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Achieving Long Term Sustainability through Green Process Innovation: A Study on Small Packaging Companies in the UK

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Abstract

Packaging is increasingly considered as dominating environmental issue in the last two decades and has forced many global businesses to reconsider the true function of their packaging. Manufacturing flexibility and efficiency are considered highly competitive for industrial success. However, several packaging organizations are trying to see the packaging problem from the aspect of sustainability and in the 21st century, the word "green" and sustainability have become essential adjectives for the packaging industry. To maintain environmental impact and sustainability together, packaging has required clear directions to address challenges, while addressing environmental issues that result from packaging waste. Packaging operations for small firms is a costly and timely endeavour and there is no crystal-clear guideline for small firms to get the most from their existing processes. Green process innovation is seen as an efficient solution that can help society and businesses to deal with environmental problems but green process innovation popularity among researchers is not prominent. With having very little information on green process innovation this research considers various elements to bridge the sustainable framework. Based on the analysis this research identifies the key implementations and develops a framework of sustainable green process innovation. This research also discusses the limitations and provide greater insight on the implementation of green process innovation in the small packaging business.

Keywords: green innovation, green process innovation, sustainability, packaging sustainability

1. Introduction

The most notable development in corporate behaviour is the increasing sensitivity of businesses concerning environmental problems (Lyon and Maxwell, 2004). Characteristics of the environmental phenomenon divide into two tendencies. First, the global environment is concerned about; global warming, ozone depletion, climate change, pollution, greenhouse influence, and nuclear meltdown which are not subject to any rules and regulations. Different national and international laws have been imposed to regulate and monitor the environmental attributes. Second, environmental impacts are increasingly spread among nations, and people are more willing to make behavioural changes because of environmental concerns. Manufacturers and consumers have realized that by performing together they can make a big impact in preserving and protecting our atmosphere, (Wong, 2012).

The cost of reducing the impact on the environment has increased significant challenges in sustaining the economic progression while addressing the environmental issue which arose from the production process and usage of packaging. Over the past years, nation's alarm regarding the atmosphere has kept growing and along with that shoppers' consciousness has been gradually increased, (Chang, 2011; Zand and Yousefi, 2013), The bigger impact of ecological loss is from the dreadful conditions resulting from private households' usage (Nair, Guldiken, Fainshmidt, and Pezeshkan, 2015).

The packaging is a pervasive detail of modern consumption that offers an extensive variety of functionalities and customer advantages (Loucanova, Kalamarova, and Parobek, 2017, Steenis, van Herpen, van der Lans, Ligthart, & van Trijp, 2017). The growing usage of packaging supplies is a key concern in our public sector. Without packaging we couldn't deal with the supply of ordinary merchandise; packaging makes it possible to disperse perishable sustenance's over long distances. Indeed, even the most inaccessible spots can appreciate similar items as items are transported in and sent out everywhere around the world.

The overall packaging industry is valued at almost GBP 11 billion (United Kingdom packaging Market, 2020), and the packaging industry of the European market itself is valued at 195 billion EURO and forecast to reach it to 214 billion EURO by 2023 (Bill, 2018), whereas the United Kingdom's packaging industry expected to increase values by 3% until 2026 (United Kingdom packaging Market, 2020). The packaging sector consists of four competing areas: plastics (37%), board and paper (35 % of the world market), glass (12%), and metal (14%) (Simms and Trott, 2014).

In the United Kingdom, the packaging industry employs around eighty-five thousand people, representing 3% of the United Kingdom manufacturing human resources and has sales of over around 1 billion. The UK packaging industry is double that of any other industry because of productivity and is accounted for as a leader in manufacturing technology and product innovation and contribute potentially to UK economy (United Kingdom packaging Market, 2020)

The production processes of the packaging industry are extremely heterogeneous because of their degree of flexibility. For instance, the manufacturing of most of the cardboard packaging for food is flexible and can be manufactured in short runs, whereas the manufacturing of drink cartons such as the Tetra pack is less elastic because of their standardization and requires a high cost of tooling. Most of the customers of the packaging industry are pharmaceuticals and FMCG companies. Such firms commonly become tied in specific formats. However, new packaging investment requires the lease of modern tools or their acquisition (Scott and Vigar, 2012). The majority of the packaging industry in the UK is owned by non-UK based firms and their decision to invest in a United Kingdom-based business is adversely stimulated by perception of one-sided actions and that is a reformation of low carbon economy (Bell, Crick, and Young, 2004).

As a result, the business put more effort to integrate green activities (Xie, Huo, Qi, & Zhu, K.X. 2016). According to the Eurobarometer report, the reduction of unwanted things and re-use are the two most dominant techniques to overcome the ecological issue from the shoppers' concerns. Businesses are thus pleased to hold this pro-ecological concern and sustain the requirements of shoppers' by developing a revolutionary process that has less impact on the atmosphere (Raheem *et.al,* 2014).

To overcome this problem green innovation is reflected to be an effective solution that can be an advantage both to society and industry (Xie, Huo, Qi, & Zhu, K.X. 2016). Green innovation involves all characteristics that address, reduce the environmental load, energy, and material, and can be divided into green organizational innovation, green product innovation, and green process innovation (Xie, Huo, Qi, & Zhu, K.X. 2016). This paper focused on green process innovation that can contribute to the production process as a potential solution through the substitution of inputs, optimization of manufacturing, and reclamation of the outcome. Whereas green process innovation is an essential factor in the construction of green product innovation (Voss, Sirdeshmukh, & Voss, Z.G. 2008). Product innovation is regularly observed in process innovation, regardless of whether it is in research and development, the test phase of manufacture, or the mass production stage. (Mantovani, 2006).

