Eco-innovation in Packaging Industry for Environmental issues, and Waste Prevention

Samina Sumrin[(a)], Suraksha Gupta[(a)]*, Yousra Asaad[(b)], Yichuan Wang[(c)] and Saurabh Bhattacharya[(a)]

(a) Newcastle University, UK

(b) Brunel University, UK

(c) Sheffield University, UK

* Corresponding Author

Summary

The changing ecological environment and increasing awareness on sustainability and waste management issues have pressed firms to adopt innovation for their survival, efficiency, environmental performance and to attain a competitive advantage. More and more firms are keen on adopting an eco-innovation strategy to show their corporate social responsibility towards the environment and contribute to waste prevention. Regardless of innovative technological advancement, expanding the number of global supply chains for items has prompted a synchronous increment in the utilization of many layers of packaging and related waste all along the supply process. Consequently, packaging causes both difficulties and opportunities for the world environment and society. This resultantly leads to the circular economy and sustainability-related concepts that create the importance of the eco-innovation in packaging design relationships with waste prevention. Innovation in packaging has been studied as part of product eco-innovation, but mostly at an anecdotal level. Research calls for more empirical studies to examine factors that make eco-friendly packaging innovation more effective. This paper aims to examine the eco-innovation of packaging industry, and understand how driving factors (i.e. managerial environmental awareness, technological capabilities, human capabilities, organizational capabilities) contribute to the successful implementation of eco-design innovation in packaging and its impact on waste prevention and brand.

Keywords: Eco-friendly packaging design, Waste prevention, Managerial Environmental Awareness, Eco-Capabilities, Eco-innovation, Branding, Green packaging

Introduction

The packaging industry has an increasingly unique part on the world market, from last few years this market is quickly expanding its market value and is estimated to reach $1 trillion in 2020 as compared to the year 2015 when it remained $839 billion (Meherishi et. al., 2019). The need to guard food items in boxes against organisms and contaminants has pushed business thinkers to discover new arrangements, first utilizing naturally occurring materials and later, utilizing increasingly complex materials, that enabled transporting and saving the items for a long time (Emblem, 2012). The initial success of keeping food safe with packaging paved the way for introducing packaging in other industries including cosmetics and medicine (Lautenschlager, 2001). This surges in the necessity of packaging for management of different product parts, raw materials, and elements, and for distribution to the end buyer, along these lines expanding the packaging waste made at each stage.

The packaging is a fifth "P" with the other four "P's" (Product, price, place, promotion) of the marketing mix because it assumes a noteworthy job in a customer relationship, product promotions and differentiation and consumer buying decision process (Kotler & Armstrong, 2010; Magnier & Schoormans, 2015). Packaging also works as an important component in product transport, storage, and preservation of the product (Van-Herpen et. al., 2016). According to Boudreaux & Palmer (2007) packaging is the very first component that creates a relationship between consumers and any product; irrespective of the quality element of the product at this interaction stage. There are several packaging materials, i.e. glass, wood, metal, paper, and plastics.

Different packaging materials are used either alone or with the combination of any other material to fulfil packaging requirements. The excessive use of packaging material by producers contributes to unnecessary packaging waste. This excessive packaging mostly consists of plastic requiring a more challenging recycling process and a longer degradation (Grant et. al., 2015). Plastic recycling also emits harmful gasses in the air therefore plastic is not a favorable packaging material anymore (Grant et. al., 2015). Nowadays, buyers are becoming more socially responsible and showing awareness of the unnecessary waste and pollution caused by the usage of too much packaging, and therefore, demand for sustainable packaging has increased by consumers (McBride, 2012; Emmett & Sood, 2010).

Therefore, packaging-related waste management issues and environment-related packaging innovation concepts are becoming an essential part of academic and market research.

Unfortunately, some companies are yet to understand the benefits of eco-packaging and seize to considering eco-packaging as an unnecessary cost for the company (Guillard et. al., 2018). Despite the introduction of some packaging management schemes, packaging waste is still an economic, social, and environmental problem. Even though packaging has a direct impact on the environment and contributed to the waste as well. The regulations for extended producer responsibility were issues by OECD were issued in 2001 for producers to change their product design into more friendly with reusable and recyclable features. It also discusses the costs and benefits of environment friendly designs but still this law is not implemented effectively (Rogoff, 2014).

According to (Tencati et al., 2016) the municipal waste consists of 15–20% of solid packaging waste in numerous states. Only the waste created by plastic packaging is a part of half of the overall plastic waste worldwide (UNEP, 2018), along with the many Asian countries such as the Philippines, China, and Thailand accumulating plastic waste in their seas send by European countries (Conservancy, 2015). Additionally. depletion of plastic is dangerous for seabirds (one billion sea organisms and 100,000 sea creatures) every year, while its deterioration process releases noxious gases into the environment that can cause many health problems including kidney and respirational problems. Furthermore, U.S Companies FedEx, UPS, and USPS reveal that they collect 165 billion packages in form of yearly shipments, which consumes cardboard packaging that is made from just about 1 billion trees (GAIA, 2018).

There exist some waste management strategies promoting recycling, but then the packaging destination is landfill. Therefore, it is necessary to promote waste prevention schemes that introduce new packaging that does not require landfill as its last destination. From the last few years, industry-level studies are focusing on different types of eco-innovation and the driving forces behind them. Fussler and James were the first two persons who introduced the concept of eco-innovation in 1990's. They defined eco-innovation as the change in the existing products and process that make that decrease their negative environmental effect and make it more valuable for the both buyers and sellers (Fussler & James, 1996).

The resource-based view is used as a theoretical base for many eco-innovation studies (Chen, 2008; Li, 2014; Sarkis et al., 2010). According to resource-based view firms can use their internal resources to fulfil the external resource demands (Oliver, 1997). Based on the resource-based theory by Barney (1991) that a firm can get competitive advantage by using its non-substitutable, valuable and non-imitable resources, used by (Cai & Li, 2018) and managerial cognition theory (Peng & Liu., 2016) this research expands the argument about the antecedents

of eco-innovation. Souza et al, (2017) explain three main components of eco-capabilities that a firm can develop from its internal resources. These elements are technological capabilities, human resource capabilities, and environmental organizational capabilities. This study is analysing these eco-capabilities along with managerial environmental awareness (Peng & Liu., 2016) to estimate their effect on the adoption of eco-innovation practices.

The definition of sustainable development by World Commission on Environment and Development (1987), eco-capability is important for the firm aiming to decrease the environmental impact of its production process (Thomsen, 2013). This eco-capability consists of three main resources; technology, human and organisational that did not only reduce ecological impact of the firm but also helps in performance improvement (Gabler et. al., 2015). Managerial cognition theory says that managerial concern and knowledge on environmental issues plays a very important role in the firm strategy (Kaplan, 2011).

This research consists of multiple research questions such as do managerial environmental awareness, technological capabilities, green human resource capabilities, and environmental organizational capabilities can drive the eco-packaging innovation implementation? In case it is true, then did it have a specific impact in terms of waste reduction and brand benefits? Which driving factor is most efficient to stimulate eco-packaging innovation? Can eco-packaging innovation achieve environmental benefits in terms of waste reduction for companies?

To work out these research problems, this study contributes to the eco-innovation literature in two ways. First, this study develops a theoretical framework that combines managerial cognition theory and the resource-based view to examine the driving factors. The research framework helps firms understand how to adopt eco-packaging innovation and its impact on business performance. Next, the study will assess the benefits of eco-design innovation in packaging in term of brand benefits and its waste management practice of the firm.

This paper discusses different drivers for the adoption of eco-friendly packaging innovation. This study is based on the food packaging industry to evaluate the adoption of eco-design innovation in packaging as a waste management practice. Another objective is to understand how managerial environmental awareness, technological capabilities, human capabilities; organizational capabilities can be associated with the environmental mindset that appears in the business. The studies available on eco-innovation are mostly based on eco-product innovation and eco-process innovation, therefore, it will be the first kind of study on eco-packaging innovation that will investigate how managerial environment concern and firm eco-

capabilities helps in the adoption of eco-design innovation in packaging and benefit the firm in terms of reduction in its packaging waste, less environmental impact of packaging and brand benefit.

Literature Review

In general, the term “innovation” has different definitions. In the context of this research, innovation is about discovery, development, or adoption of a new idea in the form of a product, process, or a decision by the firm's management. Some studies favour completely new ideas for sustainability through radical innovation to solve big issues including poverty and pollution (Kennedy et. al., 2017). Other researchers reject the idea of a complete transformation and favour an incremental innovation by making improvements to the existing products, processes, or marketing ideas (De Marchi, 2012).

Some researchers argue that in the context of sustainability, innovation is about moving from incremental innovation to radical innovation stage (Klewitz et. al., 2014). Taking steps towards incremental innovation to move towards radical innovation is a more realistic approach for firms. If innovation is solely understood as a radical innovation, then the small changes and efforts accomplished by firms towards sustainability will be discounted. Innovation in the industry aims to move away from traditional production techniques to a different process that provides firms considerable profits and gives them competitive advantages (Magnier & Schoormans, 2015).

