

**T.C.  
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SOSYAL BİLİMLER ENSTİTÜSÜ  
İŞLETME (İNGİLİZCE) ANABİLİM DALI  
YÖNETİM VE ORGANİZASYON (İNG) BİLİM DALI**

**INVESTIGATING SUSTAINABLE SUPPLY CHAIN  
MANAGEMENT PRACTICES AND PERFORMANCE: AN  
EMPIRICAL ANALYSIS FROM FOOD INDUSTRY**

**Yüksek Lisans Tezi**

**GİZEM GÜNDOĞDU**

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**DANIŞMAN: PROF. DR. BERİL DURMUŞ**

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## ÖZET

Dünya çapında çevresel kaygıların hızla artması nedeni ile sürdürülebilirlik konusu şirketlerin çevresel performanslarını arttırarak ekonomik karlılıklarını ve rekabet avantajlarını korumak için kullanılan önemli bir yaklaşım olarak ortaya çıkmıştır. Sürdürülebilirlik kavramının önemi dünya çapında artarken şirketler çevresel sorumlulukları kapsamında yeşil tedarik zinciri yönetimi uygulamalarını benimsemeye başlamıştır. Yeşil tedarik zinciri yönetimi uygulamaları gelişmiş ve gelişmekte olan ülkelerde araştırılmış olmasına rağmen bu uygulamaların benimsenmesi hakkında henüz yeterli bilgiye ulaşılamamıştır.

Araştırmamızın amacı Türkiye'deki gıda endüstrisinde yeşil tedarik zinciri yönetimi uygulamalarının şirketin çevresel, ekonomik, operasyonel ve sosyal performansı üzerindeki etkilerini araştırarak literatüre ve iş hayatına katkı sağlamaktır. Bu doğrultuda yeşil tedarik zinciri yönetimi uygulamalarının firma performansı üzerindeki etkisini anlamak için, mevcut literatür taranarak araştırma modeli geliştirilmiştir. Bu çalışma kapsamında gıda endüstrisi boyunca çeşitli firmalarda tedarik zinciri profesyoneli olarak çalışan 180 kişiden toplanan anket verilerinden faydalanılmıştır. Literatür taramasına dayanılarak altı hipotez öne sürülmüş olup anket sonuçları SPSS üzerinden faktör analizi kullanılarak analiz edilmiştir. İçinde bulunduğumuz salgın hastalık (Covid-19) sebebi ile anket internet üzerinden uygulanmış ve salgın hastalık sebebi ile 180 kişiye ulaşıldıktan sonra anket kapatılmıştır.

Araştırma sonucunda yeşil tedarik zinciri yönetimi uygulamalarının Türk firmalarınca benimsenmesinin henüz emekleme aşamasında olduğu halde şirket performansı üzerinde olumlu yönde etkili olduğu görülmüştür.

**Anahtar Kelimeler:** Yeşil tedarik zinciri yönetimi, çevresel performans, ekonomik performans, operasyonel performans, sosyal performans, yeşil tedarik zinciri yönetimi uygulamaları, çevresel sürdürülebilirlik; faktör analizi.

## **ABSTRACT**

Sustainability can be considered as a mindset that permits companies boost their profitability and competitive advantage by improving environmental performance. Eco-responsible consideration gained worldwide importance along the industries. To form their desired environmental behavior organizations are striving to accept GSCM practices. Up to now, GSCM and its application was tried to explain along different countries, but still it is needed more information about GSCM practices.

The purpose of the study is to have a hand in empirical investigation pertaining the impact of GSCM practices on environmental, economic, operational, and social performance along the organizations from the supply chain manner for food industry.

To understand outcomes of GSCM practices along corporate fulfilment an assessed model were developed by making use of previous studies based on extant literature. 180 supply chain management employees' answer was used from different firms within the internet survey. Making use of the previous investigations, 6 suggestions were outlined and tested during study. To evaluate these 6 suggestions, 58 items were utilized. On-line survey applied and analyzed using SPSS as a quantitative research.

With an employment of survey methodology, our exploration worked on GSCM practices and performance outcomes referencing food producers in Turkey. Making use of factor analysis, five GSCM dimensions were analysed: ECO, IEM, GP, IR, and CC.

