how’ questions. However, they could be modified or changed during the interview process depending on the correspondent’s conception of what is reasonable.

Now words that constitute the questions may not be the same for all respondents in this type of interview and they might be altered depending on who the interviewee is (Robson, 2002: p. 270). On the other hand, unstructured interview, according to Eriksson & Kovalainen (2008, p. 82) are helpful from an interviewee perspective in that it allows for in depth understanding of a phenomenon. These interviews are emphasizing what participants are talking about while interviewer acts as an observant and produce questions based on the reflections of the narratives of the participants. Of course, interviewer in this type unstructured interview setting has an area of focus, however, he allows the conversation develop within that focus area (Robson 2002: p. 270). Now unstructured interview attempts to generate useful insights on key issues that researcher would not have thought otherwise. However, well-thought out interactive skills such as having the ability to produce questions instantly in response to the context is an absolute necessity in order to conduct these type of interviews

### 4.4. Data collection

Data was collected from Company X website, a small Finnish SME known for leading circular economy business. The company has only 5 employees. Before the data collection, several
emails were sent to the chairman of the company to familiarize himself with the topic. The chairman of the company and human resource manager were selected in order to identify the drivers of eco innovation in circular economy context. The methodology of the data collection process was explained to them beforehand. Also, in order to fully comprehend the purpose of the study, a brief managerial summary was sent to the chairman of the company. The managerial summary contained three section such as purpose of the study, data collection method and future implication of the research. The questionnaire surrounding the concept of drivers of eco innovation and circular economy were mailed to them. Also, requests were made asking them to participate in an oral face to face interview and ensuring the anonymity and confidentiality of the information they share during the interview. The structure of the questionnaire contains two section: 1) the contact information 2) a series of questions regarding the topic. Of the participants, one was male who was the chairperson of the company is and the other one was the human resource manager. The questionnaire covered one company in one industry. Prior to the data collection, preliminary questionnaire were designed to test the validity of the content. Firstly, supervisor of the thesis was asked to check and critique the questionnaire for ambiguity. Secondly, I contacted chairman of the company to identify the appropriate of the items. Based on their suggestions, the questionnaire were modified to enhance the validity. Although final questionnaire was designed according to the objective of the study.

Initially, I had an oral agreement with the chairman of the company that interview would be conducted through Skype meeting. However, due to the time constrain of the skype interview, we had reached to an agreement that interviews would be conducted face to face for the sake of collecting rich qualitative data. The company had prior information that a total of 5 interviews each consisting at least one hour in length would be conducted to gather rich qualitative data. The chairman of the company, however, informed that it would not be possible for them to arrange 5 interviews considering the size of the company. Since the case company is very small in size and the chairman, who is an entrepreneur himself, has been successful, has most of the technical, operational and management knowledge of the company, that’s why, it was an obvious choice for him to be identified as the most significant participant for the interview. Also, the participant made sure that the information he is going to provide would be the equivalent to the length of the 5 interviews which technically will fulfill the requirement of the data the study demands. However, to have a different perspective, another participant, who is the human resource manager, was interviewed.
The interview took place in the business premises of the company on an agreed upon date. It was conducted on 14\textsuperscript{th} of December 2017. The duration of the interview was 3 hours and 30 minutes. Since, the case company had been successful in new start up circular economy business, that’s why, as a natural progression, it has lots of collaboration with various stakeholders and projects such as Teleketju projects (https://telaketju.turkuamk.fi/) and Relooping fashion initiatives (http://reloopingfashion.org) that were identified as primary sources also for collecting the rich qualitative data for the study. These two projects are related to how different actors such as companies, government, NGO, environmental agencies, universities, municipalities and other stakeholders came together to find a sustainable solution for the business. Also, the two projects works deals with the circular economy concept that help companies to find new ways of doing business. All of these important factors in the projects provided the context and rationale that are relevant for the study which in the end has enabled me to receive as much qualitative data as possible.

The interview was conducted in English since the study was done in English. Also, the interview was recorded as well. In addition, all the quotation from the interview used in the study are in English. The interview was then transcribed which was about 40 pages of qualitative interview data.

There are varieties of ways researcher can collection data in the case study research. For example, researcher can collect the empirical data in the following ways: first he himself can collect the data which is known as primary data or they might be collected through existing empirical data known as secondary data. According to Eriksson & Kovalainen (2008, p. 77-78), one can collect primary data through various means of method for instance, interviews, observation, questionnaire, survey, focus group etc. On the other hand, secondary data may be collected through readily available published materials done by others (Saunders et al., 2007). Also, Eriksson & Kovalainen (2008, p. 78) argue that collection and accumulation of secondary data is done for the sole purpose of reuse in different setting.

Availability of empirical data may include documented or written or visual materials. One can derive secondary data from booklets, note memos, stories, video recording, journal etc (Eriksson & Kovalainen 2008, p. 77-78). Now there are many benefits of using secondary data. For instance it is easier to get and easier to use. It is inexpensive as well, means of recovering information is easy. Also, secondary data can facilitate framing and refining the research question and problem with clarity. By and large, secondary data is a valuable source of information for understanding the topic being studied more clearly and it can be investigated.
more later on with the primary data. In this way, phenomenon under study could be better understood (Aaker et al., 2006: p. 100)

Now as a researcher, there are different ways of collecting data from case study for instance, Eriksson & Kovalainen (2008, p. 97) identified two ways through which a researcher can do search and collection information online. One is library service and the other one is on the internet. Library service has well collection of e-books or electronic books, e-journal, diverse range of database, library catalogue etc. On the other hand, internet service provides different search engine option such as google, yaho which provide a varieties of web pages to be used for information search. In terms of company’s secondary data recovery, website of the company or organization, annual reports, corporate and organization weblogs or blogs etc are viable option for information (Eriksson & Kovalainen 2008, p. 101-103).

4.5. Secondary data collection

For my secondary data, varieties of sources was used to collect the data. Generally, I have collected data from articles, reports, book, conference proceedings, journals, company websites, documents, current research and the projects the company involved in. I have also used University of Eastern Finland electronic database and OECD reports about eco innovation and circular economy and other academic publications.

4.6. Data collection

In this section, result will be presented from the empirical study. In the beginning, I will introduce the case Company X, including the general information about the products and services they offer. The structure of the section is as follows. First, eco innovation in Company X, second the definition of eco innovation for Company X and what it meant for them. Third the drivers of eco innovation in Company X. In each phase, information from the interviews, websites and research journals, project works are accumulated to outline the situation. The interview was conducted on 14th December, 2017. The Company X has facilitated the environment for me to conduct the interview in the premise of the company.

To have a brief overview of the Company X, general information of the company is given below:
<table>
<thead>
<tr>
<th><strong>Table 1: General information of Company X</strong></th>
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<tbody>
<tr>
<td><strong>Full name</strong></td>
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<tr>
<td><strong>Company type</strong></td>
</tr>
<tr>
<td><strong>Number of employees</strong></td>
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<tr>
<td><strong>Total Revenue</strong></td>
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### 4.7. Introduction of Company X

Company X is a textile manufacturing company that makes garments out of leftover waste by doing 100% recycling. It is a distinct environmental company. The company has been successful in converting waste into products. Company X believes that ecological thinking and fashion should go together. The objective of the company is to offer sustainable solution to the textile or fashion industry and contributes to create and effective society with minimum impact on the environment. Company X was founded in 2013 by entrepreneur Respondent 1. The company was inspired by its first born company Costo, a company that specialized in sustainable textile accessories. Environmental care and ethics are at the center of company’s vision and mission. Company X wants to be pioneer in textile manufacturing industry in terms sustainability and eco innovation.

The overall objective of the Company X is to offer cost effective products and services that reduce negative environmental impact. In addition, it focus on environmental impact of reduced emissions from the production process. The company offers environmentally friendly products and services to its clients. Its establishment was deeply rooted in the idea of taking care of the environment. They are also helping and educating the society regarding environmental issues.

The company is small and medium size company. The total number of employees is 5. Total revenue was 800,800 euros. Company is expecting that the total revenue will hit 1.6 million in 2018. It is operating within both competitive and niche market. However, according to the company officials, company wants to grow and go mainstream and be operative within bigger competitive market so it is not that niche market anymore as opposed to when started. Also, they would like to make it a volume business because it is 100% recycled garment.
The customer focus of Company X is international. However, 90% of company’s sales comes from Finland. Therefore the largest customer segment is national and domestic market. In the beginning, the company’s focus was on national or domestic market. However, in recent times, the company has been able to capture good customers from Northern Europe. According to the company officials, company would go to regional and then to international market. Officials also said that from the beginning, the focus has been worldwide which is related to the company’s objectives.