Innovation abilities differ from firm to firm and industry-to-industry based on the level of technology, knowledge, economic conditions, and type of innovation (Pavitt, 2005). According to Ettlie (1983), firms need to consider the following questions in their innovation decision-making process: 1) What is the benefit or inspiration behind innovation? 2) Why would the company decide to innovate instead of focusing on other strategies to improve their market performance? 3) If it is decided that innovation is the best solution, the next question is to understand which are the specific capabilities needed to start the innovation process? 4) How a company's strategic decisions will help to attain the innovation goal?

Pavitt, (2005) underlines three important steps for innovation: 1) Knowledge assimilation; 2) Knowledge transformation (into the system, production, process, and services); 3) Knowledge gathering to keep the product connected with the demand and supply in the market. Companies will only be willing to invest in such innovation if they found that real demand exists in the market and these innovative products will have value for the buyers (De Marchi, 2012).

The term adoption indicates moving forward from designing sketches to practice. The idea of innovation is starting from the search of new knowledge through experiment then discovery, replacing the old with the new/better, and the adoption of the new product, process, and market methods or services. The availability of resources is crucial for the implementation of an innovative idea. If innovation leads to market success then the company can get higher profits, which can feed more innovation ideas (Kennedy et. al., 2017).

Innovation can be the result of the interaction of different economic agents including rivals, clients, and traders (Companies), development and technological institutions (Public organizations) and private, public, and academic research (Research organizations). On the other hand, Díaz-García et. al., (2015) used green innovation, environmental innovation, eco-innovation, and sustainable innovation as interchangeable terms. Eco-innovation is directly related to the aim of less product and process impact on environment (OECD, 2009). Therefore, eco-innovation can also be termed as innovation but only innovation cannot be termed as eco-innovation (Bossle, et. al., 2016)

All mentioned in the above paragraph differentiate term innovation from eco-innovation. It also shows that innovation can become a barrier for eco-innovation in which modus operandi is very different from eco-innovation. Therefore, companies should have complete knowledge and understanding of both terms innovation and eco-innovation to overcome the barrier.

Eco-innovation

Eco-friendly packaging materials are available in the markets that are marked by eco-labels. Many companies are working on environmentally friendly packaging materials. These environments friendly packaging is also named as biodegradable packaging, green packaging, and eco-design packaging. Such new eco materials for packaging are the need of time and nature demands to replace the traditional materials with these new packaging materials (Aminabhavi, et. al., 1994 and Boustead, 1998).

The new packaging design with eco-friendly packaging material consists of less material that needs to be disposed of at the end without sacrificing our environment. Consumers are also educating themselves to make environment-friendly purchasing decisions because they are ever more hostile toward extravagant, distorted, and single-use packaging, and having more awareness of the impact of their products on the environment (Holdway et. al., 2002).

Such ss a study by Kim & Secock, (2009) on female beauty customers with much more environmental concern show more importance to biodegradable and recyclable packaging. Eco-innovation in packaging/green packaging as a green marketing strategy can influence consumers' purchasing decisions (Scott & Vigar-Ellism 2014).

The identification elements of eco-friendly packaging are its recyclability, biodegradable, simply constructed, and reusability. Such eco-innovation in packaging makes it more sustainable and eco-friendlier through which the organizations can get an opportunity to improve their market get a green position (Blanco & sheffi, 2015). Such new eco-designed packaging adds brand value to the product (Chen et. al., 2017)

Recent literature presents eco-innovation as a specific type of innovation, that has a prospect to reduce the traditional impact on the environment (Table 3). The extant literature shows that there are many synonyms of eco-innovation including environmental innovation, eco-friendly innovation, sustainable innovation, and green innovation (Schiederig et. al., 2012). Nowadays, the link between innovation and the environment is greater as companies strive to innovate to save natural resources and decrease the environmental impact of their products, packaging, and production processes.

Eco-innovation has a close association with the social and environmental aspects of a company (Bossle et.al. 2016). Fussler & James (1996) were the very first authors who introduces the term eco-innovation in their study. they define eco-innovation as a change to make new products and processes that significantly decrease the environmental impact. The Organisation for Economic Co-operation and Development (OECD) define eco-innovation as "*the formation or application of new/upgraded, goods, services, processes, and marketing methods that provide environmental improvements as compared to relevant substitutes"* (OECD, 2009).

Arundel & Kemp (2009) emphasize that eco-innovation is not only for environmental benefits but it has many economic benefits as well that can make a firm think about the eco-innovation strategy to eco-innovate. *"Eco-innovations can be motivated by economic or environmental considerations. The former includes objectives to reduce resource, pollution control, or waste management costs, or to sell into the world market for eco-products"* (Arundel & Kemp, 2009; P. 15).

Schiederig, et. al. (2012) highlights that eco-innovation is used by the firm as an environmental strategy that helps companies improve their economic and environmental performance but along with that it also gives them many other benefits through other ways. In addition to having

satisfactory environmental and economic benefits from eco-innovation, Kemp (2011) introduce life cycle assessment as an important step for eco-innovation For eco-innovation, any product, technology, and the process should be tested through its lifecycle. (Arundel & Kemp, 2009). Similarly, another definition of eco-innovation states that "*as hardware or software innovation that is related to green products or processes, including the innovation in technologies that are involved in energy-saving, pollution-prevention, waste recycling, green product designs, or corporate environmental management"* (Chen et. al., 2006). Other definitions of eco-innovation are summarised in Table 1.

Table 1: Summary of eco-innovation definitions in the literature

Author	Definition
OECD, (2009)	Eco-innovation is an environmentally friendly product, process, marketing, services, or promotional design.
Carrillo-Hermosilla et. al., (2011)	Environmental innovation consists of all kinds of innovations that do not affect the environment by keeping in mind that what was the purpose behind innovation derivation.
Andersen, (2010)	Eco-innovation is the adaption of a new environmentally friendly product, process, or marketing method in a firm that provides prolonged environmental benefits to the firm and society both.
Baroulaki and Veshagh, (2007)	Eco-innovation is any kind of change that belongs to sustainability.
Kemp (2011); De-Marchi, (2012)	Eco-innovation is described as the creation of a new product, process, or adoption of a new strategy by the firm that has a less environmental effect by releasing less hazardous material into the environment.
Chen et. al., (2017); Paraschiv et. al., (2012); Eiadat et. al., (2008)	Eco-innovation is an adapted innovation for protecting nature by decreasing environmental impacts. It may be any kind of innovation; eco-product innovation, eco-process innovation, or technological eco-innovation by saving energy, waste recycling, prevention of production pollution, and corporate environmental management.
Carrilo-Hermonsilla et. al., (2011)	……...a way to improve environmental and social performance.

According to Marsh & Bugusu, (2007) if a firm adopt packaging with environmental features as its firm strategy it can help the product to access new marketplace by making its connection with the consumers. These changes in the packaging add value in it for the socially responsible consumers that help brand in market propositioning (Kotler, 2010). Similarly, eco-labelling on packaging can also be used as marketing tactics to create awareness among consumers about firm eco-innovation practices.

Andersen, (2010) pointed out that eco-innovation did not only shows environmental practices by the firm but also provide benefits to the brand as well. The first benefit can be in the form of a price premium on the innovative eco-friendly product, process, or marketing promotions. The second benefit is in terms of decrease the cost of production as recyclable and reusable material will be less costly for the firm.

Eco-innovations as an environmental practice relates to the introduction of a new green idea or changes to an existing idea to become more environmentally friendly (De Marchi, 2012). This paper is using the idea underlying in resource-based view that focus on using firm internal capabilities as organizational practices to fulfil external demands and gain competitive advantage (Barney, 1991). Many researchers used resource-based view to explain how firm can use the its internal resources for its environmental management (Vera Ferrón et. al., 2014 & Carrillo-Hermosilla et. al., 2019).

The RBV is also used by many eco-innovation studies to capture the impact of environmental changes on the firm (Katkalo et. al., 2010 and Ljubica & Cvelbar, 2016) This study will use this theoretical approach to give more knowledge of the firm internal capabilities that are more helpful for eco-innovation and can benefit the firm.

Eco-friendly packaging

An eco-friendly packaging innovation creates a packaging design that gives the product the first impression of its environmental responsibility by maintaining its quality (Ampuero & Vila, 2006). Products with eco-design connote a more sustainable product with less impact on the environment. This concept of eco-friendliness applies to the whole life cycle and every stage of the production process from raw material consumption to its manufacturing, packaging, and waste disposal. Eco-friendly packaging design will use reusable environmentally friendly materials with the aim of waste reduction (Guillard et. al., 2018). This green packaging will be

higher in quality but will use fewer raw materials and be less harmful to nature (Van-Herpen et. al., 2016).

Nguyen et. al., (2020) introduced three key dimensions of eco-friendly packaging; these are packaging material, manufacturing technology and market appeal. In terms of packaging material, the studies reveal that socially responsible consumers follow the cues given on packaging to evaluate it in terms of environment friendly packaging (Magnier & Crie, 2015 and Lindh et. al., 2016a). The second most important element of eco-packaging is its recyclability as it is considered an essential element by the consumers in develop and developing countries (Young's, 2008). The next important characteristics of eco-packaging is its reusability. The consumer considers two types of reusability in the packaging to ensure that it is eco-friendly that is it can be reusable as it is in home and it can be used as raw material for the renewal purpose (Lindh et. al., 2016b).