Although the term green process innovation has been addressed widely, little empirical evidence from previous studies have suggested a potential link between a green process innovation and small businesses, it is because green process innovation attributes often bear a high number of risks and uncertainty because of their possible externalities (Xie, Huo, Qi, & Zhu, K.X. 2016). Large firms progressively expect to seize a business opportunity by developing sustainable related markets, for example, renewable energy improvements and eco-accommodating items (Schaltegger and Wagner, 2010). Small firms (SME) donate dramatically to the high-tech revolution and economic development and product novelty is a key aspect of economic enhancement and the growth of small firms. In comparison to giant firms, though, small firms usually undertake a smaller number of innovation jobs (Hansen and Klewtiz, 2012).

The review of previous studies poses a mystery about the small firm's revolutionary growth. On the contrary, the wide body of research on new product development has recognized the benefit of a formalized green process (Ettile and Elsenbach, 2007). A producer is considered a part of new product development best practices. On the contrary, in a journal of product development and management association, some case studies' evidence showed that small firms rarely use such a formalized process structure. Small firms, emerging through their imaginativeness, inventiveness, and capacity to immediately embrace new market settings, can likely gain advantages from green developments (Wicki, S. 2015). In focusing on the link between sustainable green process innovation and small packaging companies, this paper analyses intensity of the green process innovation to a sustainable factor.

The next segment analyses the theoretical background of this paper followed by the understanding of green process innovation, and the purpose of this section is to investigate the key concept of green process innovation and reflect it to the packaging sustainability within small companies. The third segment will explain the research methods selected for this study to explore the implementation of green process innovation and outcomes of this study. The final segment will highlight the conclusion. Limitations and further research implications for this research paper.

Research question 1: What are the key benefits and challenges of using green process innovation in the packaging industry.

Research question 2: How can green process innovation be effectively used to bring long-term sustainability?

2. Literature Review

Green innovation is influencing human behaviour and is gradually increasing global apprehension for governments, organizations, people, countries, and policymakers to diminish environmental losses (Chen, 2008, Arimura, Darnall, & Katayama, 2011, Wang et.al 2017, Gupta and Barua, 2017). Firms are not resistant to this fact. Despite this, the majority of global functional systems are in search of long-term equilibrium that will ensure businesses survive in an environmentally concerned atmosphere. On the contrary, businesses should act wisely and respond efficiently in a dual adjustment dynamic that contains augmenting resources and capabilities to reach market efficiency within limited competitiveness (Schiedering, 2012).

Such a scenario has created a hypercompetitive environment for businesses, who should foster innovativeness in their business model. However, businesses should remain up to date with the manifold market instabilities, variations, and propensities that are arising significantly (Laforet, 2009). The businesses that are pioneering green innovation might be able to sustain a competitive edge in an environmentally concerned atmosphere. Also, effective green innovation performance allows businesses to sustain high competence as well as to develop and strengthen their core product to spread a green image (Albort-Morant, Leal-Millán, & Cepeda-Carrión, 2016).

Among companies, sustainability is viewed as a growing important factor of the long-term success of the planet and humanity (Hay and Stavin, 2005, Kleindorfer, Singhal and Van, 2005). The exploration of long-term ecological balance has already started to change the challenging atmosphere, which will pressurise businesses to modify their concepts about business models, products, technologies, and processes (Longoni and Cagliano, 2015).

During the previous two decades small and medium-sized manufacturing companies have confronted increasing pressure from various partners to enhance their environmental execution ((Lee and Klassen, 2008, Lee, 2008, Vives, 2006, Hofmann and Theyel, 2015). From this time, the researchers have been demonstrating the advantages of natural sustainability, which might be particular to ecological execution yet may likewise reinforce strict regulations and enhance monetary growth (Hofmann et.al, 2012). Although small and medium-sized manufacturing companies have regularly been represented as stragglers (see, e.g., Revell and Rutherfoord, 2003; Tilley, 1999) and early activities to stimulate environmental sustainability.

According to Bos-Brouwers, (2010); Tilley, and Fuller, (2000), the sustainability area has been under-researched in small firms, but they are of potential research interest because small firms form a large part of the industry operations (Revell, and Blackburn, 2007). In the EU 99% of companies are small medium-sized (EU, 2012), Jansson, et.al, (2017, P.70) almost 53% of GDP in well-developed countries (Aghelie, 2017, P.41) is generated from small firms (Ayyagari, Beck, and Demirguc, 2007, Masurel, 2007) and small firms are accountable for two-thirds of the work force (Hamann et.al, 2017). The importance of green innovation research for small firms is defined as, “firstly many small firms could benefit by bringing up green innovation methods into their processes”. Secondly, small firms and particularly start-ups can be potential and ideal incubators for green innovation and can introduce lower atmosphere harmful products, processes, and services into the market.

Compared to giant firms, small firms could benefit from green innovation Wehrmeyer (2000) cited in (Masuel, 2007), (Darnall, Jolley, & Handfield, 2010, Chandy and Tellis, 2000, Panwar, Nybakk, Pinkse, & Hansen, 2015), recommended that powerful technological capabilities and dynamic organizational structures can make big firms more innovative. However, for giant firms, which have an unconnected innovation department, mimicking small firms’ structures can be innovative, having small firms’ benefit from wider resources and agility. Green innovation appeals more to small firms. As some researchers argue that disruptive innovation outcomes may end up in bad product performance, but such innovation outperformed the result of product cost compared with the market manufacturing cost (Bocken, 2015). However, this implies that it is essential to investigate the green innovation process in small firms, who serve small scale markets. The majority of the researchers believe that

small firms contribute more to the local economy and have a degree of flexibility to innovate considering the social environment.