Since Company X is specialized producing 100% recycled yarns, fabrics and readymade garments in India, that’s why, the company uses pre consumer textile waste as raw material. Also it collects the textile waste from nearby factories which comes in the form of cutting clips and spinning waste. After that, the material is sorted by quality and color and carded nicely without destroying the quality of the fibers. After that, the cotton is spun into yarns and finally turned into a 100% recycled high quality textiles. Customer can know the amount of water saved which about 2700 litres after making the purchase decision. The company’s main production facility is located in Tripura area of India. The company is environmentally conscious in that it does not want to contaminate or destroy the area’s already sparse natural resources. For instance, the plant has a system of rainwater collection and it utilizes and uses solar power and wind as renewable energy. The company places high importance on social and economic responsibility other than environmental responsibility in that it is giving back to the society and offer favorable work condition for employees. The aim of the establishment of the production facility in India is to produce mass quantities of fabric, made of recycled materials.

Company X is mainly operating within the B2B context which has a number of implications in the business to business landscape. Since, Company X is building its business on the concept of circular economy business, therefore, material flows, value chains and roles of the actors remain quite the same. For instances, B2B textiles buyers or customers values and environmental objectives remain almost the same and they play key role in decision making and creating demand for circular design. For instances, B2B buyers are willing to take back of used professional cloths which in turn makes the recovery of used textiles more efficient. In addition, professional textiles buyers also receive quality services for utilizing the used textiles products in professional manner which conforms to the waste management hierarchy and the principle of circular economy. This is of course offer great opportunities for textiles producers (exploring different product service systems based business model) and individual service providers maintaining collection and sorting.
4.8. Production process of Company X

Company X completely incorporated creativity, innovation and eco-friendly and cleaner technology into the production process to create 100% recycled garment. According to the company officials, Company X production facility is located in Tripura, India. Production facility collects the raw materials from two main sources and other factories with whom Company X has co-operation with. They collect the cutting clips of waste from CMT factories and Yarn waste from spinning and weaving mills. After that they sort them out by color and quality. The color of the waste determine the color of the final product which involves no dying.

When textiles are sorted out, the fraction of non-reusable textiles are processed on an industrial scale. Producing recycled fibers for new clothing is the option in order to keep the value of materials as high as possible while considering the environmental impact of the production method and over all life cycle. Company X is doing the mechanical recycling. For instance, material is being recycled in mechanical recycling where textile is broken down into separate fibers in the pre-processing step. After that, new textile structures are formed out of reproduction of these fibers. Since strength of the fibers might be reduced because of textile processing and also post-consumer textiles by wear and washing cycle, typical products for mechanically recycled fibers are non-woven made for instance by needle punching and carding. It is also possible to produce cloths and textiles out of mechanical recycling of yarns for unworn pre-consumer materials. For instances, Rotor spinning of yarns can be conducted using weakened and shortened post-consumer based fibers. However, they are aided by stronger and longer virgin fibers. Mechanical recycling is useful for both synthetic and natural fibers.

This recycling loop goes on from fiber manufacturing to the production of textiles. Due to the usage of recycled fibers or reusing or cloths and fabrics, technological changes requires for textile production. Although Yarn and spinning technologies and textile manufacturing technologies can manage recycled textiles with some modification. Mechanical recycling processes are able to produce materials which are mainly for nonwoven where the quality of the fiber is not important. A small, yet relatively growing number of recycled textile producers such as Company X use mechanically recycled fibers for yarn spinning and production of recycled fabrics and cloths. Rotor spinning is applied for recycled processes and it is suitable for sort fibers. In addition, ring-spinning is also being use for more quality recycled yarn grades. There are lots of challenges regarding fiber quality in terms of length and strength. However, Company X manages this challenge by using pre-consumer textile waste and other fashion retailers such as H&M handle it by mixing post-consumer recycled fibers with virgin materials.
This initial phase is called collecting and sorting waste. Then in the second phase is recycling in which each quality or color technically and mechanically open back into the fibers by keeping the fiber length as long as possible for the finest yarn quality. Third process is blending where cotton wastes are open mechanically which then is mixed through chemically recycled polyester or viscose fibers so that they can reach a specific functionality depending on the end use of the fabric. Fourth stage is spinning. In this stage the mixed recycled fibers are spun into yarns and this part of the process is identical as with spinning fresh fibers. The fifth stage is knitting and weaving where the yarns are knitted or woven depending on the end use of the fabric. Then finishing process depends on how the final fabrics are used. There are varieties of means as to how to finish the process. The known processes are compacting, brushing and washing. Then the seventh stage is CMT and this stage requires the cutting, making and trimming of the final garment product. The entire process of recycling of the textile fibers is innovative, sustainable and environmentally focused (Company X, 2017).

The entire production process of Company X has environmental commitment to sustainability which is motivated by the principle of circular economy. Company X’s project partner relooping fashion initiative advocated for a model for future circular business ecosystem for textile the whole value chain. This model created the platform to test and understand all the stages necessary for creating a closed loop of textiles from consumer back to consumers and offering new clothing line made of recycled fibers by taking back the product. Also this model takes into consideration the actors that are working with reuse and recycle textile. This holistic approach deems necessary for restoring the value of used textiles which is based on the concept of circular economy. Recycle is the last value cycle in this proposed value cycle of circular economy to regenerate and restore value with less environmental impact.
4.9. Eco innovation at company X

In the literature review, I highlighted that there is no specific definition of eco innovation. Few broad definition of eco innovation has been highlighted. At the beginning, I asked to the CEO of the company about the definition of eco innovation to see how they understand and how it matches with the answers with selected definition in the literature. For better understanding, I provided selected definition to the respondents beforehand to seek answer and opinion. The term ‘eco innovation’ was new to them. However, respondents were well aware of green innovation concept which is pretty close to eco innovation. Having read the selected definitions, the reaction of the company CEO was the following:

“our entire production process is innovative and sustainable”
(Respondent 1, Chairman of Company X)

The selected definition is perfectly aligned with production method of case Company X. Adoption of environmental friendly production processes is a precondition for potential eco product innovation for firms, in this case, the recycled garment. Through the mechanical recycling, Company X are producing cloths made of superior fiber. The entire process is technologically ecofriendly.
4.10. Types of eco innovation at company X

Company X is eco innovative company which is owned by same owner who owns Costco, an accessory business which is using leftover fabrics from furniture industry. Environmental sustainability is at the center of all motivation and descriptions of Company X. They are producing basic garments such as t-shirt and hats out of leftover fabrics by doing 100% recycling. They are doing and developing the production process, treat and recycle the disposed textile materials. Types of eco innovation according to the respondents are as follows,

‘‘We have other company Costco which is doing hat spinning accessories. With Costco, we are using leftover fabrics from the furniture industry. That time we realized that with the leftover fabrics, there is not enough because customers were getting bigger and bigger all the time. If some big customers wants to have 1000 pieces of certain kind of hat with certain kind of fabrics, we had something like 2 meters of that fabrics and we can’t make thousand pieces out of that. And that way we had the own idea to make our own fabrics as sustainable way as possible”

(Respondent 1, Chairman of Company X)

Company X also leads the effort to create its own production technique which is different from conventional technique. This new process improvement is innovative and sustainable. Waste management technique in the new machine is dynamic. According to the respondent

‘‘Together with the Chinese guy we started doing some development for the machine and some testes to improve the process for instance how to make separation for the wastes and how to make adjustment for the machine to keep fibers as good as possible and within small things, we got pretty good result”

(Respondent 1, Chairman of Company X)

From the empirical case Company X, it is obvious that it has vision and ambition to use cutting age technology and commercialize innovative concepts which takes into consideration the environmental issues. It is very important for Company X to do research and development of cutting age technology. Research and development at Company X is primarily driven by environment oriented objectives. According to respondent,
“We can manage to do 100% recycled yarns and fabrics. What we are doing, we are doing a lot of research and development. We want to use available technology to improve the performance and to help. Because there is lot of technology can help and that is one thing for the future. We need to implement some new technologies to help run the shop. For the technology part we want to invest to develop the recycling technology and production chain. Somebody builds in good way we want to be first who is trying it out and may be using it but mainly we are concentrating to develop the recycling, waste collection, and waste separation, recycling and production methods. Sustainability is the biggest thing in our process to take care of the environment and make things better way”

(Respondent 1, Chairman of Company X)

Productivity and sustainability is at the heart of Company X’s increase sustainability target areas. Company X continues to aim high in resource efficiency and try to make the price competitive. Investment on R&D and in production facilities are planned in a way that can achieve cost efficiency with regards to the development and environmental demand of the customers and community.