Different studies around the world reveals that along with reusability and recyclability, the biodegradability is also an essential element of eco-packaging in different countries (Lewis and Stanley's, 2012; Scott & Vigar-Ellis, 2014 and Magnier & Crie, 2015). When we ask a buyer about eco-packaging material, the first thing they usually reply is paper and ait is also considered as best environment friendly material in many studies (Allegra et. al., 2012; Lindh et. al., 2016a; Steenis et. al., 2017 and Dilkes-Hoffman et. al., 2019). Paper packaging is considered as good alternative of plastic packaging for food as it is more sustainable.

Second category is the use of environment friendly technology for the production process of packaging. According to Palombini et. al., (2017) the environmental problems are often related with the packaging material therefore it is not the consumer responsibility to create the demand of more friendly materials but it is the sole responsibility of the manufacturer that they should think about their activities that are harmful for nature and to overcome the environmental problems associated with their production activities use environment friendly manufacturing technology. By considering this they will adopt eco-process innovation that is also helpful to save the nature (Scott and Vigar-Ellis', 2014).

The third category is market appeal of eco-friendly packaging. There are many visual merchandising tools in terms of colour and graphic images can be used to make eco-friendly packaging more appealing to the buyers (Venter et al.,2011 and Tait et. al., 2016). A study by Magnier & Crie, (2015) find eco-friendly packaging simpler than it should be. He argues that paper and biodegradable packaging is often very simple therefore it cannot attract buyers as

compare to traditional packaging. Additionally, eco-packaging should also focus on functionality characteristics that it should protect the product as much as needed at different steps of its way to buyers. For this Verghese et al., (2015) suggested different functional attributes for the packaging that can contribute to the sustainability aspect of the packaging.

The final last most important element to be considered in eco-friendly packaging is the price as consumer compare market price of different products and choose the lease one to increase his utility (Magnier & Crie, 2015 and Martinho et. al., 2015). He can also compare price with its reusability feature and may be willing to more price but still it should not be too high from the market price (Scott & Vigar-Ellis, 2014). On the other hand, Krystallis & Chryssohoidis, (2005) in their study found that consumer is not willing to pay premium price unless he is not fully satisfied that the product is satisfying both environment and market conditions.

Antecedents of Eco-innovation

Managerial Environmental Awareness

Managers' knowledge, concern, and interpretation of the environment can drive environmental behavior and eco-innovation activities in the firm (Peng and Liu, 2016). Marshall et al. (2005) in their study on the US wine industry, found that a firm will adopt a proactive environmental strategy if its manager has knowledge and concern about the environment and he thinks about the firm's responsibility towards the environment. Only then this awareness by the manager is likely to lead to a strong commitment towards forward-looking environmental practices (Papagiannakis et. al., 2014). Additionally, managers will consider these environmental issues and environmental strategy development task as a development opportunity for the firm (Sharma, 2000).

According to Egri and Herman (2000), managers' awareness of environmental issues and the company's environmental performance is a driver to keeping knowledge about customers and competitors regarding green innovation trends in the economy. The knowledge about the benefits attached to the eco-innovation can encourage managers to implement a proactive environmental strategy. In summary, several studies argue that managerial environmental awareness is directly and positively related to the eco-innovation (Papagiannakis et. al., 2014).

Eco-Capabilities for innovation

Internal capabilities of a firm are the combination of multiple skills, organizational learning, working routines, and other firm resources. Tapping into these internal capabilities is necessary

if a firm wants to adopt eco-innovation (Doran & Ryan, 2016). These internal capabilities for eco-innovation are called sustainability-oriented capabilities (Lee and Klassen, 2008 and Kabongo & Boiral, 2017). Sustainability oriented capabilities include organizational capabilities, human resource capabilities, and technology capabilities (Kabongo and Boiral, 2017).

Eco-research & development and green marketing are key organizational capabilities that are necessary for a firm's eco-innovation (Pacheco et. al., 2018). Lee and Klassen, (2008) also gave importance to organizational learning capability in terms of green knowledge generation, and human resource capabilities such as green training of employees as foundations for eco-innovation (Melander, 2018). Technological capabilities are also essential for the initial phase of the innovation process.

Consequences of eco-innovation

Eco-friendly packaging and Waste reduction

Innovative packaging design based on sustainability and life cycle assessment has become an interesting topic nowadays as many environmental problems lead to social awareness among people (Nordin & Selki, 2010). Eco-friendly packaging can directly contribute to sustainable development (Wikström et. al., 2019). The packaging is an important component for a product and customer both, but the concerns are increasing for its degradation process that is directly affecting the soil and nature. During the whole life cycle, traditional packaging materials are consuming costly natural resources along with that these packaging has no reuse that creates waste, and during its degradation process, it generates pollutants in form of toxic emissions.

From the last few years, the academics and firms are working together to introduce new materials for packaging that did not only fulfil all needed requirements by also have reusability and complete recyclability feature as well (Holdway et. al., 2010). Many legislations have been introduced around the world in form of taxes, take-back requirements, recovery of packaging waste, voluntary programs, and allocation of waste prevention cost for producers so that they understand their responsibility and need of time. Such laws have different names and different procedures in different countries (Ferronato & Torretta, 2019).

Although the legislations are present from years packaging design eco-innovation is still a significant challenge for economies around the world.

Eco-friendly packaging and Brand attachment

Branding is considered as a medium to convey a brand idea and the brand benefits to consumers. Conveying brand benefits helps in creating recognition and reminder for a specific organization/product and therefore it establishes an image of the brand in the buyers' mind (Kotler & Armstrong, 2010). The packaging is a promotion tool that helps to build brand identity and communication of brand values (Silayoi and Speece, 2005). If a brand wants to deliver its environmental promises through its green brand identity, it should show its association and commitment to the environment through its brand and green marketing.

Applying green marketing in packaging occurs when a firm adopts environmental practices into its operations in the production process (i.e., eco-product and process innovating packaging) and the distribution process (Magnier and Schoormans, 2015). This integration of green marketing subsequently increases intangible brand equities. Chen, (2006) in his study on green packaging found that a green brand image gained by using the green strategy (green packaging) leads to green trust that helps to gain consumers' green brand attachment. Similarly, Hartman et al., (2005) argue that if the packaging is showing more concern towards the environment and has less environmental impact then the brand will be considered environmentally responsible.

The following table is explaining the definition of different concepts of eco-innovation used in this study.

Table 2: key concepts, definitions, and sources

Concepts	Definition	Sources
Managerial Environmental Awareness	Managerial environmental awareness can be described as the manager's understanding and knowledge of the environmental impact of his firm production activities. It shows that the manager understands his social responsibility and wants to decrease the negative effect of any of his firm activity on the environment.	Peng & Liu, (2016)
Technological Capabilities	Technological capabilities for eco-innovation are depending on three types of elements. First new physical technologies, intangibles including trained managers and employees, and the knowledge of the firm.	Cai & Li. (2018)
Green Human Resource Capabilities (GHRM)	Green human resource management (GHRM) includes HRM practices in the firm that are specifically designed to decrease the environmental impact of the firm activities on the environment. These capabilities are also linked with the	Singh & El-Kassar (2019)

	environmental strategy of a firm and employees' green behaviour.	
Environmental Organisational Capabilities	These are the abilities of the companies to assimilate environmental knowledge, organize, construct, and reconfigure its competencies and resources to comply with environmental management and eco-innovation.	Chen et. al., (2017) and Berrone et. al., (2013)
Eco-Friendly Packaging Innovation	Eco-design packaging is the packaging that contains the features of less usage of raw material, use again, recycling, and waste elimination	Holdway et. al., (2002)
Waste Reduction	Waste reduction refers to the decrease in waste volume or contaminants before releasing them into the environment.	Ferronato & Torretta, (2019)
Brand Attachment	Brand attachment is defined as the intensity of the connection that came into the existence between the customer and the brand due to any reason.	Park et. al., (2007)

We provided a summary of literature review on design eco-innovation (Table 3) and it is visualising it in Figure 1.