2.1 Green Process Innovation

The term innovation has been discussed previously in the literature that, the implication of significantly enhanced or new product and process as a new organizational technique (Del Rio, 2009, Frondel, Horbach, & Rennings, 2007, Horbach, Rammer, & Rennings, 2012), or a new marketing strategy in business operations, external association or workplace organization is referred to as innovation. Whereas the term 'green process innovation' refers to the application of an innovation perspective, widely known as eco-innovation (Yudi, Wen, Muhammad, 2015). However, green process innovation can be defined as a set of innovations applied to pollution prevention (Fussler and James, 1996; Hellström, 2007), such as biological agriculture, renewable energy, and green financial products (Karakaya, Hidalgo, and Nuur 2014).

Fussler and James, (1996), defined the green process innovation first time. According to Fussler and James (1996), green process innovation is a set of products and processes that deliver value to business and customers but considerably reduce the environmental impact. The other definition derived from (Hemmelskamp, 1999, Charter and Clarck, 2007, Cheng and Shiu, 2012, Schiederig, Tietze, & Herstatt, 2012, Kemp and Pearson 2007, stated that green process innovation is the production, application or exploitation of a good, service, production process, organizational structure, or business technique, or management, that is innovative to the firm or user and which produce outcomes in lower environmental risk, the negative influence of resources use and pollution prevention compared to appropriate substitutes. The 2007 review of the environmental technological action plan (ETAP), describes green process innovation as any innovation that provides an advantage to the environment, embracing business innovation, process innovation, and technological innovation (Karakaya, Hidalgo, & Nuur, 2014).

The industrial dynamic perspective about green process innovation appeared in 2008 and it defined the green process innovation as "innovations that can attract green premiums in the market" and highlight that green process innovation research should emphasize evaluating its integration into financial development. After the new industrial approach, OECD (2009), EIO. (2011), then described the green process innovation as "the development or execution of new or specifically enhanced products, process, marketing strategy, institutional arrangement and organizational structure, which result in environmental protectiveness with appropriate substitutes. Similarly, Arundel and Kemp (2009), Huppes et al. (2008) argued that green process innovation can be encouraged by economic and environmental aspects, with the objectives to reduce cost, waste, and resources.

The concept of green process innovation has been an interest of researchers from different backgrounds such as management, sociology, and economics, and its definition has been also broadly debated even in the dimensions of the supply chain, users, design, and governance. According to the different researchers view the term green process innovation is to reduce environmental impact, increase economic efficiency, and social well-being, which is systematically aligned with the concept of green innovation but the ambition of implementing it in small packaging businesses is still far being achieved and it requires enough directions towards sustainability which have been discussed below.

2.2 Green Process Innovation and Packaging Sustainability

Green process innovation can meet sustainability goals by combining ecology with innovation and allows companies to be competitive (Sezen, and Çankaya, 2013). For some brand owners, a key challenge in the paperboard and paper industry and the industry overall is how to address market pressure and cost performance with the adoption of sustainable principal goals (Baregheh, Rowley, Sambrook, & Davies, 2012). Concerning the packaging sustainability strategies, green innovation is to develop a system, new material, and technology that uses fewer energy reserves, raw materials, and water. Although different examples of companies are visible, investing in green innovation strategies to achieve significant financial savings for long periods as well as short periods, thereby stretching margins and growing turnover (Wever and Vogtlander, 2013).

Prices of plastic packaging are very close to those of the volatile resin and raw material is not sustainable and not reusable, even though sizeable reserves of fossil fuel are available. Their use in packaging is possible but it may increase the high cost of sustaining the carbon footprint. By contrast, paperboard and packaging materials are yearly readily reusable, renewable, and compostable. With ongoing climate change and the increasing price of fossil fuel over the decade, this is a serious concern for the future packaging market whilst looking to reduce fossil fuel usage and carbon emission which is most likely to rise (Simms and Trott, 2014). However, companies are continually seeking to:

- Reduce cost and improve supply chain operations.
- Provide a great user experience to differentiate their brand and improve shoppers' demand.
- Enhance the environmental credentials of their services and products (Molina and Palsson, 2016)

A main trial for the packaging industry is to optimize the design system, which includes striving to develop packaging that is equal in the context of delivering preservation and product protection, appeal to more shoppers, and cost-effective and at the same time take into consideration environmental impact (Knight and Jenkins, 2009).

The presented literature above mentioned the growing concern of companies to shift to green packaging and in the retail market, consumers have become more conscious in their purchasing behaviour, especially about environmentally friendly and reusable products. However, Green process innovation is trying to abolish the environmental burden from almost all manufacturing processes through their energy consumption, resources, and chemical substances. A green process emphasizes more on the application of environmental technologies that reduce the environmental burden through sustainable process designs to save energy and reduce the dependence on non-replicable raw constituents. But for small packaging firms is it far unreachable to maintain the green process innovation in packaging sustainability because of many influential factors. This research will further expand the understanding of sustainable processes and factors influencing small packaging companies.

2.3 Sustainable Process

Old-fashioned methods to sustainable creation and consumption are to make production and products procedure more vibrant and effectual (Bakshi, 2014, Charter, Gray, Clark, & Woolman, 2017). The evidence highlighting concerns related to sustainability is widespread and there is intellectual thought about most of the debate it provokes. According to the WWF, lifestyles in the developed world, currently sustain the resources of almost dual planets and if developing economies, follow a similar path this will increase by 2.5 until 2050 (WWF, 2010).

Present debates highlight previous concerns dating back to the 1972s Club of Rome report on “Limit to growth” and it is essential to temper the more sensational forecasts with a consideration of where and how variation is putting in place and realistically impact the potential results (Meadows, Meadows, Randers, & Behrens,1972, Cole, Freeman, Jahoda, & Pavitt, 1973).