Company X is well known locally and aiming to be known internationally as well. Company X’s effective waste recycling technique and production method have the potential to attract a lot of foreign investment. For instance, Company X has its own production facility in India and Company X itself was motivated in co-operation with Chinese company.

Company X also focuses on customer awareness to environment. It is active on social networking website such as LinkedIn, Facebook to create awareness about the ecofriendly product. Of course customer awareness is vital for eco innovation. The rational for creating customer awareness is that it can create demand in the market. Once customers are demanding for environmentally friendly product, they engage themselves with various social activities with this objective.
Company X follows win-win situation concept. For example, they co-operate with their partners and competitors to reduce environmental impact. Many of its partners and competitors share same production methods and technology so they complement each other in the market.

“If there is some good methods how others are doing then checking somehow we implement them to our operation”

(Respondent 1, Chairman of Company X)

4.11. Analysis

Eco innovation in organization: eco innovation in organization would be discussed in the context of case Company X with theoretical underpinning.

Definition of eco innovation: For conducting the research, I defined eco innovation that consists of new or modified products, processes, technique, practice, organizations, markets or systems to avoid or reduce environmental harms. As mentioned above, there is not yet standard universal definitions of eco innovation. Academic literature attempted to define eco innovation in different ways. Respondents were familiar with the concept of eco innovation to a certain extent. However, they were familiar with green innovation mostly. Respondents, upon reading the concept of eco innovation, recognized the fact that Company X is green, innovative and environmental company. Respondents also knew the circular economy concept as this is the term you use quite often in their business to business interaction. Company X has the commitment to achieving its environmental goals to create a long term sustainable solution for a viable sustainable society. It is actively managing its own internal environmental system that guarantees the environmental performance of the organization.

4.12. The types of eco-innovation at Company X

Company X environmental focus in all of its efforts enabled this study to explore its technological aspects such as operational and functional dimension with environmental impact. Company X is focusing on incremental innovation. The rational for this is that incremental innovation is added to the existing production and consumption resulting in a solution that is innovative. Technical change in the production process/mechanical recycling in this case has environmental implication. Such technological change or innovation enabled resource efficiency of textile waste, recycling and enable the substitute of the toxic materials that has less environmental impact. According to the respondent:
"We are reducing the waste when we are collecting the cutting waste from the factory so basically its more or less 15% would be wasted during the production process. And that 15% what we are collecting what is our raw materials. So we are reducing the waste, then when we are doing the recycle, recycle with yarns and fabrics. We can save, if compared with fresh cotton t shirt, we will save 2700 litters of water. Everything what we are doing is sustainable”

(Respondent 1, Chairman of Company X)

Company X also provides technical and macro-organizational innovative solutions in areas where it operates. For instance, this innovative solutions include environmentally focused technology, new ways of organizing the society, preservation of natural resources, creation of circular business ecosystem, complying with domestic and international regulation and requirements that prevent environmental accidents, collaboration with partners on the environmental quality and safety issues and supporting other companies to provide quality services to the customer.

**4.13. Regulation and policy drivers of eco innovation**

As highlighted before, Company X has environmental commitment. It constantly attempts to achieve long term sustainable solutions for textiles industry with minimum impact on the environment. Its production facilities follows domestic and international laws, environmental permits and conditions. Company X complies with all laws and other requirements plus GRS (Global Recycling Standard). Although its production facility has not been certified under International standard ISO 14001. However, they are about to receive BSCI in the beginning of 2018 which means they will have environmental regulation in place which can offer a systematic approach and a sensible solution to environmental issues and problems. Environmental laws and legislation to a certain extent played a role for eco innovation for Company X.

During the interview at Company X, respondents mentioned the relative importance of legislation as being the driver of eco innovation. When asked about the regulation, respondent said, ‘’we have own internal regulation and system’’. Although they are not regulated by international audit. They will, however, implement external regulation and public policy, international regulation at some point in the future, the respondent stressed. Because regulation and policy drivers advance the cause of business organization towards eco innovation. From
the empirical study, it is evident that regulation and policy drivers are not the dominant driver of eco innovation for Company X as opposed to the supply side drivers of eco innovation.

4.14. Demand side drivers

Company X is continuously engaged with customers to create more awareness and demand for the recycled garment what they are producing. They are engaging with customer via social media which acts as effective tool in terms of promoting the 100% recycled garment. The company is quite active in social media such as Facebook, LinkedIn and other social media platforms to influence the perception of the client for recycled garment products. That’s how they are creating awareness for eco products. The company also creates strong narratives as to why their process of creating 100% recycling garment is better than competitors. Respondent said:

‘‘We do not want to produce 50% fresh and 50% recycled garment but we want to do 100% recycled garment. And we tell our customers the benefits what is within our process, the production technique, then they can evaluate if they are sustainable enough’’

(Respondent 1, Chairman of Company X)

The company is also producing awareness and demand through face to face interaction, sales event and other collaboration projects. For instance, the company created a story about its production process and promote the idea through different projects in co-operation with the school and research centers. According to the respondent,

‘‘We are telling how we are doing what we are doing when we are in sales event and use other kind of platforms where we share the stories about production technique or recycling method. Because our production technique is innovative but in terms of style and fashion way no. Because we do not want to make any fashionable garment, rather we want to make basic garment’’

(Respondent 1, Chairman of Company X)
By creating narratives about the production technique, the company is creating more public awareness and knowledge regarding eco product or recycled garment.

Also, competition facilitates the condition for eco innovation. There is, of course, a general concern among actors within the textile industry as to how they can make recycling technology more circular based for instance if production chain is more sustainable. These same actors also concern other issues such as global climate change, environmental issue. It is not so much about the competition what has motivated Company X to adopt environmentally friendly recycling technology, rather it’s combining co-operation with competition better known as co-opetition to see where market is turning next. Sometimes competitors might share the same technology but they constantly complement each other. They do not see other companies as pure competitor’s rather co-operative partners where they exchange information regarding recycling technology and improve the process. Respondent said,

“We can show to our competitors that we can do better way than them. But also we collaborate with others and exchange information and idea and benchmark from other companies and vice versa”

Respondent 1 (Chairman of Company X)

Profitability is one of the important factor for Company X’s effort for sustainable innovation. According to the respondent:

“Profit also motivates us, it should be, and otherwise we are not here. But at the moment all the profit what is coming that is going for future development for research and development. So basically what we are profiting we are using to develop our process. And to do more research. If there is someday there is too much profit it’s not needed for research then where we can fund and start to keep money for good project and nice projects where we can clean the ocean to support that”

(Respondent 1, Chairman of Company X)

4.15. Supply side drivers
In the theoretical section, various drivers of eco innovation have been highlighted and those drivers to a large extent correspond with the data collected on the drivers of eco innovation from case company Company X. Collected data from the case company indicated similarities with the previous supply side drivers of eco innovation and revealed some extra drivers of eco innovation. For instance, technological competencies, research and development (R&D) and collaboration and networking drivers of eco innovation in particular were motivated by the concept of circular economy with strong focus on environmental sustainability. For the Company X, the environmental responsibility is always an important issue to make eco innovative solution for the customers.

Research and development (R&D) at Company X is one of the important driving force for eco innovation. Finnish and European Textile industry rely heavily on great scientific knowledge and know-how, fashion and creativity and innovations, which form the basis for competitive advantage. Environmental awareness is the center of discussion among the textile industry in Europe (Euratex, 2004).

It can be concluded that Company X is leading this R&D effort in close collaboration with Telaketju project and relopping fashion initiative to explore the range of possibilities to use greener and cleaner technologies for the sustainable production of finer fiber and yarn out of textile wastes. The company is seeking available fund, availability of investment for more eco or green initiative projects and drive the new ideas forward through collaboration and brainstorming. It is doing research and development by themselves and also with other industry partners for process improvement to make it as sustainable as possible. Environmental sustainability is crucial factor for Company X. They give green light to new, big and creative ideas. Since the company is flat organization and open ideas are encouraged and discussed from bottom to top. This corporate mentality diffuses during the R&D phase which create the necessary condition for more eco innovation for the company. According to the respondent,

“What we are doing, we are doing a lot of research and development. We want to use available technology to improve the performance and to help. Because there is lot of technology can help and that is one thing for the future. We need to implement some new technologies to help run the shop. For the technology part we want to invest to develop the recycling and production chain. Somebody builds in good way we want to be first who is trying it out and may be using it but mainly we are concentrating to develop the recycling, waste
collection, and waste separation, recycling and production methods.