Table 3: Summary of Literature Review on Design Eco-innovation (Eco-Product innovation/Eco-Packaging innovation/Eco-process Innovation/Eco-management innovation)

Study Reference	Name	Brief Description	Sample	Area of Innovation	Model Approach	Outcome	Study Type	Application Area	Impact
Noci and Verganti, (2002)	Managing 'green' product innovation in small firms	The framework consists of multiple necessary stages based on technological innovation for the proper implementation of the eco-innovation strategy	4 Case studies	Green Product innovation	Framework	Green product innovation cannot be considered as a minor issue for SME's, in any event, for those that are not legitimately affected by ecological guidelines.	Precursors Event methodology	SME's in Lombardy (Italy)	N/A
Foster and Green, (2000)	Greening the innovation process	In What Way environmental problems are linked with the research and development for the adoption of eco-innovation	Nine UK companies -Producers of consumers or industrial products -Large Companies -Minimum staff 50 people	Green Product and Services	Flowchart	The production process for new green products process needs to be faster for the firms who want to be competitive among many other firms in the market	Qualitative -Interviews	UK	N/A
Pujari, (2006)	Eco-Innovation and New Product Development: Understanding the Influences on Market Performance.	To investigate how a firm can make greener products more profitable in the marketplace.	-68 Valid responses -The study sample constitute multiple industries including: - automobiles, - chemicals, - computers, - electronics, - food and drink, - furniture, - paper, - packaging.	Eco-Product innovation	N/A	Factors that have a direct effect on the green products market performance are interlinked with the buyer, producer, lifecycle, firm strategy, and marketing.	In-depth interview and survey questionnaires to the executives in companies	North America	Market Performance
Herman et. al., (2007)	Life Cycle innovation model	Descriptive Framework for the proper implementation of innovation-driven by environmental issues	-597 e-mailed Surveys	Product Design innovation	Diagram	Managerial environmental concern is the utmost important factor for the adoption of eco-innovation. On the other hand, government legislations harm eco-innovation.	-Questionnaires	UK Manufacturing Companies	N/A

Baroulaki and Veshagh, (2007)	Eco-Innovation: Product Design and Innovation for the Environment	Why firms should focus on the adoption of eco-innovation as their business strategy. The lesson is given by the real-life case study of a firm	N/A	Eco-innovation	Figure	The case study provides essential proof that eco-product innovation can be beneficial for any firm and can build a customer relationship with the product	Case Study	N/A	N/A
Eiadat et.al., (2008)	Conceptual Model of Eco-innovation Strategy	A framework is made to explain the relationship between the eco-innovation strategy of the firm and its performance	N/A	Product Design innovation	Conceptual Model	(1) environmental innovation can improve firm performance (2) environmental innovation strategy adoption process is affected by multiple drivers (3) environmental innovation strategy is the mediator between certain environmental innovation drivers and firm performance	Survey	Chemical Industry in Jorden	N/A
Demirel and Kesidou, (2011)	Stimulating different types of external policy tools and internal firm-specific factors for eco-innovation	Use the framework proposed by OECD, (2009) to explain different types of eco-innovations	DEFRA Survey -289 UK firm's data	Product Design innovation	Framework	1. Environmental regulations 2. Market-driven cost-saving factors, and 3. ISO14001 certification, are the drivers of technological innovation and research and development for eco-innovation	DEFRA -Quantitative	UK	N/A
Chen and Huang, (2011)	Eco-Innovative Design of Product Service Systems	A three-stage design and a flow chart is built for the explanation of the relationship between Product Service System and eco-innovative design implementation		Eco-design	Flowchart of PSS eco-innovation process	Flaws that need to be overcome in product service-system models for better products and services relationships discourse.	- Functional analysis - The TRIZ substance-field model	European Companies	N/A
Ar, (2012)	The impact of green product innovation on firm performance and competitive capability: the	Empirically prove to the firms with this study that green product innovation is essential to improve business performance and to gain competitiveness	140 manufacturing firms	Green Product innovation	Conceptual Model	- Green product innovation positively affects business performance and provide	Questionnaire-based survey	Turkey	- Firm Performance - Competitive capability

	moderating role of managerial environmental concern					competitiveness to a firm. - Managerial environmental concern is proved as moderator the relationship between green product innovation and firm performance			
Carrillo-Hermosilla et al, (2011)	Integrated framework for the impact on internal and external firm drivers for eco-innovation	A Research diagram that shows the different internal and external drivers that drive a firm for the adoption of eco-innovation	Manufacturing firms	Eco-design	Diagram	Many internal and external drivers work together for the effective implementation of eco-innovation	Survey -Interviews -questionnaire	Eco-innovation product and services	Competitive and sustainable advantage
Kaenzig &Wustenhagen, (2014)	The Effect of Life Cycle Cost Information on Consumer Investment Decisions Regarding Eco-Innovation	This study built a conceptual model that shows the influence of life cycle cost (LCC) information on the buyers buying decision for eco-product in the market	N/A	Eco-design	Conceptual model	Instead of rising the cost of eco-products, the company should take eco-innovation as a marketing challenge that can be won by correct investment decision and better knowledge spread among consumers	Case Study Interviews	N/A	Lifecycle Cost assessment
Levidow et. al., (2016)	Process eco-innovation: assessing Meso level eco-efficiency in industrial water service systems	This research use diagram to analyze the amount of water used during the production process to show it as their eco-innovation strategy by less waste of water	- 2 large manufacturing Company Case	Process Eco-innovation	Diagram	This study involves different stakeholders in the decision-making process that how they can less impact the environment. - both studies prove that internal discussion at different levels is necessary for the effective decision making and investment in eco-activities,	Case Study	N/A	N/A
Huang and Li, (2017)	Green Innovation and Performance	This study incorporates different diving factors for green innovation and then their resultant impact on firm performance	-600 ICT (Information, communication, and Technology industry) Companies -CEO's and managers of environmental protection and R&D department interviewed	Green product and Green process innovation	Framework	There are 3 major driving forces for green product innovation and green process innovation 1. Dynamic capability, 2. Coordination capability, and	Qualitative -Survey Questionnaire	Taiwan	N/A

						3. Social reciprocity			
Chen et. al., (2017)	The Influence of Excessive Product Packaging on Green Brand Attachment: The Mediation Roles of Green Brand Attitude and Green Brand Image	In this research, the influence of excessive product packaging on green brand attachment was discussed. it also discusses green brand attitude and green brand image as a mediator for green brand attachment	- 238 valid questionnaires	Excessive Product Packaging	Framework	The study findings prove that green brand attitude and green brand image negatively mediate the relationship between excessive product packaging and green brand attachment.	Questionnaires	Taiwan	N/A
Kiefer et. al., (2018)	Drivers and Barriers of eco-innovation types for a sustainable transition	This study used a resource-based view to analyze the resources as competences of the firm to drive different types of eco-innovation. It also discusses different barriers of the eco-innovation	-197 Spanish SME's -638 persons (close to innovation area) were accessed through Questionnaire	Different Types of Eco-innovation	N/A	The drivers of different types of eco-innovation are: - Physical resource and capabilities, - Green supply chains - Eco-innovation-friendly corporate culture, - Technology-push factors - Market-pull drivers - Internal financing resources The barriers of different types of eco-innovation are: - Cooperation, - Organizational learning, - An ISO (International Organization for Standardization) ecological certification, - Dependency on Technology	Quantitative	Spanish industrial SME's	N/A
Ghisetti and Montresor, (2019)	Design and eco-innovation: micro-evidence from the Eurobarometer survey	The study discusses eco-design that how eco-design activities are linked with the eco-innovation initiative of the firm	- The sample size of 4500 firms -European (US and Switzerland) and - Non-European	Eco-design	Diagram	Firm investment decision has a direct impact on its eco-design activities. IF the firm is successful in its eco-design introduction then it will show a good eco-	- Eurobarometer Surveys - 2015 and 2016	- European and - Non-European	N/A

						innovation understanding.			
Branska et.al., (2020)	The innovation of Customer Chemicals Packaging in Concern of Sustainability	It discusses different options a firm can use to decrease the packaging material from the primary packaging of the firm product as an environmental initiative	N/A	Packaging innovation	N/A	- Plastic can be replaced with eco-friendly materials it will resultantly decrease its environmental impact - The color change can also be used as a marketing strategy to show the environmental initiative of the firm, -The firm can start using recycled plastic to show its environmental concern - By changing the packaging production technology that will use fewer resources - Creating awareness in consumer to reuse plastic packaging	- Primary data - Qualitative research	N/A	N/A
Maziriri T. E., (2020)	Green packaging and green advertising as precursors of competitive advantage and business performance	The study focusses on the green packaging and green Advertising. It estimates the impact of green packaging and its marketing activities on firm performance and competitive advantage gain	Manufacturing Small and Medium-sized Enterprises (SMEs)	Green Packaging	Conceptual Model	As consumers are showing more concern to the environment and understanding their social responsibility, therefore, green practices in terms of green packaging and green advertising have a positive influence on firm performance. It also helps the firm to gain a competitive advantage	- Quantitative -Simple random sampling	South Africa SME's	N/A