Despite this, it is essential to replicate more positive thoughts which view potential advantages evolving. The efficient methods of energy management and resources, more delivery of substitute goods and services and new partnerships and the way of doing work can help to unleash a new era of modern economic growth. According to the PWC (Price Water House Cooper)’s report, green products and services are significantly becoming a potential system of growth in the 21st century. (Seebode, Jeanrenaud, & Bessant, 2012).

The growth of sustainability focuses on categorical attentiveness in the notion of innovation dimensions. Previous literature considers innovation as knowledge in which resources are either developed or exploit (Widya-Hastuti, Noraini, Wong, & Mardani, 2016). According to Ren (2009), process innovation is classified as enhancing existing process phenomena or developing new mechanisms. Ren (2009) investigated that enhancing a new process could be efficient for energy and in the development of the new process. However, process enhancement can be shaped by reducing surplus operation activities which can improve cost efficiency (Hart and Sharma, 2004, Hall, and Wagner, 2012).

To produce quality and analyses goods and estimate the economic equilibrium of consumer material life. An innovator has to switch between these life cycles at the right time. This "not just one point-in-time value creation" is an economical way to make more efficient use of resources (Slowak, and Regenfelder, 2016). Resources utilise improvements bring down the natural effect of an association's exercises by taking out the utilisation of an asset as information. (Slowak, and Regenfelder, 2016, Dangelico, Pujari, & Pontrandolfo, 2017). Sustainable product innovations in this class can be extensively recognised as developments concentrated on disposal of (1) a naturally destructive fixing from an item, (2) a filler ingredient from an item, and (3) the need to utilise a correlative item. Resources utilise substitution developments to bring down the ecological effect of an association's exercises by substituting resources utilised as information. Supportable developments in this class can be comprehensively recognised as improvements concentrated on substitution of (1) a non-renewable asset with an inexhaustible asset, (2) a naturally more hurtful non-renewable asset with a biologically less unsafe non-renewable asset, (3) a less copious non-renewable asset with a more bottomless non-renewable asset, subject to the substitution not negatively affecting the general maintainability profile of the item (Varadarajan, 2017).

The portfolio of sustainable innovation opportunities sought by most firms is probably going to involve a degree of restriction in particular development opportunity stages (Varadarajan, 2017). Concerning environmental factors, the majority of businesses have participated in ecological influence through their actions towards

production processes to reduce the pollution impact on the environment. Gupta and Sharma (1996) viewed the production process as a source of controlling pollution by natural resources, equipment, and human capital in the manufacturing process. Whereas, Porter and Van de Ven (1995), highlight that there are inappropriate or useless resources that causes pollution, for instance, waste material energy, harmful substances, defective materials and scrap and the hidden change of product life cycle. With most products, there are hidden costs associated such as packaging that distributes along with the product and is considered as excess wastage because of the use of discarded material in the packaging (Widya-Hastuti, Noraini, Wong, & Mardani, 2016). However, this statement is potentially validating the importance of this research, to control excess wastage that is caused by discarded or inappropriate material.

2.4 Influential Factors

The present literature portrays different elements that conceivably impact the usage of packaging sustainability in small firms, specifically in developed procedures. This area tends to a choice of conceivably significant variables with either a contributing impact (empowering agents) or a deterring impact (boundaries). Comparable divisions are portrayed by Boks, 2006; Kleindorfer, Singhal & Wassenhove, 2005; and Van Hemel and Cramer 2002. In any case, portrayals of elements that particularly impact sustainable item packaging improvement remain limited.

De Koeijer et.a., 2017, demonstrates significant barriers and enablers (table 1), organised according to the foundation of the development process and the company level at which these are appropriate in the small firm's sustainable packaging process. Previous studies consider the chosen factors from the literature on packaging development, sustainable development, product development and marketing.

Table 1. Factors influencing sustainable packaging development in small firms (De Koeijer, et.al, 2017)

	Enablers	Barriers
Strategic	• Engagement and support for leadership • Holistic sustainability ambition. • The goal of sustainability-driven by profit. • Front-end joining of supportability contemplations. • Joining of ecological turning points being developed process.	• Absence of administration duty and support. • Avoidant supportability aspiration. • Business weakness. • State of mind towards change. • Insignificant concentrate on incremental item advancement. • Authoritative complexities. • Struggle with practical necessities. • Extra workload. • Extra expenses.
Operation	• Utilisation of ecodesign devices/assessments. • Arrangement of multidisciplinary advancement groups. • Natural contemplations as a component of improvement groups' discourse. • Arrangement of maintainability expert. • Early inclusion of acquisition division. • High level of worker mindfulness and preparation.	• Store network complexities. • Absence of appropriate devices. • Trouble among divisions: restricted. • contribution of promoting and deals; hole between. • ecological advocates and agents. • Constrained experience.
External	• Market interest for maintainability. • Administrative controls.	• Lack of resources to execute a strategic plan.
Operational	• Supplier	• Retain customers. • Meet market demand.

The documented internal and external barriers to sustainable packaging development in small companies were grouped into strategic and operational factors. The study of De-Koeijer et.al, (2017), focused on the alignment of strategic level and the operational levels of packaging sustainability by emphasizing the operational functionality of product development.

The strategic level refers to the company's vision, mission, and ecological strategy. This generally passes on to the company's stakeholders through corporate social responsibility reports containing the short term and long-term sustainable goals. De-Koeijer et.al, (2017), recognized that the strategic level represents a company's anticipation of sustainability. On the other hand, side, sustainable development at an operational level is linked to

the activities of the cross-functional team who are collectively responsible for producing tangible growth of concepts and products. In the course of the development process and after completion, the cross-functional team members have a certain perception of sustainability standards to meet the company's ecological goals. This indicates the company's inspiration for sustainability constitutes the recognition of sustainability in manufacturing.