Sustainability is the biggest thing in our process to take care of the environment and make things better way”

(Respondent 1, Chairman of Company X)

Research and Development (R&D) at Company X is largely inspired by circular economy concept. In order to make the readymade garment, the company is doing joint research collaboration with VTT where they are making the trial with mechanical recycling. In the mechanical recycling of waste materials, less chemical and less pesticides are used in the production process. It’s much easier to recycle. Consequently, the life cycle of the material extends. According to the respondent,

“We are collecting the waste and processing them into fabric and for the ready garment. We have couple of projects where we are researching and investigating the possibilities to use that kind of post-consumer waste which is basically used cloths. We are making small scale trials and they look good. In the future, we can use post-consumer waste as our raw materials. Circular economy is the way we need to go in the future. With the existing technique, for the cotton fiber, at least 3 lives are possible. However, with the new technology improvement in the textile industry, it can be at least 4-5 lives for the cotton fiber. So it’s easier to recycle to have strong cotton fiber as possible”

(Respondent 1, Chairman of Company X)

Technological competencies is one of the leading factor, if not the most, for eco innovation for Company X. According to Euratex, (2006) there is always a need for the development of environmentally friendlier production process which complies with stiff environmental regulations. Green technologies might encompass bio-based and recycled raw materials and utilization of enzymes. More sustainable production of textiles requires environmentally friendly technology For instance, water free textile dyeing and finishing technologies, integrated and intensified processes and replacement of chemical processing by biotechnology are now being developed for sustainable production of textiles.

Development of recycling of textile fibers is required to increase the sustainability and reduce the environmental load of textile production. For instance, the company is doing joint research
and development with VTT and other companies are coming up with 100% recycling technology which is based on circular economy concept. For instance, it is developing cellulose carbamate (CCA) technology based recycling method for cotton fiber in co-operation with VTT. In this new production technique, fiber can be used for a wide range of textile applications ranging from fashion to home textiles and to technical applications. Company X through this mechanical recycling is opens up the new possibilities of using post-consumer waste for producing durable, high quality recycled fabrics and clothing. Also, the company is designing the prototype and a clothing line made of new fiber and to test the characteristics and possibilities of new material together with another company Seppälä. The idea is to bring ecological clothing lines based on circular economy to the market.

According to the respondent:

“Our production process is innovative and sustainable. We make it more efficient. We can automate the sorting when we are sorting the waste and it can be automated” We are using less electricity, less water and no chemical in our production method. Sustainability and circular economy is the future way to go. We need to start to recycle, we need to use raw materials, and we need to keep better use of those because of the whole global environmental issue”

(Respondent 1, Chairman of Company X)

Now a number of theoretical arguments also supports the technological achievement of Company X. This technological achievement is related to the improvement of the production process which is also cleaner than the conventional production system in a sense that it consumes less electricity and less water and less energy, the respondent highlighted. This new production recycling technique is considered to be an closed loop manufacturing system based on circular economy concept in that it reduces the amount of textile waste materials over a prolong period of time.

According to Altham (2007), SMEs preferring cleaner production can transform their way of using recourses, operate the product output through closed looped production or industrial symbiosis, thus increasing the long term eco-efficiency of business activities and operation. As SME, Company X has certainly achieved this unique technological competencies by transforming the conventional production system into eco, cleaner, efficient production method which is deeply rooted in circular economy. Also, Doran and Ryan, (2012) supports the idea
that firm’s organizational capabilities and technological competencies are important means of eco innovation which is supported by Horbach (2008) arguing that technology drivers’ triggers innovation in the development phase.

According to (Baumol, 2002; Paivitt, 1984), technological capabilities play a vital role in triggering innovation. These competencies include the ability to create physical knowledge capital of firms to initiate different, new and products/processes. In an effort to create such capital stock, firms have to focus on increasing R&D investments. Firms with advanced innovation capabilities also achieve higher innovation success in the future as Baumol labelled these path dependencies with such ‘‘ innovation breeds innovation’’ (Baumol, 2002). To put it another way, the available technological possibilities enhance integrative capability. All of these theoretical arguments are reflected in the practice of R&D effort of Company X. As a SME, Company X with this technological competencies leads the effort for 100% recycling resulting in a competitive advantage for the company.

Networking and collaboration with different industries, suppliers, customer, stakeholders’ joint research and development (R&D) also create eco innovation for Company X. Company X are effectively engaging with customers, suppliers to learn from each other, benchmark from each and to build something together. And the company has been successful in doing that. According to the respondent:

‘‘There is lot of companies who would like to collaborate with us. Of course there are companies who want to benchmark also. But many of those companies want to collaborate with us at some level. There is one huge international brand who would like to collaborate with us many B2B and there is really many from different industries. But the main and potentials one from they are textiles brands. They are smaller domestic Finnish brand. But there is really huge international players. Also, what we are doing, we are doing lot of research and then when we are discussing with other companies, we need to have something ready to offer for them. Then we are telling what we are doing, what we have been testing, if they are interested, then we can start to build something together with’’

(Respondent 1, Chairman of Company X)
Company X is collaborating with customers in terms of implementing large scale circular economy concept into their production method. For instance, according to the respondent:

“We are testing different kind of circular economy style. We have couple of bigger customers and it’s easier to operate those with bigger customer who have lots of selling point. They have ready collection points and everything, we are partnering with them. Also, collaboration with different industries, environmental agencies and other NGOs to share information, share good habits and to learn from each other so we will learn from them and they will learn from us and we see that collaboration with different organizations its beneficial for us and that’s the main issue for making green effort. Because some issues they will have lot more knowledgeable than us and when we are collaborating with them, we can get ideas and some help from them how it would be best way to organize”

(Respondent 1, Chairman of Company X)

It is obvious that networking and collaborative effort is shaped by the concept of circular economy. In terms of the nature of co-operation Company X has, it is important to say that co-operation is very dynamic. Company X is engaged in different projects with government and non-government organization in an effort to create a cluster of networks. One of the co-operation network Company X is involved is called Telaketju, a pilot projects which forwards the concept of the textile recycling also brings together end of life textiles collectors, sorters, operators developing primary processing and automatized sorting, companies utilizing final products, work centres arranging social work, waste centres, charity organization and municipalities. This projects aims at developing the collecting, sorting out and refining processes of end of life textiles. The project was held by Lournais-Suomen Jätehulto, Turku University of Applied Science, and regional wastement company. Also, this project is coordinated by Lounais-Suomen Jätehuolto Oy and VTT. Through this project, textile recycling with regards to whole life cycle became interesting for many companies in Finland. Telekatu project is supported and funded by Ministry of Environment and Tekes. Teleketju is building a strong platform in terms of the creation of new and strong industry with multidisciplinary collaboration. Companies involved in this project including Pure Waster Textiles are encouraged to design new business model in accordance with circular economy (Telaketju, 2018).
Another collaborative project Company X is involved in is called the relooping fashion initiatives. The relooping fashion initiatives deals with the quality of the reproduced fibers in way that can improve it. This new process use cutting age-technology that grant for unlimited recycling of cellulose based fabric without the extension of any harmful chemicals or new materials. In this way, global textile industry today has positive impact on the environmental issues. And this closed looped value chain manages the value of the materials, eliminates the waste and introduce a completely new line of sustainable future designs (Relooping Fashion Initiative, 2016).

In the Relooping Fashion Initiative, Company X main job is to test the spinning of fibers into yarn, and manufacturing of the fabrics and clothing for the pilot. The company is of the opinion that there is a huge potential for textile waste recycling. The reason being, world’s population is growing and not sufficient cotton and other raw materials could be produced to meet the demand. According to the company, ‘’we have no choice but to increase the use of recycled materials’’. Chemical recycling bring new opportunities so that post –consumer textile can be used for producing durable, high quality recycled fabrics and clothing (Relooping Fashion Initiative, 2016).

Company X is working together with VTT, Technical Research Centre of Finland and other joint venture collaboration projects where there are many companies, NGOs and organizations are involved. These companies are working together in these projects to come up with new different ways to work with post-consumer waste. So for instance, VTT Technical Research Centre of Finland developed a method that requires dissolving worn and thrown away cotton and use it as substitute raw material for the creation of new fiber. The model developed at VTT reveal the fact that recycled fiber could be converted into a yarn and refreshing fabric. On the basis of carbamate dissolution process, first batch of recycled fiber was created in a pilot facility using this technology. (VTT, 2017).