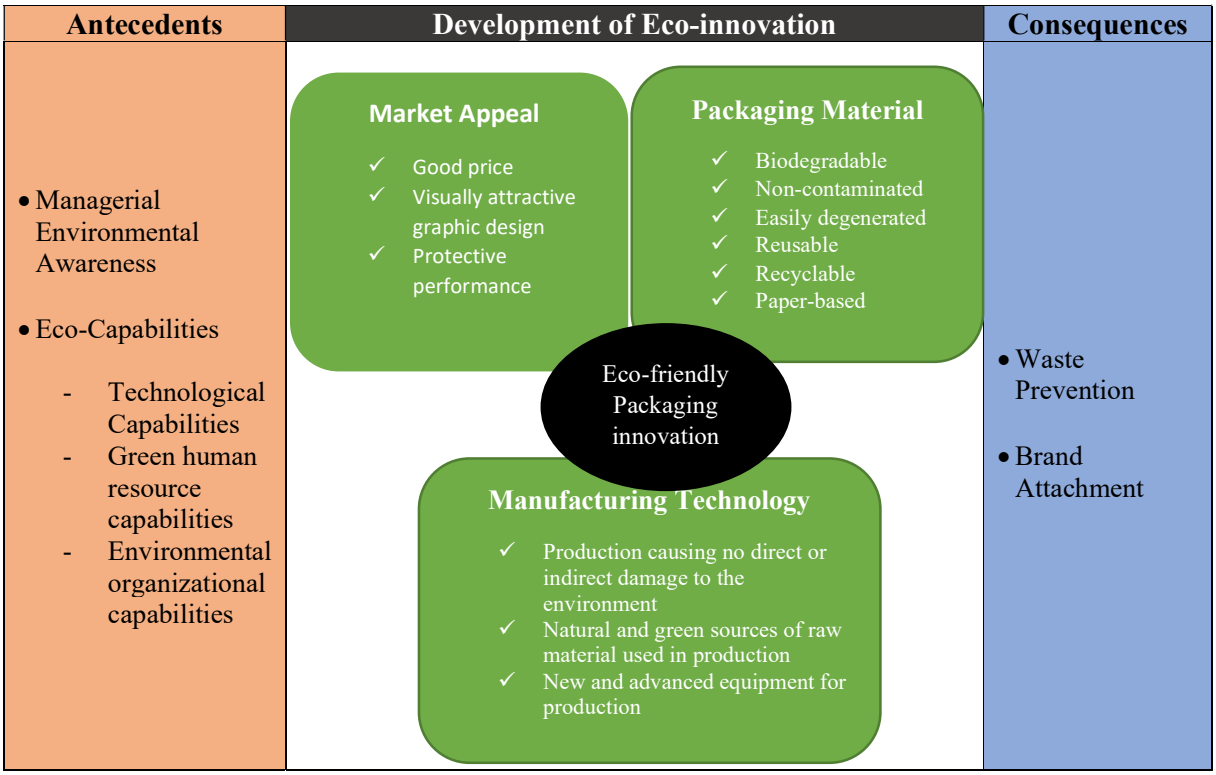

Figure 1. Antecedents and Consequences of Eco-Innovation

Proposition Development

A firm can use its internal capabilities and knowledge in a well-managed way to bring the change needed for its development. The same way they can also learn from their internal operations and managers learning from his past decision and his attitude towards future strategies for the firm (Cohen & Levinthal, 1990). Organisational learning theory explains that how a firm learn from the decisions taken by managers and higher authorities in the past and acclimatisation of such erudition into all functions of the firm (Levitt & March,1988 and Drejer, 2000).

Organisational support is an essential element for effective introduction of eco-innovation. The same argument can be used for eco-innovation. Management knowledge and support for eco-

innovation mean the company will be more willing for the introduction of innovation (Ho et. al., 2009). The more managerial knowledge and awareness for green innovation the more efficiency and success will achieved by the firm of any kind of sustainability development (Mohd. Saudi et. al., 2019).

Additionally, managerial environmental concern is not only essential factor to espouse any kind of environmental practices but also help for the advancement in effectiveness of eco-innovation. That resultantly helps to fulfil environmental objectives and competitiveness by the company (Qui et. al., 2010). In the same study the positive relationship evidence was found for the relationship between manager environmental concerns, green innovation, and firm performance (Ar, 2012). In the same way Tang et.al., (2017) in his study on Chinese firms proves that managerial environmental concern moderates the relationship between green process innovation and firm performance.

According to the study by Lin & Ho, (2008) encouragement by the management have a big influence on the adoption of environment related eco/green practices. Similarly, Lin and Chang, (2009) observe the positive relationship of corporate environmental integrities on green innovation and green learnings. Qui et.al., (2010) also found that managerial concern for environment work as a driver of eco-innovation adoption by the firm. As if manager is aware of environmental regulations and environmental impact of the industry on environment, he will be in more favour of eco-innovation practices for industry (Peng & Liu, 2016).

Based on above literature following hypothesis is developed

Proposition 1: The higher the managerial environmental awareness, the more likely is the adoption of eco-innovation

The Schumpeter theory states that ever since 1785, the world has experienced 5 innovation waves and the fifth wave introduced in the early 1990s (technology push). The technology push has introduced a specific type of innovation in IT, electronics, and networks industry (Maxwell, 2009). To adopt eco-innovation, firms should enhance technological capabilities (e.g., ability to handle big data) so that they can achieve better results (Lee and Klassen, 2008; Wang et al., 2018; Wang & Wang, 2020).

Philips has taken the initiative to make this world sustainable by innovation. In 1994, Philips introduced an eco-design process for the development of green energy-saving technologies to reduce CO_2 emission. With the aid of technology, Philips reduced CO_2 emission by up to 7%

in one year. Typically, innovation technologies help to use resources efficiently without harming the natural environment. These technologies help humans to extract raw materials efficiently and use them more productively and efficiently than the traditional methods for production (Pujari, 2006). Specifically, technological capabilities assist companies in design eco-innovation.

Proposition 2: The higher the technological capabilities, the more likely is the adoption of eco-innovation

In addition to technical capabilities, human resources are essential for the successful implementation of eco-innovation in the firm (Kabongo and Boiral, 2017). From the perspective of eco-innovation, human resource capabilities refer to the development of human resources for innovation purposes. Human resources are considered as an essential element to drive eco-innovation (Paraschiv et. al., 2012). Human resources include knowledge management between the employees and the arrangement of educational training on sustainability programs for employees (Arnold and Hockerts, 2011).

There should also be an investment in employees in terms of their development and training so that they have adequate knowledge and information about eco-innovation for its introduction in the firm (De Marchi, 2012; Weng & Lin, 2011). Employees need the necessary skills to design eco-friendly packaging that can sustain the company's products. Human capabilities are further including the life cycle assessment activities by the employees that help firms to trigger their eco-design efforts (Johansson, 2002), which is also termed as design for environment (González et. al., 2008).

Many researcher emphases on training needs before the implementation of any kind of green initiative (Kaur, 2011; Renwick et. al., 2013 and Jos & Jabbour, 2013) human resource capabilities can also improve by performance base rewards (Govindarajulu & Daily, 2004; Jackson and Renwick, 2011; Kaur,2011; Shatouri et. al., 2013 and Renwick et. al., 2013). The green team is also beneficial for any environmental initiative by the firm (Banerjee, 2001; Johansson, 2002; Pujari, 2006; Kaur, 2011; Jos & Jabbour, 2013). Thus, the above argument proves that human capabilities are directly related to the eco-innovation initiative of a firm. Therefore, the following hypothesis is proposed:

Proposition 3: The higher the human capabilities, the more likely is the adoption of eco-innovation

Organizational capabilities are an integral part of the eco-innovation adoption process (Huang and Li, 2017). Organizations should develop capabilities to meet environmental demands by society and eco-innovate (Doran & Ryan, 2016). Pacheco et. al., (2018) introduced key organizational capabilities that help companies to eco-innovate. These are organizational learning, adaptability, eco-efficiency, and internal communication as pillars of organizational strength that are essential for the adoption of eco-innovation.

Melander, (2018) also highlighted the importance of effective international communication as an eco-capability. As an eco-capability, internal communication includes making employees aware of the benefits of sustainability and provide them the complete knowledge about different eco-innovation activities in the firm such as the development of eco-friendly packaging for its products. Hence, we propose that:

Proposition 4: The higher the environmental organisational capabilities, the more likely is the adoption of eco-innovation

According to Van-Herpen et. al., (2016), the main objective of using eco-friendly packaging is to provide a new material that is best in quality even if it is reused as raw material and it has environmental benefits in terms of reduction of the packaging waste. The recyclability feature also helps to reuse the material of eco-friendly packaging along with the reduction in waste (Guillard et. al., 2018). If a company is using paper packaging as eco-friendly packaging, it will ensure to use recycled for reuse purposes. Paper uses less energy during its production so this will consume less energy emission (Ahmed et. al., 2017). Another type of eco-friendly packaging is polylactides (PLA) is made from corn, potato, cane-sugar, and agricultural waste, as it is coming from nature itself therefore it will deteriorate easily and will have less impact on the environment. In summary, the important advantage of different eco-friendly packaging materials available in the market is the reduction in the packaging waste through their features (i.e. reusable, recyclable, re-manufacturable, etc).

Proposition 5: Eco-innovation in packaging stimulates waste prevention.

Companies showing green commitment and environmental concern can influence consumers' memories, thoughts, and feelings. A study by Yang and Zhao, (2019) on a brand adopting green practices concerning packaging, has found that adopting environmental initiatives can make brand memorable, and consumers feel an attachment to the brand. It can also prompt repurchase and commitment to buy the brand with a strong environmental commitment (Chen et. al., 2017). Conversely, customers tend to avoid brands that have excessive product packaging that is creating negative connotations with environmental concerns (Chen et. al., 2017). Consequently, we propose that the implementation of eco-friendly packaging makes the brand stronger in the eye of the customer, with the latter being more likely to become attached to the brand.