Considering the above arguments, the study discovered that sustainable innovation procedures included both a leadership framework and extensive social systems. Such systems don't just incorporate firms, yet additionally different partners. In view of this knowledge, the researcher agreed with the utilisation of the four components of a business model to align sustainable innovation by (Boons and Leudeke-Freund, 2013), which are value creation, sustainable network, client interface, and monetary model, distinguished previously and proposed an arrangement of essential standardising prerequisites that we trust should be met for effectively adjusting the sustainable innovation and business model.

In the view of the literature of sustainable packaging and small business management journals, this research reviewed that previous academic literature hardly emphasises on small firm packaging sustainability. However, the researcher formulated the theoretical overview through a combination of the literature on green innovation, green process innovation and packaging sustainability. Previous studies have used a qualitative and empirical method to evaluate small firms' sustainability, but the majority of the research focuses on product packaging and neglect the process which has a significant role in the delivery of the product, management by introducing the green process innovation to achieve long-term sustainability. The next section will draw and discuss the research method and findings of this study.

3. Method

This study focuses on the implementation of green process innovation in small packaging companies. Data on green process implementation obtain from small-medium packaging sustainable companies. Further, this study used a qualitative research design and followed a thematic analysis approach. The qualitative technique is employed when the aim is to get a deep insight into participant behaviours, experiences, and opinions (Bell and Bryman, 2007). Qualitative methods are based on feeling, perception and words and are often regarded as providing rich data about real-life situations of people and allow the researcher to understand behaviour in its wider context (Bryman and Bell, 2007). The involvement of packaging expertise opinion and recommendation contributed significantly, which couldn't be obtained using quantitative methods. Regardless of the qualitative data analysis, results are often gathered through respondents ' interviews given the heterogeneity of qualitative processes. The research that follows is based on a specific set of principles: transcript of the interviews; immersion in the data to obtain comprehensive insights into the phenomenon under investigation; creating a data code system; and connecting data codes or units to broader themes that can lead to the development of the theory (Attride-Stirling 2001).

4. Discussion

The discussion in this chapter draws together a big picture of findings brought up by corresponding research questions. It draws attention to understanding the concept, what hurdles are experienced in the green process and the benefit from it also choosing the right course of sustainability and navigation through the implementation of green process innovation. Significant studies and theories were utilised to outline the discussion and to accomplish interpretive incorporation; in addition, they emphasised how the research; looked at the gaps and broadened the literature through the discoveries of the investigation. The overall aim of adopting green process innovation in the packaging industry is to maintain the operation of packaging development with reducing the environmental burden.

In green process innovation, the external and internal factors have a significant influence on implementing an eco-friendly solution. Therefore, the findings of the study that have emerged from the contextual account of packaging experts, revealed that green process innovation is not only modifying or developing new system focus on the eliminated environmental burden rather there are more important un-revealed characteristics that are not discussed in previous literature. The majority of the previous studies emphasise on developing a new environmentally friendly system through green process innovation but there is hardly any study on the externalities and internalities of green process innovation. As Shan-Ping & Chang-Lin, (2014) mentioned in the literature, a green process emphasises more on the application of environmental technologies that reduce the environmental burden through sustainable process design to save energy and lowering dependence on non-replicable raw constituents. Having said that green process innovation is dramatically embedded in different contexts not only establishing or modifying a process.

Since small packaging companies often lack the skills to implement efficient solutions, they need to hire a consultant which is an extra cost for a company, and it is difficult for a business to hire a professional environmentalist. Also going for cheaper material all the time is not helpful for small packaging businesses. However, a company needs to consider economical and efficient processes for developing sustainable packaging. The strict directions on natural substances and well-known environmentalism have changed the focused principles and examples for organisations' green development which incorporates the advancements that are associated with energy saving, contamination counteractive action, squander reusing green item plans, or corporate natural administration (Chen, Lai, . & Wen. 2006). Being green is an impetus for consistent development, new market opportunities, and wealth creation. Green improvements may epitomise the idea of ecological insurance into the separate outline and bundle of items to expand their points of interest. The contributing assets of ecological administration would not just maintain a strategic distance from the inconvenience of dissent or discipline about natural assurance, yet additionally, improve their generation effectiveness, grow new ecological markets, and along these lines increment their capacities of green advancement (Chen 2008).

5. Findings

The findings presented in this study highlighted the conceptual models for small packaging companies from the concept of green process innovation to achieve sustainability. In addition, this study also highlighted multiple challenges that small packaging business owners face while manufacturing sustainable packaging. This study revealed the unique and mutual characteristics in the model that will not only help small companies with their present situation but also project future growth and sustainable goals.

5.1 Challenges and Benefits of Using Green Process Innovation

Organisations that create and market an imaginative green process appear to confront a few difficulties yet experimental examinations that give an account of these difficulties are inadequate (Dangelico and Pujair, 2010). To enhance the understanding of key internal and external challenges while developing green process innovation, this study gained interesting insights during the discussion with experts. The majority of the experts and scholars labelled green innovation with many obstacles, and extensive literature has been devoted to investigating the barriers for small businesses. However, the findings of this study show explored significant internal and external challenges for small packaging companies. The study distinguished barriers include resources, awareness and acknowledgement, application, mind and community, certifiers, financial matters, structural failures and assistance and guidance. Apart from the technical, environmental, and financial obstacles, experts highlighted that due to increasing regulation on packaging waste, small packaging companies may be criticized for neglecting their involvement in the local society and using low-cost material which is not environmentally friendly. However, considering the experts' views and theoretical explanation of challenges, this research proposed a model of external and internal challenges of small packaging companies.