VTT method is part of a project called Teki, an internationally launched project, better known as Relooping Fashion Initiatives. The objective of the project is to pilot and model closed looped ecosystem that correspond with the principle of circular economy enabling new industrial applications of discarded textile waste unusable previously. The number of other companies other than Company X are also involved in this project. These companies are: VTT, Ethica, The Helsinki Metropolitan Area Reuse Centre, Seppälä, Remeo, Repack, and Lindström (VTT, 2017).
Different collaborative projects and networking helped Company X to improve the production process for recycled garment. Existing literature also suggest the same thing. Potential networking with other firms, institutions, authorities, research institutes is considered vital for adoption of eco innovation (Cainelli et al., 2011; Klewitz and Hansen, 2013; Petruzzelli et al., 2011). Also, Wong (2013) pointed out that knowledge sharing affects firms achieving green requirement positively. According to Halila & Rundquist (2011), successful innovation is supported by a network with diverse competences, however, eco innovators tend to use network for mitigating technological problem while other innovators considers network to be of helpful for financing and marketing. Now Triguero et al. (2013) suggest that entrepreneurs giving priority to alliance with research institute, agencies and universities are far more likely to instigate all types of eco-innovations. It is fair to say that Triguero’s argument is reflected in Company X prioritization of alliance with research institute and universities for conducting research and development to initiate green effort for eco innovation. Also, according to Dosi (1988), SMEs have access to sophisticated technology and technological expertise if they can engage and participate in the network of innovation (Dosi, 1988).

As a SME, Company X was benefited directly by all these projects work that emphasize primarily eco-efficiency, that is, the unification of environmental and economic performance to achieve economic gain while at the same time reducing adverse environmental impact. According to Schaltegger & Synnestvedt (2002), SMEs can create eco efficiency innovation with limited resources such as time, knowledge and finance in order to initiate more sustainable mode of business operation. The case company successfully created eco efficiency platform by allowing these co-operative project activities to trigger for continuous change in the future.

Brand reputation drives eco innovation for Company X. According to the company CEO,

“To create a common future for the company that is one of the main thing and promote brand reputation that way that is really important. Because that is how we can affect the others. When others can know that’s ok this company can do 100% recycling and they are using less, less energy, and we need to do the same so that is the thing how we can affect bigger scale that only what we are selling”

(Respondent 1, Chairman of Company X)
To reflect upon on the core message of the manager regarding the brand reputation, Company X really focused on the environmental awareness which is reflected in company’s effort to make 100% recycled garments. Now also the motivation and spirit of the chairman are also an important ground breaking factors that laid the foundation for initiation of eco innovation within Company X. This environmental awareness coupled up incremental technological development in this area are crucial point of differentiation for Company X which has enabled the company to stand out uniquely among other companies within the textiles industry, something that is reflected in company’s vision for creating common future. Company X has successfully identified itself as green innovator by aligning its core values with the behavior and goal of the organization. The company is exploiting and exploring the environmental image and the brand identity in different ways. For instance, they are raising eco innovative awareness regarding the 100% recycling technology by participating in social media platform such as Facebook, LinkedIn and other social media platform. They also have partnership with other organizations that work on humanitarian relief work etc.

As SMEs, Company X made an important breakthrough in the aspect of ecofriendly recycling technology. The size of the firm did not really affect the firm’s ability to come up with 100% recycling garment. Although mainstream literature suggest that firm size has positive impact on the firm to adopt eco innovation. Bigger firms are prone to eco innovation while smaller firm or SMEs are not. For instance, according to Connell and Flynn (1999), bigger firms go for eco innovation through external and internal pressure while smaller firms by and large by external pressure. For Company X, firm size did not matter most. According to respondent:

“In terms of innovation and sustainability, size doesn’t matter. It’s not the way big companies can be sustainable and small companies can’t. Everybody can be innovative and sustainable but its different kind of actions what you are going to do but size doesn’t matter”

Respondent 1, (Chairman of Company X)

Cost saving factor triggers eco innovation. However, in the empirical study of Company X, cost saving factor is not found to be an important factor for eco innovation. According to the respondent:

“Cost saving factor is small side thing and secondary issue. Even the raw material price is cheaper for us than fresh cotton. The cost of our production should be 30% cheaper than the fresh cotton. But in terms
of calculation, it’s not coming like that because we want to develop and we are doing lots of research and development for high quality yarns. Even though, our cost level is 10-20% expensive than fresh cotton. However, it’s not main factor for us. Sustainability is the main factor even though the cost is higher”

(Respondent 1, Chairman of Company X)

Environmental management system (EMS) does play a role to a certain extent to trigger eco innovation for Company X. The company does not have formal EMS. However, they have internal mechanism and own system in place and environmental management roadmap. The respondent of Company X highlighted the importance of having internal formal environmental management system that comply with environmental regulation and policy. They stressed that environmental regulation guides the organization into adoption of improvement of the production method.

“Of course we have the environmental management system but it’s not audited yet. Of course there are couple of processes we want them to be audited but at the beginning, it’s mostly India where we are making the production. There we are going to take couple of audits. First would be GRS global recycling standard. Then many of our customers they are asking for social issues they are asking BSCI. So basically those are the first ones. Those are what we are going for now and BSCI would be in the beginning of next year. We have our own internal environmental management system but not certified audited ones. It’s only what we have been building ourselves. Because of course we have our own internal system how we are working but that we have not been audited by any international organization yet. We will implement this kind of Environmental Management System in the future EMS”

(Respondent 1, Chairman of Company X)

Sustainability is one of the main driving force of eco innovation and process improvement at Company X. Everything the company is doing is motivated by sustainability. Mechanical recycling technique of noble fiber is itself more sustainable, innovative and environmentally friendly than the conventional process. The respondent said:
‘‘Sustainability is one of the biggest driving force and everything what we are doing’’

(Respondent 1, CEO of Company X)

New recycling method of producing superior fiber out of textile materials has number of implications for Company X in terms of its environmental objectives. The company has commitment to sustainability and it achieved that sustainability by reducing negative environmental consequences. For instance, 100% recycling method is saving a lot of water, using less energy and less electricity, thus achieving its economic and environmental objectives. The company’s environmental objectives corresponds with mainstream literature. For instance, according to Hansen et al., (2009), sustainability oriented innovation tries to integrate the environmental, social and economic dimension. This sustainability oriented innovation better known as eco innovation. Another scholar Huber, (2008) pointed out that process innovation is associated with the concept of production of goods and services in order to increase the eco-efficiency, a term better known as eco effectiveness (Huber, 2008). Huber’s position and argument regarding process innovation perfectly aligned with the production method of Company X in that it has achieved eco effectiveness by transforming its conventional production process into 100% recycling method, a method which is environmentally friendly.

5. RESULT

I have found the drivers of eco innovation from the case company Company X, by conducting the unstructured qualitative interview process. The information was found from the Company X website, reports and the projects they are involved in such as relooping fashion initiatives and Teleketju project. The drivers were categorized and analyze on three fronts such as supply side drivers, demand side driver and regulatory drivers. The results derived from the case company is quite diverse and provided the answer to the research question.

The main research question is, what are drivers of eco innovation in an organization from the view point of circular economy?

Supply side drivers of eco innovation summarize a range of drivers found in both primary and secondary study such as R&D, cost savings, EMS (Environmental Management System), brand reputation, collaboration and networking. From the empirical case study on Company X found additional drivers such as sustainability and networking and collaboration. However, networking and collaboration driver shows its strong relationship with circular economy.
concept. In the demand side drivers from the literature, customer demand, competition and market share increase were appeared to be the main drivers of eco innovation. However, market share increase was not found to be an important demand side driver from the empirical case study. But economic factor such as profitability came out as new driver for eco innovation. In terms of the regulatory drivers, both secondary and primary study found the same result, mostly unchanged. Although, it was obvious that regulatory aspect was not the dominant driver of eco innovation for Company X. It is important to note that no study was found in the previous literature that showed the relationship between eco innovation and circular economy. However, in the empirical investigation of the case study, mostly the supply side drivers such as technological competencies, R&D and networking and collaboration showed a strong correlation with circular economy. New conceptual model of drivers of eco innovation is realized from empirical findings with supply drivers showing strong relationship with circular economy.

The literature shows that regulation, R&D, environmental management system, technological competencies, and customer demand are the main drivers of eco innovation. However, in the empirical study it suggests that R&D, technological competencies, sustainability, networking and collaboration are the important drivers of eco innovation. Although, brand reputation, competition, economic factor such as profitability are found to be somewhat important factors for eco innovation in the empirical study. But they are not the dominant drivers of eco innovation. So there has been changes between primary study and literature study regarding the major drivers of eco innovation. R&D, and technological competencies are found to be common denominator in both secondary and empirical study and they are found to be the most dominant drivers of eco innovation in both secondary and empirical study. One other driver networking and collaboration is found to be particularly important in the empirical study alongside R&D and technological competencies. They are mostly supply side drivers with networking and collaboration being the additional driver in terms of its relationship with circular economy.