Proposition 6: Eco-innovation in packaging stimulates brand attachment

Research Agenda

The existing research in packaging design and eco-innovation demonstrates several concerns that can be a part of further research. We discuss packaging in terms of a waste prevention strategy of a firm with benefits to the brand for future research of eco-innovation in packaging design. To fulfil the study gaps in packaging eco-innovation literature the future research can focus on the different brand benefits that a firm can attain from eco-packaging.

There are different external and internal driving factors of eco-innovation are discussed in earlier studies but there is still lack of research in small and medium size industries (De-Koeijer et. al., (2016). The future research can emphasis on the eco-innovation in packaging industry, the area that is highly neglected by the researchers who studied eco-innovation. Such studies can contribute in the identification of the driving factors and consequences specific for eco-innovation in packaging industry.

Second, the proposed framework in this paper emphasizes the need for an organized approach that helps a firm to use eco-friendly packaging design, to deal with the problems such as packaging waste. The study of eco-innovation in packaging can compare the need and benefits of eco-innovation for different types product packaging i.e. online sold products packaging v/s high street products packaging or food and beverage product packaging eco-innovation.

Third, a study can specifically contribute to the packaging industry by explain costs and benefits of different types of eco-friendly materials and their use in terms of different packaging i.e. primary packaging, secondary packaging (Ahmed et. al.,2017). The studies based on eco-packaging materials cost can contribute in terms of overcoming the cost related barriers that hinder the process of packaging eco-innovation.

Fourth, another possibility for further research is the development of performance measures of eco-package design. Different packaging may provide different levels of environmental benefits. Therefore, establishing an evaluation mechanism of packaging that consists of the essential packaging characteristics that are important to ensure the best eco-friendly packaging design.

Sixth, one research opportunity for eco-innovation in packaging industry is available in terms of improvement in eco-packaging development modes in terms of incorporating life cycle assessment and differentiating the model in terms of radical and incremental innovation (Koeijer et. al., 2016).

References

Ahmed, I., Lin, H., Zou, L., Brody, A. L., Li, Z., Qazi, I. M. and Liangtao, L. (2017). A comprehensive review of the application of active packaging technologies to muscle foods. *Food Control*, 82, pp. 163– 178.

Allegra, V., Zarba, A.S., Muratore, G., (2012). The post-purchase consumer behaviour, survey in the context of materials for food packaging. *Italian Journal of Food Science.* 24 (4), pp. 160-164

Aminabhavi, T. M., Balundgi, R. H. and Cassidy, P. E. (1990) Review on Biodegradable plastics. Polymer Plastic Technology and Engineering, 29(3)235-262

Ampuero O. and Vila, N (2006). Consumer perceptions of product packaging. *Journal of Consumer Marketing*, 23(2). 100-112.

Andersen M., M. (2010). Eco-innovation toward a taxonomy and a theory, Paper for the DRUID Conference, June 18-20: Copenhagen

Ar, I. (2012). The Impact of Green Product Innovation on Firm Performance and Competitive Capability: The Moderating Role of Managerial Environmental Concern. *Procedia - Social and Behavioral Sciences*. 62. 854-864.

Arnold M., G. and Hockerts, K. (2011) The greening dutchman: Philips' process of green flagging to drive sustainable innovations, *Business Strategy, and the Environment*, 20(6), 394-407

Arundel, A. V. & Kemp, R. (2009). *Measuring eco-innovation*. UNU-MERIT Working Papers, no. 017, Universiteit Maastricht, Maastricht.

Banerjee, S. E. (2001). Corporate Environmental Strategies and Actions, *Management Decisions*, 39(1), pp. 36–44

Barney, J. (1991). Firm resources and sustained competitive advantage. Journal of Management, 17(1), pp. 99-120

Baroulaki, E. & Veshagh, A. (2007). Eco-Innovation: Product Design and Innovation for the Environment. In: Takata S., Umeda Y. (eds) Advances in Life Cycle Engineering for Sustainable Manufacturing Businesses. Springer, London

Berrone, P., Fosfuri, A., Gelabert, L., & Gomez-Mejia, L. R. (2013). Necessity as the mother of 'green'inventions: Institutional pressures and environmental innovations. *Strategic Management Journal*, 34(8), 891-909.

Blanco, E. E., and Sheffi, Y. (2015) Eco-Growth: A Framework for Sustainable Growth, enter for Transportation & Logistics Massachusetts Institute of Technology, Cambridge, MA, U.S.A.

Bossle, de Barcellos M. D., Vieira, L. M., Sauvée, L. (2016) The drivers for adoption of eco-innovation. *Journal of Cleaner Production*, 113(1), pp. 861-872.

Boudreaux, C. A., and Palmer, S. E. (2007) A charming little Cabernet: Effects of wine label design on purchase intent and brand personality. *International Journal of Wine Business Research,* 19(3), 170-186.

Boustead, I., (1998). Plastics and the environment. *Radiation and Physical Chemistry,* 51(1), 23-30.

Branska, L., Patak, M. and Pecinova, Z. (2020) Innovation of Customer Chemicals Packaging in Concern of Sustainability, 61-67, Conference: Hradec Economic Days.

Cai, W. & Li, G. (2018) The drivers of eco-innovation and its impact on performance: evidence from China. *Journal of Cleaner Production*, 176, 10-118

Carrillo-Hermosilla, J., Del Río, P., Könnölä, T. & Bleda, M., (2011). Business strategies and capacities for eco-innovation. Instituto de Empresa Business School Working Paper No. EC8-124-I.

Chen, C. C. (2006) Development of a framework for sustainable uses of resources: more paper and fewer plastics? *Environment International,* 32(4),478-486

Chen, J. L. & Huang, S. C., (2011). Eco-Innovative Design of Product-Service Systems by using the Substance-Field Analysis Method. In Functional Thinking for Value Creation, Proceedings of the 3rd CIRP International Conference on Industrial Product-Service Systems, Technische Universität Braunschweig, May 5-6, 2011, Braunschweig (Germany)

Chen, Y. (2008) The driver of green innovation and green image-green core competence. *Journal of Business. Ethics,* 81(3), 531-543

Chen, Y. S., Lai, B.S. and Wen, C. T. (2006) The Influence of Green Innovation Performance on Corporate Advantage in Taiwan, *Journal of Business Ethics*, 67(4), 331-339.

Chen, Y.-S & Hung, S.-T & Wang, T.-Y & Huang, A.-F & Liao, Y.-W. (2017). The Influence of Excessive Product Packaging on Green Brand Attachment: The Mediation Roles of Green Brand Attitude and Green Brand Image. *Sustainability*, 9(4), 654

Cohen, W., and Levinthal, D. (1990). Absorptive Capacity: A New Perspective on Learning and Innovation. *Administrative Science Quarterly*, 35(1), pp.128-152

De Marchi, V., (2012). Environmental innovation and R&D cooperation: empirical evidence from Spanish manufacturing firms. Research Policy, 41(3), 614-623

De-Koeijer, Wever, R. and Henseler, J. (2016) Realizing Product-Packaging Combinations in Circular Systems: Shaping the Research Agenda, *Packaging, Technology and Science: An International Journal*, 30(8), pp. 443-460

Díaz-García, C., González-Moreno, A. and SáezMartínez, F. J. (2015) Eco-innovation: insights from a literature review*, Innovation*, 17(1), pp. 6-23.

Dilkes-Hoffman L, S., Pratt, S., Laycock, B., Ashworth, P. and Lant P. A. (2019) Public attitudes towards plastics, *Resources, Conservation and Recycling*, 147, pp. 227-235

Demirel, P., Kesidou, E., (2011). Stimulating different types of eco-innovation in the UK: Government policies and firm motivations. *Ecological Economics*, 70(8), 1546-1557.

Doran, J. & G Ryan, (2016) The effectiveness of R&D and external interaction for innovation: Insights from quantile regression, *Economic Issues Journal Article*, 21(1), 47-65

Drejer, A. (2000) Organisational learning and competence development, *The Learning Organization*, 7(4), pp, 206-220

Egri, C. P., & Herman, S. (2000). Leadership in the North American environmental sector: Values, leadership styles, and contexts of environmental leaders and their organizations. *Academy of Management Journal*, 43(4), 571-604.

Eiadat, Y., Kelly, A., Roche, F., Eyadat, H., (2008). Green and competitive? An empirical test of the mediating role of environmental innovation strategy. *Journal of World Business*, 43(2), 131-145.

Emblem, A. (2012). *Packaging technology: Fundamentals, materials, and processes provide a comprehensive introduction to packaging*. Oxford Woodhead Publishing.

Emmett, S. and Sood, V. (2010) *Green Supply Chains. An Action Manifesto*. West Sussex: John Wiley & Sons Ltd.

Ettlie, J. E. (1983). Organizational policy and innovation among suppliers to the food processing sector. *Academy of Management Journal*, 26(1), 27–44.

Ferronato, N., & Torretta, V. (2019). Waste Mismanagement in Developing Countries: A Review of Global Issues. *International journal of Environmental Research and Public Health*, 16(6), 1060.