The result indicated that a lack of knowledge on how to execute green process innovation is a significant challenge for packaging companies that damagingly impacts the innovation activities of the business. Williander, (2006), argued that top management or directors and employees ought not to have discernments or convictions that new green development activities will have minimal ecological advantages. Such mind set will stop workers from innovatively in small businesses. Poor correspondence, poor existing corporate standards, frail human asset practices, and absence of responsibility from top management are the potential drivers of representative protection from development (Osterman 2000, Zwick, 2002). A small packaging business must have the capacity to offer chances to workers to attempt new things, to create innovative thoughts, new procedures, enhanced frameworks, and better items by constant change activities (Williander, 2006). Consequently, directors must be receptive what's more, ready to make a domain that can develop a change in the association (Madrid-Guijarro, Garcia, & Van, 2009).

The lack of data about the market and innovation is another obstruction of green process innovation. The absence of mindfulness regarding applicable green data on the market and green innovation is a drawback to associations (Woolman and Veshagh 2006). Finding the correct process to battle greenhouse gas emissions is difficult for organisations since their knowledge are questionable about natural controls and necessities.

Furthermore, Vn Hamel and Cramer, (2002), discovered that poor external relationships create negative significances in the implementation of green process innovation. Substantial and developed associations will dependably need to expand their main generation procedures, practices, and frameworks to their accomplices or providers using the customer-provider relationship programme. This aim will make a win-win circumstance for both sides of the two relationships: high calibre, less waste, shorter process duration, shorter lead time, better

control strategy, lower cost, and higher benefit in the long term.

Runhaar, Tigchelaar, & Vermeulen (2008), Eltayeb, Zailani, & Filho (2011) argues that insufficient support from the government is another hindrance that affects the green process innovation in packaging companies. The administration sets the directions and motivating forces that actuate associations to take up green activities, however, the control and restraint to agree to be green are poor. The control comes just if protests are made by people in general or if the administration itself sees the destructive practices of an association. Weight will be applied to this association, which may likewise prompt a brief conclusion to redress the circumstance and to set up framework processes. Although the UK government advances green exercises and gives budgetary help and impetus to manufacturers who set out on green activities or items, government bolster lacks toward sustaining green innovation activities in the United Kingdom fabricating organisations.

Insufficient knowledge and collaboration with a sustainable partner are other challenges for small packaging companies. Exceptionally talented representatives are viewed as vital for transforming creative thoughts into solid research so that advancement comes about. Specialised know-how, information about intellectual property rights and the capacity to retain and actualise outside learning, for example, client input in development forms is of especially high incentive in these organisations (Rizos, et.al, 2016). The findings of this study report a lack of management expertise and professionals with external knowledge of achieving sustainability through green process innovation.

Besides the internal and external challenges, green process innovation is helpful for expanding long haul advantage, and the firm acts like a middle person. Those organisations which take proactive activities to actualise process innovation can enhance their firm's pictures and so that achieve long term advantage. Unlike short-term advantage, the partners engaged in the long-term advantages are contenders, government, and representatives who have enough data about the trend-setters. In the process of a non-stop connection, the organisations who are effectively occupied with green process innovation can enhance the partners' perspective of them, and improve the picture of the firm, in this way expanding their impact and requests to accomplish long-term sustainability (Ma, Hou, & Xin 2017).

Finally, the aftereffect of the present investigation uncovers the negative impacts of the absence of ecological business benefits on the green process and framework advancement. This finding is predictable with Abdullah, Zailani, Iranmanesh, & Jayaraman, (2016) and Valero-Gil, Rivera-Torres, & Garces-Ayerbe, (2017), who expressed that ecological business advantages might be procured from green development activities, diminishing green advancement activities in firms.

5.2 Sustainable Green Process Model

It is important to reiterate the problem of this research which is a lack of consideration and information in academic research, and which also neglects the capability of small packaging companies to produce sustainable packaging solutions. The finding of the study proposed a sustainable green process model (figure 1), in which a system approach is likely to be an indigenous factor because green process innovation is often viewed as expensive and complex as compared to green product innovation. To address this gap, this study developed a comprehensive model to identify the route to sustainability in small packaging businesses.

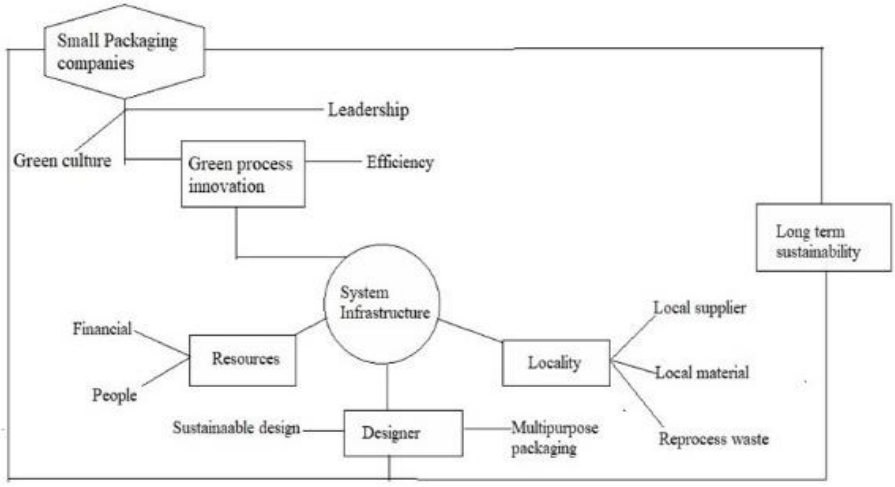

Figure 1. Sustainable green process model (SGP)