Now among all these drivers of eco innovation, particularly in the empirical study, the R&D, technological competencies and networking and collaboration are found to be most dominant factors of eco innovation in terms of their relationship with circular economy. The reason being, all these three factors are motivated by the concept of circular economy. This new outcome of empirical study reveals the relationship the between eco innovation and circular economy concept. Company X has been very active and successful in integrating eco
innovation with circular economy concept, thus achieving its economic, environmental and social objectives.

Figure 8: Modified concept of drivers of eco innovation in relation to circular economy

The empirical investigation presents a completely different pictures of how a resource efficiency view, in this case circular economy concept, contributes to trigger eco innovation for companies on three fronts supply side, demand side and regulatory and policy side. The investigation also presents a new insight to eco innovation definition as highlighted in the literature. The result provides the necessary inceptives to further advance the definition of eco
innovation which is a significant contribution of this study. Because the resource efficiency view is outside the scope of the definition of eco innovation. Also, the empirical investigation further contributes to the discourse of eco innovation drivers

6. DISCUSSION

The objective of the research was to analyze the drivers of eco innovation from the viewpoint of circular economy. Also the research focused on one small and medium size company in one industry. In order to find out the factors of eco innovations, the selected respondents were asked to identify the factors influencing the eco innovation in the organization. Many firm level drivers of eco innovation were discussed in the literature from supply, demand and regulatory perspective. Respondents identified many of the factors as potential stimuli for eco innovation for the firm.

The dominant supply side drivers found at Company X are technological competencies (100% recycling technology), R&D, collaboration and network and all three of them showed strong relationship with circular economy. The dominant demand side drivers found from the empirical studies are customer demand and profitability and competition to a certain extent. Although regulatory drivers remained unchanged in both primary and secondary studies. However, respondents pointed out the importance of regulatory factors for eco innovation.

The findings suggest that research and development (R&D) was among the leading factors for eco innovation for Company X. The respondents particularly stressed the importance of research and development (R&D) to improve the efficiency of the production/recycling process which enabled the firm to stay ahead of its competitors. The new innovative production technique/mechanical recycling is helping the firm to produce more units of cloths while reducing the negative environmental impact. Now this factor corresponds well the current literature as to how R&D triggers eco innovation in the company. For instance, a number of theoretical arguments supports the technological achievement of Company X. Doran & Ryan, (2012) regards the technological competencies to be an important mean for eco innovation. Also, Horbach (2008) enhanced that similar idea suggesting that technology drivers’ triggers innovation in the development phase of the firm, an argument which is reflected in the practice of R&D effort of Company X. Therefore, the findings and R&D as driving force for eco innovation correspond with the existing literature with regards to the initiation of eco innovation for the firm. Now the inference can be drawn about the impact this R&D has on firm attaining environmental sustainability, and that is, Company X has achieved greater
environmental sustainability which in turn has enabled the firm to stand out unique from its competitors in the market.

Also, sustainability was identified as one of driving forces of eco innovation. According to the respondent, everything Company X doing is motivated by sustainability. In the case of Company X, process improvement meaning new waste recycling technique is much more sustainable and environmentally friendly than the conventional system which is reflected in every aspect of company’s operation. This new process improvement is supported by number of theoretical constructs within the literature. For instance, eco innovation embodies the idea of new product or enhanced processes, new organizational forms or technologies that offer benefits to the environment in a way that can avoid negative environmental consequences (Beise & Rennings, 2005; OECD, 2005; Rennings, 2000). This process improvement at Company X can be labelled as process innovation which is related to the concept of production of goods and services in order to increase the eco-efficiency sometimes known as eco-effectiveness (Huber, 2008).

In addition, the respondents identified brand reputation is one of the important driving force for eco innovation at Company X. The respondents emphasized the importance of brand reputation as one of the main factor for eco innovation within the firm claiming that company should be deemed as green company as it produces 100% recycling garments which in unique. Consequently Company X is creating many business opportuning by promoting its brand value. As a result company is recognizing many competitive advantages in the market as compared to other competitors within the textile industry. The ways Company X promote its brand reputation and communicate its brand image correspond with existing literature. According to Sarkar (2013), business is gaining many competitive advantages and creating opportunities for business which are stemming from eco marketing effort and eco-sustainability. This kind of green marketing effort plus the promotion of its circular economy concept reflect Company X’s commitment to sustainability. Also, the company is using different social media platform such as Facebook, LinkedIn and other medium to promote its brand.

Another motivating factor of eco innovation is profitability which is the demand side drivers. Respondent stressed the need for the expansion of the company as SME. According to the chairman of Company X, new technique, new ideas, new technologies and motif are the main resources of the company to compete with bigger players in the market. They bring profit and are important sources of revenue for the company. This profitability aspect is what motivated
Company X to come up with 100% recycling technique which is not only innovative but also unique in the market, respondent added.

Regulation was identified as important source for eco innovation for the Company X. The company is following the regulation in the environment where they operate, in this case Indian law and regulation. Respondent claimed that Company X is fully complying with domestic and international regulations coming from different organizations. For the process improvement for better fiber they are also following international laws and EU regulation. The company is implementing the best regulation coming from the EU side for the recycling operation of finer fiber. Although the regulatory aspects were not the dominant drivers of eco innovation found in the empirical study.

Through the adoption of circular economy concept, Company X has been able to ensure the resource efficiency which technically means the reduction of the usage of virgin materials, elimination of waste, new potential for business, innovation, employment and sustainable lifestyle and foster the socio-economic wellbeing. Company X, through collaboration with relooping fashion initiative and teleketju projects, significantly reduced the inequalities in the textile value chain such as lack of water, exposure to toxic materials and unfair working condition by reducing the environmental and social costs that cotton farmers and manufacturers bears. Since circular economy requires collaboration in the entire value chain, therefore it has the capacity to increase transparency throughout the entire life cycle by distributing the value more equally (Becker, 2017).

Company X, through green and transformative innovation, the outcome of which is 100% recycled garment, has been able to ensure resource efficiency and material use and it did that through the adoption of the principle of circular economy. Also one of the other objective of Company X was also to focus on improving the product life cycle through its supply chain, that is, to minimize cost by sustainably regulating and managing the lifecycle of the textile from the beginning (e.g. less textile material and less energy use in the production process, same applies to the packaging and delivery) to the end of life (e.g. reuse, reduction of textile waste, creating recovery networks). This enabled the Company X to save its cost. Cost savings is an important drivers of eco innovation in an effort to minimize energy and use of raw materials and avoidance of higher taxation (Horbach et al., 2012) particularly for environmental R&D (Demirel & Kesidou, 2011) and eco process innovation (Triguero et al., 2013).
And Company X successfully did that by incorporating the environmental aspect into the supply chains from the onset and made collaboration between other actors and stakeholders such as companies, suppliers and customers to close the loop. For instance, Rashid et al., (2013) argued that the conversation of existing supply chain is supported by technological development which enhances the resource efficiency, reuse and recycle plus the organizational innovation which in turn leads to new distribution, collection and business model.

This kind of transition towards circular economy lays the foundation for companies to move more towards clean conformity. Although the relationship between the concept of eco innovation and circular economy is still in an evolving stage in the literature. And the respondents also admitted the fact that Company X is not 100% circular economy business. Some authors pointed out the fact that circular economy strategies are also important drivers for eco innovation for instance circular economy act as a leading principle for eco innovation whose aim is to create zero waste society and economy (Mirabella et al., 2014: p. 29). Company X embodied that principle through its capacity for eco innovation that provided new business opportunities for the company and contributed to a transformation towards a sustainable society.

There are number of implications can be drawn from the drivers of eco innovation at Company X. Those drivers of eco innovation has contributed to the decline of the negative environmental impact of business activities. As a result, the role of eco innovation at Company X has served as force for good towards creating sustainable society where the vision of society, economy and environment has intermingled in a dynamic way. Green technology such as 100% green recycling technology at Company X has provided the real mechanism for the potential creation of zero waste society. For instance, the relooping fashion initiatives helped Company X and other textiles companies to find new connections and collaboration partners and circular business opportunities by exchanging information about new technologies and solutions with regards to making recycled fabrics. This technology aspect and research and development at Company X increased the co-operation between actors and business partners, facilitated the knowledge sharing and green and clean technology transfer which helped reduce the cost of the resource material and minimize the use of non-recyclable materials.