Foster, C.& Green, K. (2000). Greening the innovation process. *Business Strategy and The Environment*. 9, 287-303

Fussler, C. & James, P., (1996). *Driving Eco-innovation: a breakthrough discipline for innovation and sustainability*, Pitman Publishing: London

Gabler, C. B., Richey Jr, R. G. and Rapp, A. (2015) Developing an eco-capability through environmental orientation and organizational innovativeness, *Industrial Marketing Management,* 46, pp. 151-161

Gadenne, D., Kennedy, J., & McKeiver, C. (2009). An Empirical Study of Environmental Awareness and Practices in SMEs. *Journal of Business Ethics*, 84(1), 45-63.

GAIA, (2018) A Burning Plastic: Incineration Causes Air Pollution, Dioxin Emissions, Cost, Retrieved December 27, 2018, from http://www.no-burn.org/burning-plastic-incineration-causes-air-pollution-dioxin-emissions-cost-overruns/

Ghisetti, C., & Montresor, S. (2019). Design and eco-innovation: micro-evidence from the Eurobarometer survey. *Industry and Innovation*, 26(10), 1208-1241.

González, P. Sarkis, J., and Adenso-Díaz, A. B. (2008) Environmental Management System Certification and Its Influence on Corporate Practices: Evidence from the Automotive Industry, *International Journal of Operations and Product Management*. 28(11), 1021–1041.

Govindarajulu, C. & Daily, B. f. (2004). Motivating Employees for Environmental Improvement. *Industrial Management & Data System*, 104(4), 364–372.

Grant, D. B., Trautrims, A., and Wong, C. Y. (2015). *Sustainable Logistics and Supply Chain Management. Principles and Practices for Sustainable Operations and Management. Revised Edition*. London: Kogan Page.

Guillard, V., Gaucel, S., Fornaciari, C., Angellier-Coussy, H., Buche, P., & Gontard, N. (2018). The next generation of sustainable food packaging to preserve our environment in a circular economy context. *Frontiers in Nutrition*, 5, 121.

Hartmann, P., Apaolaza-Ibáñez, V. A., & Sainz, F. J. F. (2005). Green branding effects on attitude: Functional versus emotional positioning strategies. *Marketing Intelligence & Planning*, 23(1), 9–29.

Hellström, D. & Saghir, M. (2007). Packaging and Logistics Interactions in Retail Supply Chains. *Packaging Technology and Science*. 20, 97 - 216.

Hermann, B. G., C. Kroeze, and W. Jawjit. (2007). Assessing environmental performance by combining life cycle assessment, multi-criteria analysis, and environmental performance indicators. *Journal of Cleaner Production* 15(18), 1787-1796.

Holdway, R., Walker, D., & Hilton, M. (2002). Eco-design and successful packaging. *Design Management Journal (Former Series)*, 13(4), 45-53.

Huang, J. & Li, Y. (2017). Green innovation and performance: The view of organizational capability and social reciprocity. *Journal of Business Ethics*, 145(2), 309-324.

Ibanez N (2011). Business Leaders: Dupont Packaging Diamond and Gold Winners, June 14, available at http://www.businessreviewusa.com. Retrieved on January 24, 2019, from Business Review, USA.

Johansson, G. (2002). Success Factors for Integration of Eco-design in Product Development: A Review of State of The Art, *Environmental Management and. Health*, 13(1), 98–107.

Jos, C. and Jabbour C. (2013), *Environmental Training In Organisations: A Literature Review, In The Clute Institute International Academic Conference.*

Juwaheer, T.D., Pudaruth, S. & Noyaux, M.M.E. (2012). Analysing the impact of green marketing strategies on consumer purchasing patterns in Mauritius. *World Journal of Entrepreneurship, Management and sustainable development*, 8, 36-59.

Kabongo, J. & Boiral, O. (2017). Doing More with Less: Building Dynamic Capabilities for Eco-Efficiency: Building dynamic capabilities for eco-efficiency. *Business Strategy and the Environment*. 26(7), 956-971

Kaenzig, J. & Wüstenhagen, R., (2010). The effect of life cycle cost information on consumer investment decisions regarding eco-innovation. *Journal of Industrial Ecology*, 14(1), 121-136.

Kaplan, S. (2011) Strategy and PowerPoint: An Inquiry into the Epistemic Culture and Machinery of Strategy Making, *Organisation Science*, 22(2), 287-539.

Katkalo, V. S., Pitelis, C. N., & Teecey, D. J. (2010). Introduction: On the nature and scope of dynamic capabilities. *Industrial and Corporate Change,* 19, pp. 1175-1186.

Kaur, H. (2011). Impact of HR factors on employee attitudes: an empirical analysis of a sample of ISO14001 EMS companies in Malaysia. *Journal of Public Administration and Governance*, 1(1), 174-196.

Kemp, R. (2011). Ten themes for eco-innovation policies in Europe. *Sapiens: Surveys and Perspectives Integrating Environment and Society*. 4(2)

Kennedy, S., Whiteman, G., & van den Ende, J. (2017). Radical Innovation for Sustainability: The Power of Strategy and Open Innovation. *Long Range Planning*, 50(6), 712-725.

Kiefer, C., Del Rio, P. & Carrillo-Hermosilla, J. (2019). Drivers and barriers of eco-innovation types for sustainable transitions: A quantitative perspective. *Business Strategy and the Environment*. 28, 155-172.

Kim, S., & Seock, Y. K. (2009). Impacts of health and environmental consciousness on young female consumers' attitude towards and purchase of natural beauty products. *International Journal of Consumer Studies*, 33(6), 627-638.

Klewitz, J. & Hansen, E. (2014): Sustainability-oriented innovation in SMEs: a systematic literature review, *Journal of Cleaner Production*, 65, 57–75

Kotler, P. & Armstrong G. M. (2010) *Principles of Marketing.* Prentice-Hall.

Krystallis, A. and Chryssohoidis, G. (2005) Consumers' willingness to pay for organic food: Factors that affect it and variation per organic product type, British Food Journal, 107(5), pp. 320-343

Lautenschlager B, I. (2001). Avaliação de embalagem de consumo com base nos requisitos ergonômicos informacionais (in Portuguese), M.Sc. thesis in Production Engineering, Santa Catarina Federal University, Brasil.

Lee, S., and R. D. Klassen (2008) Drivers and enablers that foster environmental management capabilities in small and medium-sized suppliers in the supply chain. *Production and Operations Management*, 17(6), 573-586

Levidow, L., Lindgaard-Jørgensen, P., Nilsson, Å., Skenhall, S. A., & Assimacopoulos, D. (2016). Process eco-innovation: assessing meso-level eco-efficiency in industrial water-service systems. *Journal of Cleaner Production*, 110, 54-65.

Levitt B. and James G. (1988) Organisational Learning, Annual Review of Sociology, 14, pp. 319-340

Lewis, H., Stanley, H., 2012. Marketing and communicating sustainability. In:Verghese, K., Lewis, H., Fitzpartrick, L. (Eds.), Packing for Sustainability. @Springer-Verlag London Limited 2012.

Li, Y. (2012) Environmental innovation practices and performance: moderating effect of resource commitment *Journal of Cleaner Production*, 66, 450-458

Lin, M. J. J., and Chang, C. H. (2009). The positive effect of green relationship learning on green innovation performance: the mediation effect of corporate environmental ethics. *PICMET 2009 Proceedings*, pp. 2341-2348

Lin, C. Y., and Ho, Y. H. (2008). An Empirical study on logistics services providers intension to adopt green innovation, *Journal of Technology Management & Innovation*, 3(1), pp, 17-26.

Lindh, H., Olsson, A., Williams, H., (2016a). Consumer perceptions of food packaging: contributing to or counteracting environmentally sustainable development? *Packaging, Technology and Science*. 29 (1), pp. 3-23.

Lindh, H., Williams, H., Olsson, A., Wikstrom, F., (2016b). Elucidating the indirect contributions of packaging to sustainable development: a terminology of packaging functions and features. *Packaging, Technology and Science,* 29 (4-5), pp. 225-246

Ljubica, V. B., & Cvelbar, K. (2016). Resources and capabilities driving performance in the hotel industry. *Tourism and Hospitality Management*, 22, pp. 225-246.

Magnier, L., and Schoormans, J. (2015). Consumer reactions to sustainable packaging: The interplay of visual appearance, verbal claim, and environmental concern. *Journal of Environmental Psychology*, 44, 53-62.

Magnier, L. and Crié, D. (2015) Communicating packaging eco-friendliness: An exploration of consumers' perceptions of eco-designed Packaging, *International Journal of Retail & Distribution Management,* ISSN: 0959-0552

Marshall, R.S., Cordano, M. and Silverman, M. (2005), Exploring individual and institutional drivers of proactive environmentalism in the US wine industry. *Business Strategy, and the Environment*, 14(2), 92-109.

Marsh, M. and Bugusu, B. (2007) Food Packaging Roles, Materials, and Environmental Issues. *Journal of Food Science,* 72(3), R39-R55

Martinho, G., Pires, A., Portela, G., Fonseca, M., (2015). Factors affecting consumers 'choices concerning sustainable packaging during product purchase and recycling. *Resource. Conservation and Recycling.* 103, pp. 58-68.