The model was developed with the help of the literature review and experts of small and medium enterprises and cleantech start-ups. One of the structures from innovation studies that can possibly add to the comprehension of reasonable mechanical change is the sustainable innovation system approach. It has turned into an entrenched heuristic system in the field of the innovation process. It presents knowledge in the elements that clarify the procedures of innovation and long-term sustainability (Hekkert, & Negro, S.O, 2009). As of late various studies have considered the system innovation approach in sustainability and green innovation (Jacobsson, Bergek, Linköpings, Tekniska & Ekonomiska, 2004). A study by Klerkx and Leeuwis, (2009), demonstrates the system innovation with different functionalities and argues that this system not only promotes the development of innovation, but several other factors which play essential roles such as, market development, funding, and infrastructure. In order to implement the green process innovation, a system innovation approach has been applied to describe the functionality of the green process that will navigate key activities and execute long-term sustainability.

From interview responses the researcher observed that small businesses show more entrepreneurial enthusiasm, meaning that entrepreneurial exercises are a prime marker as to whether an innovation system advance or not. To begin with, we saw that it is a decent marker for innovation enactment. Much of the time feasible change was created in accordance with entrepreneurial action. Second, entrepreneurial exercises turned out to be a focal capacity that associates with other system capacities and, in this manner, adds to the event of manufacturing cycles. We regularly encountered green innovation trailing entrepreneurial exercises and thus these exercises activating numerous other system capacities (Hekkert, & Negro, S.O, 2009). Also, the findings of Gast, Gundolf, & Cesinger, (2017) study, agreed that the entrepreneurial trait is important for sustainable motivation and is linked highly with individual values. As compared to normal entrepreneurs a sustainable entrepreneur seeks sovereignty and freedom, but their main goal is to educate society, follow their passion for green business and spread green values. Also, Markman, Russo, Lumpkin, Jennings, & Mair, (2016), found entrepreneurial identities that suggested that environmental entrepreneurs are persuaded by expert social personalities, as well as by the chance to combine with challenging identities involved with the business and natural logic. This connection between striking identities is related to every rationale which clarifies why people become environmental entrepreneurs. Continuing from this understanding, they build up a model recommending that environmental entrepreneurs organise a business as well as environmental and social objectives together. This prioritisation then influences entrepreneurship to approach partners in a comprehensive, restrictive, or self-made way. However, in this context, the sustainable green process model places the leader on the top to enable the understanding of green process innovation. It also illuminates how different sustainable or ecological entrepreneurs' personalities and goals are from a business entrepreneur. As my research demonstrated, leadership consistently influenced long-term sustainability, especially the choice of a decision in a business divided between social and environmental concerns. Overall, the analysis showed that sustainable entrepreneurial or ecological leadership influenced the long-term sustainability in green process innovation.

Other than sustainable leadership in the small packaging companies, the culture also impinged the structure of a system approach. Another originality of this study is associated with the internal environment of the small business for motivating sustainable practice through cultural practice and bringing together green process innovation and long-term sustainability. Interestingly, the owner's ability to seed the sustainable culture at the beginning seems to reflect the approach of using natural resources and interacts with both inside and outside environments and in making highly driven strategic choices (Donna, Lucy, Paul, Marius, 2015), prioritising the sustainable culture frame's employee relationship with external stakeholders and the environment around them. Having a culture in a central place brings the leader and employees together in common belief. Importantly, a green process innovation sustainable culture and a quality belief system, stresses moral speciality, social reconciliation, quality, adaptability, and worker pledge to oversee in turbulent conditions (Linnenluecke and Griffiths, 2010). This study highlighted the differential understanding from Tepekucukoglu's, (2018), study in which the author demonstrated that sustainability has a positive relationship with green innovation performance and business culture. Creating environmental sustainability inside the organisation is accomplished through the internal staff. At the point when staff act to serve environmental sustainability then the business culture will take shape along with business operations. It means that environmental sustainability helps with building green hierarchical culture. Also, if environmental sustainability is created inside the organisation, then green exercises are additionally upheld along these lines. Green innovation will have its own offer from an environmental point of view.

In line with leadership and culture, system infrastructure proactively linked green process innovation with packaging sustainability. According to the nature of a sustainable packaging business, the findings of this study