And the other implication is that eco innovation is also reflected on the organizational level as well. Different public and private agencies and organizations and environmental agencies provided the institutional standard, laws and regulations that also support the concept of circular economy and Company X successfully implemented those policies and regulations in
the operation of 100% recycled garment business and created a successful circular economy business for others to emulate in near future. Also, the drivers of eco innovation at Company X facilitates the integration triggering alternative ways of collective eco innovation such as different actors and companies sharing services and other schemes as to how to collect the textile waste materials, sorting out the textiles and reusing of the textiles in an effort to maximize the value of resources and post-consumer textile wastes. Company X achieved this organizational innovation by co-operating with other companies and industries, by involving with projects such as relooping fashion initiatives and teleketju to test the spinning of the fibers into yarn and manufacturing of the fabrics and clothing to increase the use of recycled materials, thus producing durable, high quality recycled fabrics and clothing. Consequently, through the promotion of the co-operation and interrelationship of companies and collective collaboration. This intertwined relationship enabled Company X to create more circular system that better utilizes the textile waste materials for longer time possible to close its loop.

Another implication is that, in terms of creating goods and services, government provided all the necessary regulatory framework for circular economy business which also encourage the awareness of social participation among different actors. Due to the replacement of the take-make-dispose business model, Company X had to emphasize more on creating new products, services and resources based on the circular economy business model. That’s why, eco innovations at Company X ensures the designing of efficient garment product, quality and durability of recycled garment. The cause and effect relationship between eco innovation and circular economy is so prevalent that it has created competitive advantages for the company in that circular economy consideration created lot of opportunity for long term positive business differentiation, the implication of which is increased resource efficiency.

The adoption of circular economy concept and 100% recycled garment has enabled Company X to achieve competitive advantages over its competitors, which corresponded with existing literature for instance Porter and van der Linde (1995) argued that it is imperative to deem whole product life cycle while making product and process design decision. They also argued that green product and process aids the company to boost its competitive advantage by reducing negative environmental impact. On all front of the eco-innovation, Company X has been relatively successful in reducing negative environmental impact, thus creating new business opportunities. For instance, Chen (2008) argued that companies can constantly create new business opportunities and enhance competitive advantage by increasing their environmental performance and corporate green image.
Company X pioneered itself in the production of recycled fibers and cloths. Since it has adopted closed loop ecosystem which is based on the efficient use of discarded textiles materials. Therefore, as a natural progression, it had to implement new recycling technologies to come up with 100% recycled garments. As a result, the company achieved greater competitive advantages. A number of studies supported pure of textiles practical implementation of closed looped ecosystem or circular economy concept. For instance, Young, (1991) argued that an environmental innovation strategies is determined by how efficiently raw materials are used. Porter and van der Linde (1995) agreed with Young on the aspect of resource efficiency suggesting that prioritizing the productivity of the resources, change in the process and new innovative products can earn competitive advantage over competitors. It helps firms to find different ways of transforming waste into saleable products leading to more revenues (Porter & van der Linde, 1996). This resources based economic outlook has helped Company X to enhance its brand image which leads to enhanced business performance.

All of these motivating factors of eco innovation at Company X are deeply rooted in circular economy concept, therefore, Company X has achieved great economic success and enhanced its business performance by adopting closed loop production system. It has created shared value by meeting its economic, societal and environmental objectives in a fashionable way. This is something what Porter and Kramer, (2011) advocated, and that is, the principle of creating shared value promotes the idea of economic value by addressing the challenges and needs of the society, something which is reflected in case company’s visions for creating sustainable and better world. Through stakeholder’s involvement, the company has been able to address social needs that offers a huge potential for a variety of business, thus creating a condition to create more business ideas, and to seek new potential market.

Through this collective supportive action and co-operation (Relooping Fashion initiatives and Teleketju projects), such as sharing technology and information, the company has been able to get a lucrative supplier network, which in turn create a dynamic society for business. It has been able to establish new profitable/distribution channel which has essentially reduced the resource use. By this dynamic collaboration with other stakeholders, the Company X achieved resources efficiency through the minimization of textiles wastes, increased its know-how and innovative capacities through research and development which gave them competitive edge. For instance, Porter & Kramer (2011) is of the opinion that the cluster of collaborative network enable firms to create more productivity, innovations and competitiveness for local business and economy.
6.1. Eco innovation leads to resource efficient circular economy

Company X has lead the effort in moving from linear business to circular economy business through the adoption of closed loop production system that are deeply rooted in circular economy concept. The transition towards circular economy brings significant opportunities in creating new jobs which contributes to the sustainable economic growth for Company X. Significant innovation effort such as development of new products, materials, and the design of new business model is required in order for this transition to be fruitful. Also, this transition requires system innovation that change the value chain supporting the idea of current product and consumption pattern. This concept of innovation ‘change ‘and ‘transition’ in business and social practice is directly connected to the idea of circular economy (O’ Brien, M et al., 2013: p. 9).

Eco innovation is any kind of innovation that reduces the use of natural resources and lessens the release of harmful substance during the whole product lifecycle (EIO 2010). That’s why, eco innovation has the capacity to facilitates this transition to a circular economy business model which in and of itself is an effort to transform the mainstream business model, alter the way citizen engages with new products and services (ownership of the product, leasing and sharing etc). This results in an improved system which offers value (for instance sustainable cities, green mobility, smart energy system). Eco innovation in this way creates a condition for the shift towards more sustainable production and consumption practice. This focus of eco innovation in relation to circular economy is important because it enables the process of change, circular economy model represent an economic system that can support future resource efficiency society and economy. Eco innovation is causing the systemic process of change such as new production and consumption system but during the transition towards circular economy, it already is supported by the incremental change or evolution within the existing system such as improved recycling technologies or material efficient manufacturing (O’ Brien, M et al., 2013: p. 9).

If the theoretical underpinning on the role of eco innovation in transition towards circular economy can be applied to the empirical evidence found from the case Company X, few insights can be drawn. First of all, eco technological competencies such as 100% recycling technologies, research & development and networking and collaboration were found to be the most important drivers of eco innovation and those were in accordance with the principle of circular economy. For instance, Company X implemented eco technology or 100% recycle
technology in the production process which facilitated resource optimization by remanufacturing and regenerating textile waste materials to make finer fiber and cloths and provided superior customer experience. 100% recycling technologies falls under the category of cleaner technologies. Cleaner technologies, demands lessening of pollution and waste and significant changes in the entire production process and foster efficiency of production process by reducing the consumption of materials and energy, thus enabling the firm’s productivity and competitive advantage (Del Rio, 2005).

In addition, technology changes the economy. The reason being, technology is the prime driver of change. Also, information and industrial technologies are changing at a rapid scale which supports the closing the reverse loops. Therefore, there is already a technology solutions that enables circular economy for instance, advanced materials, renewable energy, energy storage technology that reduce the imbalance between demand and production of renewable energy (Timmermans 2015: p. 23). Existing literature also the supports the Company X resource optimization which can be related to circular economy concept. For instance, the efficient use of materials and energy are also important driver for environmental process innovations (Green et al., 1994; Rennings, 2000). Cleaner recycling technology or eco process innovation increases the eco efficiency of the firm. The essence of the eco innovation efficiency depends on the reduction of needed inputs (energy and material). Company X as SME achieved this eco efficiency which corresponds with the principle of circular economy. Existing literature also support this position for instance, according to Altham (2007), argued that SMEs preferring cleaner production can transform their way of using resources, operate the product output through closed looped production or industrial symbiosis, thus increasing the overall eco-efficiency of business operation.

R&D was considered to be another driver of eco innovation for Company X. Because it facilitates the condition for scientific knowledge, innovation and creativity. The central theme guiding the research and development at Pure was textile was circular economy. According to Euratex (2004), Finnish and European textile industry lies in great scientific knowledge and know-how, fashion and creativity and innovation. As a natural progression, being as SME, Company X had to collaborate with others such as VTT, which is, a leading research and technology company providing resource efficiency and circular economy solutions related to textiles. VTT played a huge role in the development of technology based recycling method for cotton. This kind of research and development co-operation essentially helped Company X to increase the efficiency of textile waste materials in cyclic fashion. The other research and development partner pure has textile has been involved with is the relooping fashion initiatives,
whose objective, is to create a model for closed looped ecosystem based on the principle of circular economy, thus producing business opportunities and creates value for parties within the value chain. Consequently, the case company increased its knowledge base and technological competencies on modelling and practical implementation of post-consumer textile recycling, thus processing and producing noble fibers and cloths. Through this joint research and development projects, the case company and other parties involved facilitated the delivery of the cloths and returning of used cloth from the consumer back to the cycle, thus closing the loop. At each stage of the R&D initiatives, negative environmental impact was reduced which is a direct result of environmental innovation. Horbach (2008) argued that improvement of technological competences (knowledge capital) by R&D facilitates environmental innovation.