Maxwell, J. & Bickman, L. (2009). *Handbook of applied social research methods*. 69-100.

Maziriri, E. T. (2020). Green packaging and green advertising as precursors of competitive advantage and business performance among manufacturing small and medium enterprises in South Africa. *Cogent Business & Management,* 7(1), 1719586.

McBride, S. (2012). Recycling Reconsidered. The Present Failure and Future Promise of Environmental Action in the United States. Massachusetts: The MIT Press. Available at: http://site.ebrary.com.xhalax-ng.kyamk.fi:2048/lib/kyam/reader.action?docID=10528245 (Accessed 14th April 2018)

Meherishi, L., Narayana, S. A., & Ranjani, K. S. (2019). Sustainable packaging for supply chain management in the circular economy: A review. *Journal of Cleaner Production*, 237, 117582.

Melander, L. (2018) Customer and Supplier Collaboration in Green Product Innovation: External and Internal Capabilities, *Business Strategy, and the Environment,* 27(6), 673-697

Mohd Saudi, M. H., Sinaga, O., Gusni and Zainudin, Z. (2019) The Effect of Green Innovation in Influencing Sustainable Performance: Moderating role of Managerial Environmental Concern, *International Journal of Supply chain Management*, 8(1)

Nguyen A. T., Parker, L., Brennan, L. and Lockrey, S. (2020) A consumer definition of eco-friendly packaging, *Journal of Cleaner Production*

Noci, G. & Verganti, R. (2002) Managing 'green' product innovation in small firms. *Research and Development Management,* 20(1), 3-15

Nordin, N., and Selke, S. (2010) Social aspect of sustainable packaging. *Packaging Technology and Science: An International Journal,* 23(6), 317-326

OECD. (2009). Promoting Consumer Education—Trends, Policies, and Good Practices. Paris: Organisation for Economic Co-operation and Development. *European Journal of Consumer Policy* 33, 291–292.

Oliver, C. (1997) Sustainable competitive advantage: combining institutional and resource-based views. *Strategic. Management. Journal*, 19(9), 697-713

Pacheco, L. M., Rodrigues, M. F. and Liboni, L. B. (2018) Green absorptive capacity: A mediation-moderation model of knowledge for innovation. *Business Strategy and the Environment,* 27(8), 1502-1513.

Palombini, F.L., Cidade, M.K., de Jacques, J.J. (2017). How sustainable is organic packaging? A design method for recyclability assessment via a social perspective: a case study of Porto Alegre city (Brazil). *Journal of Cleaner Production* 142, pp. 2593-2605.

Papagiannakis, G., Voudouris, I., & Lioukas, S. (2014). The Road to Sustainability: Exploring the Process of Corporate Environmental Strategy Over Time. *Business Strategy and the Environment,* 23(4), 254-271.

Paraschiv, D., Nemoianu, E., Langă, C., & Szabó, T. (2012). Eco-innovation, Responsible Leadership, and Organizational Change for Corporate Sustainability. *Amfiteatru Economic*. 14(32), 404-419.

Park, C., Macinnis, D. & Priester, J. (2007). Beyond Attitudes: Attachment and Consumer Behaviour. *Seoul Journal of Business.* 12(2), 3-36.

Pavitt, K, Tidd, J. & Bessant, J., (2005) *Managing Innovation Integrating Technological, Market, and Organizational Change*. John Wiley and Sons Ltd.

Peng, X., & Liu, Y. (2016). Behind eco-innovation: Managerial environmental awareness and external resource acquisition. *Journal of Cleaner Production,* 139, 347-360.

Pujari, D. (2006). Eco-Innovation and New Product Development: Understanding the Influences on Market Performance. *Technovation*. 26(1), 76-85.

Qui, G.Y., Shen, L.Y., Zeng, S.X., & Jorge, O.J. (2010). The drivers for contractors' green innovation: an industry perspective. *Journal of Cleaner Production*, 18, pp.1358-1365.

Reid, A, and Miedzinski, M. (2008). Eco-innovation: Final report of sectoral innovation watch, For Europe Innova, Technopolis Group, Belgium

Renwick, D. W. S., Redman, T., & Maguire, S. (2013) Green Human Resource Management: A Review and Research Agenda. *International Journal of Management Review*, 15(1), 1–14.

Sarkis, J., Gonzalez-Torre, P., & Adenso-Diaz, B. (2010) Stakeholder pressure and the adoption of environmental practices: the mediating effect of training *Journal of Operation. Management*., 28, 163-176

Schiederig, T. Tietze, F, & Herstatt, C. (2012). Green innovation in technology and innovation management – an exploratory literature review. *Research and Development Management*, 42(2), 180-192

Scott, L. and Vigar-Ellism, D. (2014) Consumer understanding, perception and behavior with regard to environmentally friendly packaging in a developing nation, *International Journal of Consumer Studies,* 38, 642-649

Shatouri, R. M., Igusa, K. O. and Filho, D. S.P. (2013) Embracing Green Technology Innovation Through Strategic Human Resource Management: A Case Of An Automotive Company. *American Journal of. Economics and Business Administration*, 5(2), 65–73.

Silayoi, P & Speece, M. (2005). Packaging and purchase decisions: An exploratory study on the impact of involvement level and time pressure. *British Food Journal.* 106(8), 607-628

Singh, S. K., & El-Kassar, A. N. (2019). Role of big data analytics in developing sustainable capabilities. *Journal of Cleaner Production*, 213, 1264-1273.

Souza, A. A., Alves M. F. R., & Macini, N. (2017) Resilience for sustainability as an eco-capability. *International Journal of Climate Change Strategies and Management,* 9(5), 581-599.

Steenis, N.D., van Herpen, E., van der Lans, I.A., Ligthart, T.N., van Trijp, H.C., (2017). Consumer response to packaging design: the role of packaging materials and graphics in sustainability perceptions and product evaluations. *Journal of Cleaner Production*,162, pp. 286-298.

Tait, P., Saunders, C., Guenther, M., Rutherford, P., Miller, S., 2016. Exploring the impacts of food label format on consumer willingness to pay for environmental sustainability: a choice experiment approach in the United Kingdom and Japan, *International Food Resource Journal*, 23 (4), pp. 1787-1796.

Tang, M., Walsh, g., Lerner, D., Fitza, M. A. and Li, Q. (2017) Green innovation, Managerial Concern and Firm Performance, *Business Strategy, and the Environment*, 27(1), pp. 39-51

Tencati, A., Pogutz, S., Moda, B., Brambilla, M. and Cacia, C. (2016) Prevention policies addressing packaging and packaging waste: some emerging trends, *Waste Management*, 56, 35-45.

Thomsen, C. (2013) Sustainability (World Commission on Environment and Development Definition). In: Idowu S.O., Capaldi N., Zu L., Gupta A.D. (eds) Encyclopaedia of Corporate Social Responsibility. Springer, Berlin, Heidelberg

UNEP, (2018) Single-Use Plastics: A Roadmap for Sustainability Retrieved from https://wedocs.unep.org/bitstream/handle/20.500.11822/25496/singleUsePlastic_sustainability.pdf?isAllowed=y&sequence=1

Van-Herpen, E., Immink, V., and van der Puttelaar, J. (2016). Organics unpacked: The influence of packaging on the choice for organic fruits and vegetables. *Food Quality and Preference*, 53, 90-96.

Verghese, K., Lewis, H., Lockrey, S., Williams, H., (2015). Packaging's role in mini-mizing food loss and waste across the supply chain. *Packaging Technology and Science*. 28 (7), pp. 603-620.

Venter, K., van der Merwe, D., de Beer, H., Kempen, E., Bosman, M., 2011. Consumers 'perceptions of food packaging: an exploratory investigation in Potchefstroom, South Africa. *International Journal of Consumer Studies*. 35 (3), pp. 273-281.

Vera Ferrón, V., de la Torre-Ruiz, J. M., & Aragón-Correa, J. A. (2014). Quality and something else: The joint effect of the quality and environment management in business profitability. *Spanish Journal of Finance and Accounting/Revista Española de Financiación y Contabilidad and Accounting,* 39, pp. 655-675.

Wang, Y., Kung, L., & Byrd, T. A. (2018). Big data analytics: Understanding its capabilities and potential benefits for healthcare organizations. *Technological Forecasting and Social Change*, 126, 3-13.

Wang, W. Y. C., & Wang, Y. (2020). Analytics in the era of big data: The digital transformations and value creation in industrial marketing. *Industrial Marketing Management*, 86, 12-15.

Weng, M. and Lin, C. (2011) Determinants of green innovation adoption for small and medium-sized enterprises (SMEs), *Journal of Business Management*, 5(22), 9154-9163.

Wikström, F, Verghese, K, Auras, R, Olsson, A, Williams, H, Wever, R, Grönman, K, Kvalvåg Pettersen, M, Möller, H & Soukka, R (2019). Packaging Strategies That Save Food: A Research Agenda for 2030. *Journal of Industrial Ecology*, 23(3), 532-540.

Young, S., (2008). Packaging and the environment: a cross-cultural perspective, *Design Management Review*, 19, pp. 41-48.