discovered multiple layers of a system that clarify the understanding and implication of green process innovation in small packaging companies. Previous literature measures green process innovation which includes a company reducing the consumption of raw material and avoiding hazardous substances (Chang, 2011) and the improvement of an existing process (Cheng, Yang, & Sheu, 2014). Packaging is always argued as creating significant challenges for businesses not to conflict with sustainable development and consumer and market segmentation (Nordin and Selke, 2010). The proposed infrastructure of this study placed designers, resources, and locality in a system of green process innovation to obviate the conflict of sustainable hurdles. According to Hillary, (2004), people and financial sources are crucial for small businesses for the implementation of new ideas. Progressively, packaging designers are centred around adjusting the requirement for item protection, material use efficiency and the packaging material's effect on nature from manufacture to storage in a store network (Svanes, Vold, Møller, Pettersen, Larsen, & Hanssen, 2010). While the European authoritative system has identified the prerequisite to limit material used in a design, item and packaging material waste can be examined further to achieve item protection and bundle utility in view of cost and waste issues. From design to post-customer administration, reasonable packaging design can emulate the standards of the European Waste Hierarchy Directive (Dominic, Östlund, Buffington, & Masoud, 2015). The road to sustainability requires the attention of sourcing material in the design process (Wever and Vogtlander, 2013). Globalisation and monetary patterns have made exceptionally complex supply chains over different ventures (Varma, Wadhwa, & Deshmukh 2006), and there has been an unmistakable and critical move to firms offshoring their internal activities (Darnall, Jolley, & Handfield, 2008). Geographical separations increment transportation costs, yet besides mix-up choices around stock because of the more extended lead-times (Cagliano, Caniato, Golini, Kalchschmidt, & Spina,. 2008). It can hinder operational proficiency and make contracts difficult because of an absence of trust and there can be an absence of comprehension, correspondence, and connection, together with social and dialect contrast (Caniato, Golini, & Kalchschmidt; 2013, Larsen, Manning, & Pedersen, 2013). More importantly, it releases a more negative impact on sustainability, and due to the lack of supply chain visibility, it becomes difficult to maintain social and environmental standards. The findings of this study emphasised the locality of material and suppliers for small packaging companies. The decision to source locally enables better control over the manufacturing process and increase results in greater sustainability and also decreases the environmental impact that results from transportation and working practice. A local production network, and collaboration with educational institutes or sustainable oriented businesses, are key exercises indispensable to accomplishing sustainability standards and responsibility to the planet, people, and products. Besides these improvements, the structural implication of green process innovation became clear along with the long-term sustainability model, across the findings of the study, revealing understanding and practical norms.

This study empirically explores the relationship between green process innovation and sustainability and examine the influential factors to drive ecology in small businesses. Unlike prior studies, this research not only explore the implementation of green process innovation for packaging companies but also discover long term sustainability characteristics. After analysing previous researchers, the majority of studies explore the effectiveness of green product innovation and in such a case, a long-term sustainability framework adds potential value in the field of innovation. This proposed model supports operational aspects of small businesses and is not restricted to packaging companies but also holds significant importance for an industrial designer, product development, and eco-entrepreneur. On the other hand, side, SGP (sustainable green process model), explores a systemic approach to achieving long term sustainability where green process innovation is placed in context. Green process innovation contains external and internal factors, and those factors are considered important for small packaging businesses because the concern is to achieve sustainability in the whole system. Without making the whole process sustainable it is hard for the packaging business to claim sustainability. For example, making sustainable packaging using sustainable material without having transparency in the system and omitting hazardless substance before reaching to end product resulted in partial ecological achievement. However, in the final remarks for successful integration of green process innovation and long-term sustainability in small packaging companies, the SGP model aligns structure and procedure to diversify the understanding of packaging sustainability.

6. Recommendation

Based on the findings of the study, the following are recommendations to implement green process innovation.

6.1 Accountability

A personal mission and vision of delivering a sustainable packaging solution to build a strong business identity. Failure to deliver sustainable commitment can break down the trust of employees and customers. Taking personal accountability towards sustainable packaging can increase the expectation and personal commitment

from employees. However, at a small business level, it is important to make the sustainable agenda important for both directors and employees. Promoting the green packaging solution through legislation. Include environmental standards and green packaging regulations in the development and administrate the process to prevent fines and pollution. Every decision a business owner makes in terms of the product or supply chain should consider how it can be greener so long as it is not a financial burden point on your innovation.

6.2 Prioritizing

Failure to prioritize the development of environmentally friendly packaging is not going to make any difference in the business. Since it is such a great amount down the line when you are a start-up, you would prefer not to consider what will occur in five years with the manageability of each item. You will consider what will happen in one hour from now. It's much the same as firefighting and endeavouring to assemble something, starting with no outside help. It won't be great. Putting such a large number of prerequisites at the underlying stage for new companies can obstruct real vision. It's about time conveying them to think green first and foremost like seeded into a sustainable idea from the bottom line.

6.3 Leadership

Government policymakers and packaging derivatives motivate the growth of the green packaging business. Governments encourage entrepreneurs to develop innovative sustainable solutions but fail to guide them through the development process. However, in such a case leadership commitment is very crucial in fostering green practice aimed at reducing packaging waste and engaging the workforce into a sustainable culture. The leadership of an association can enormously affect its culture. A significant contention here is the work and improvement of representatives and pioneers which must be key to an association's maintainable achievement. If there isn't a culture of improvement and preservation inside an association, then the foundation of green process innovation and long-term sustainability are virtually absent.

7. Conclusion

It can be concluded from the above discussion that the implementation of green process innovation is critically defined in relation to small packaging companies and the purpose to achieve long-term sustainability in business. Although it was difficult to establish a relationship with small businesses because the concept was not linked with small scale businesses in previous studies. Presently small packaging firms need direction and knowledge that can be used to facilitate the implementation of the innovation process. Green process innovation requires understanding and a strategic road map that can transform the packaging business (Hashim, Bock, & Cooper, 2015). Thus, a sustainable green process model (SGP) plays a key role in persuading small firms' ability to implement green process innovation because it involves a new structure of the process that involve novel characteristics. The findings of this study understood the internal and external factors that hinder the small packaging firms' ability to prosper green activities. The government regulations and strict laws of packaging waste and the tough competition from giant firms along with the turbulent environment have complicated the whole business operation. However, the leader or director of small businesses can not only maintain the regulatory standards but also direct and motivate all the actors involved in sustainability. The findings of the sustainable green process model are a unique contribution to green innovation and the sustainable innovation knowledge field. Moreover, it should also be considered that the sustainable green process model and long-term sustainability can be implemented in cleantech start-ups along with the packaging industry. Furthermore, future investigation in this field can examine the impact of the green process on large scale attributes, such as, social geographical impact, governmental procedures and guidelines that encounter significant impact because of packaging.

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