Networking and collaboration was appeared to be another important driver of eco innovation for pure waste in relation to circular economy. Knowledge is exchanged through collaboration and networking. For instance, according to Wong (2013), knowledge sharing affects firms achieving green requirement positively. Collaboration and potential networking with other firms, institutions, authorities, research institutes is considered vital for adoption of eco innovation (Cainelli et al., 2011; Klewitz & Hansen, 2013; Petruzzelli et al., 2011). Through the collaboration and networking with government organization, Universities, NGOs, Research and development institutes such as VTT, Relooping fashion initiatives, teleketju projects, and consultancy firms, Company X mitigated the technological problem, resulting in the reduction of negative environmental impact of business activities.

This network and collaboration brought together different actors in cyclic manner that placed environmental awareness at the top of their agenda. For instance, Teleketju project in which the case company involved brought together end of life textiles collectors, sorters, operators developing primary processing and automatized sorting, companies utilizing final products, work centers arranging social work, waste centers, charity organization and municipalities promoting the concept of textile recycling and circular reasoning that are rooted in circular economy concept. Consequently, cutting age recycling process technology developed through this collaboration enabled case company to produce unlimited recycling of cellulose based fabric without the extension of any harmful chemicals or new materials, thus reducing the negative impact on the environment. So the entire collaborative effort created a value chain that restored the utility of the resources in each stage of the collaboration. And this closed looped value chain manages the value of the materials, eliminates the waste and introduce a completely new line of sustainable future designs (Relooping Fashion Initiative, 2016).
Company X achieved this from an economic point of view, Company X achieved greater economic and financial success in that it achieved competitiveness domestically through the eco efficiency across all dimensions such as the allocation of waste resources, efficient use of the waste materials and efficient production of resources out of waste materials. Also, there is demand for ecofriendly fashionable cloths as environmentally conscious customers are increasingly looking for eco products. So it fulfilled the demand trend by utilizing depleting waste materials. And on the other hand, resource cost increases because of supply side trend. Due to the rising resource cost, Company X provide inceptives towards cost reduction of the resources through the recycling of the waste materials.

From an environmental point of view, the case company reduced the negative consequence of the business activity as it focused on the ecological design of its production process with less impact on the environment. In terms of the social objective of the business, it had created more opportunities for employment on national and international level, because, its main operation is in India, thus contributing to the economic growth and wellbeing of people.

The bottom line is, dominant drivers of eco innovation and their role significantly reduced the negative environmental impact helping to create more business opportunities, increase productivity efficiency and diversity growth such as opening of new niche market and new product(new fashionable ecofriendly cloths) and competitive advantage for Company X. That’s why eco innovation drivers and their impact on the case company has been the byproduct of systematic and critical thinking that acted as an enabler of circular economy. According to Vence & Pereira (2018), this kind of transition to circular economy requires systemic change, new knowledge, new technologies, new regulation, new instructions and new business model, new financial rules and new consumption behavior. Although chairman of Company X stated that they could not actualize 100% circular economy business. However, it achieved the objective of circular economy to a certain extent in that it reduced resource consumption and waste, maintain and to share the value of the waste materials over long period of time to end life of waste. Eco innovation drivers such as recycling technology/new production process played an important role as an enabler of circular economy. Of course, it has been largely possible due to the favorable Finnish and common circular economy regulation in place. Another enabler of circular economy has been possible due to the networking and collaboration. Networking and collaboration as eco innovation driver facilitated the collaborative and systemic thinking, co-operation, interaction among different actors and synergies that are deeply rooted in the concept of circular economy. Another enabler is research and development through which Company X developed its technological competencies such
as recycling technology and created clothing line that uses noble fiber. Through these kind of eco innovations, Company X gained both economic and environmental benefits with productive efficiency, increased production and diffusion plus creating new products (fashionable recycled garments) and services.

All three factors such as technological competencies, R&D and technological competencies acted as enabler of circular economy, resulting in the creation of shared value for Company X. The company’s desire to make technological breakthrough such as 100% recycling technique is facilitated through the principle of circular economy concept. Company X has been successful in new systemic thinking in terms of bringing new solution to their business. According to Becker (2017), circular economy concept carries with it the potential for creating shared value, but requires radical and systemic changes in the current thinking model and system.

Company X has been successful to a certain extent in circular economy business and it did that through collaboration with stakeholders throughout the entire value chain. Consequently it achieved resource efficiency (better utilization of textile waste), higher level of knowledge, research and development and reduction of cost, productivity, innovations, competitiveness of local businesses, and the reduction of the usage of the virgin material, elimination of the waste, creation of new opportunities for more employment and business. New technological breakthrough such as 100% recycling technology coupled with new circular economy insights, Company X achieved economical sustainability as well as ecological sustainability. This intertwined relationship between technology and circular economy aspect triggers a new discourse which is techno-economic paradigm. A hypothetical conceptual model, which is the representation of the relationship between eco innovation enablers and circular economy, has been presented based on the empirical result of the case study.
Figure 9: The conceptual model of the relationship between eco innovation and circular economy at Company X
6.2. Limitation

The research was conducted on single organization Company X. The study addressed the concept of eco innovation drivers from circular economy perspective. Therefore, it was a sound justification to find a company that has environmental concern. Company X is environmentally focused company that has environmental awareness and activities. The study focused only on one company in one industrial sector in one country. More research should be conducted on more companies within textile industry to prove the hypothesis of the result derived from the study. The result of the study and its research findings might not be applicable to other industries. Hypothesis or conceptual model derived from the result need to be tested over and over again to apply its generalization to other companies on international level.

6.3. Future research

The study emphasized on finding eco innovation drivers from circular economy perspective and attempted to show potential relationship between eco innovation drivers and circular economy which also opens up new areas of future research surrounding this topic. The study was unique in that almost no was study was done on the drivers of eco innovation from circular economy perspective. Therefore, the study opened up new possibilities for businesses to look at the environmental sustainability in new light. My recommendation for future research would be to further study the eco innovation drivers in various context across different industries and how those relate to the circular economy. Also, more research should be done on the potential relationship between eco innovation and circular economy that might contribute further for companies to practice environmental sustainability. Also, more research can be carried out on country specific drivers of eco innovation from circular economy perspective and finding out necessary connection between eco innovation and circular economy. Few of these future recommendation would be helpful in solving the current limitation of the study.
7. REFERENCE:

7.1. Primary sources

Interviews:

No | Name | Position
---|---|---
1 | Respondent 1 | Chairman
2 | Respondent 2 | Human Resource Manager

7.2. Secondary Sources


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EC, 2011. Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. Roadmap to a Resource Efficient Europe. COM 2011 571 Final.European Commission, Brussels, Belgium


Harvard Bus. Rev. 87 (11), 52–60.


Kemp, R., 2010. Eco-innovation: definition, measurement and open research issues.Econ. Polit. 397e 420


Saha, M. and Darnton, G., 2005. Green companies or green con-panies: Are companies really green, or are they pretending to be?. Business and Society Review, 110(2), pp.117157.


8. APPENDIX

8.1. Interview questionnaire for respondents at Company X

Interview details:

- The name of the respondent:
- Gender:
- Job/position:
- Education:
- Interview place:
- The type of the interview: Open ended

Interview questionnaire:

1. What is your concept of eco innovation? Please tell a little bit of eco innovation
2. Could you please tell about eco innovation in your company? For instance why it is important?
3. Why Company X starts to practice eco innovation?
4. What are the main drivers of eco innovation in your company?
5. What is circular economy?
6. Why do you think the companies should follow circular economy concept?
7. Could you please tell about how your implemented circular economy concept in your business?
8. What is the relationship between eco innovation and circular economy in your company?
9. What specific drivers of eco innovation can you relate to circular economy?

That’s all I have for my questions. Do you have more things to say?

➢ Interviewer: Md Aminul Islam 0456937115
➢ Thesis topic: The drivers of eco innovation. A circular economy perspective
➢ Thesis type: Master’s thesis of 30 ECTs credits
➢ Program: Innovation Management (Master of Science, Economics and Business Administration)
➢ University: University of Eastern Finland

9. FIGURES

Figure 1 The closed-loop production system
Figure 2 the conceptual model of drivers of eco-innovation
Figure 3 Difference between linear and circular economy (RPS Ltd 2014)
Figure 4 European Union’s waste hierarchy (Recyctec Holding AB 2016)
Figure 5 Recovery & recycling closed loop (Lacy et al. 2015, 1338)
Figure 6 Industrial symbiosis (United Nations Development Programme 2010)
Figure 7 Four (technical) value cycles of a circular economy (Ellen MacArthur Foundation, 2017a)
Figure 8 Modified concept of drivers of eco innovation in relation to circular economy
Figure 9 The conceptual model of the relationship of eco innovation and circular economy at Company X ................................................................. Error! Bookmark not defined.

10. TABLE

Table 1: General information of Company X ....................... Error! Bookmark not defined.