As a conclusion it can be said that GSCM practices play role for getting boosted outcomes for any organization. It was concluded that the acceptance of GSCM practices by Turkish companies is in their beginner stages now, it means sustainability mindset isn't created as expected among companies. Results of our evaluation outlined that application of GSCM practices for environmental protection has positive impact for firm performance. Also, our report outlined that investment recovery and inner environmental management have crucial positive impacts on economic, environmental and social outcomes while cooperation with customers has positive effect on environmental and operational outcomes. The results outlined that both IR and IEM significantly impact firm performance. The results further show that GSCM practices have positive impact on the environmental performance as well as economic, operational and social performance.

**Keywords:** Supply chain management, environmental performance, economic performance, operational performance, social performance, GSCM practices, environmental sustainability; GSCM, survey, Turkey, factor analysis.

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## **ABBREVIATIONS**

**GSCM-** Green Supply Chain Management

**EFA-** Exploratory Factor Analysis

**IEM-** Internal Environmental Management

**SCM-**Supply Chain Management

**TBL-** Triple Bottom Line

**ECO-** Eco-Design

**GP-** Green Purchasing

**IR-** Investment Recovery

**CC-** Cooperation with Customers

**EM-** Environmental Management

**EP-** Environmental Performance

**EC-** Economical Performance

**OP-** Operational Performance

**SP-** Social Performance

**SR-** Social Responsibility

**SC-**Supply Chain

# 1 INTRODUCTION

Depending on increasing industrial activities, environmental degradation problem faced by all countries exists as global common responsibility for businesses, governments, and consumers. That's why environmental management concept is more popular on global scale in today's business era than it did previously (New et al., 2002). Since environmental behavior has become a crucial concept for society, generations of sustainable strategies gained more attention (Sarkis, 1999). As the result of increased environmental responsibility consideration, companies review their responses related to environmental protection to lessen their environmental outcomes (Theyel, 2000).

Moreover, with the help of enhanced technological activities of all companies, in today's competitive environment expectations of customers change fastly. As a result of changing strict expectations from customers, meeting the requirements of customers is a challenge for all organizations (Attia and Essam Eldin, 2018). To survive in today's stricter business world, firms should understand the market conditions, consumer expectations, also form their sustainability strategies consistent with improved technology to enhance their performances in 'green' context. (Habib and Bao, 2019); Su et al., 2015).

Integration of environmental considerations into companies' management practices result in significant competitive success (Zhu et al., 2008).

Today, so many countries have regulations associated with recovery of used materials or products caused to 'reverse logistics', 'closed loop supply chains' and 'green supply chains' concepts. Since customers are more into environmental considerations, environmentally friendly activities applied by companies are more essential to attract them. Companies are expected to answer about their green supply chain management strategies (Tan et al., 2014, Brandenburg et al., 2014). GSCM concept declines the environmental impacts, provide efficient energy utilization, creates empathy and collaborative mindset among partners while permit companies to boost their environmental fulfilment by declining waste while gaining the corporate image (Zhu and Sarkis, 2004, Rao and Holt, 2005, Vachon and Klassen, 2006, Srivastava, 2007).

To sustain the corporate image, companies are expected to reconsider the outcomes of their business (Hick, 2000).

Previous researches supported that 'green' approach of companies creates value because of effective resource usage which result in waste and pollution reduction (e.g. Bansal, 2005; Darnall and Edwards, 2006).

Today's increasing sustainability mindset with its 'green' concept strains the industries to spread their direction on the TBL mindset which includes the environmental, economic, and social areas (Carter and Easton, 2011, McGee, 1998; Hollos, Blome, and Foerstl 2012). TBL concept is in line with the measurement of performance outcomes; additional to traditional financial bottom line, TBL concept requires to consider the corporate social performance (Markley and Davis, 2007). As mentioned by Seuring and Muller (2008), sustainable management applications have linkages with environmental and financial performance outcomes, also they have effect on corporate social performance (De Giovanni, 2012). With the integration of TBL concept into SCM, partners along SC concentrate environmental and social targets besides of their financial targets (Markley and Davis, 2007; Hendricks and Singhal, 2003). As a result of this integration, customers can be attracted related to their ecological requests in line with environmental and social corporate responsibilities (McWilliams and Siegel, 2000). With the integration of social bottom line, environmental management practices contribute to corporate social responsibility additional to corporate social performance. However, social performance effect of green management practices is still required long-term investigations to obtain more generalizable results (De Giovanni, 2012).

Environmental consequences must be considered in all production processes to form 'greener' environmental strategies. That's why GSCM concept created as a new approach which make companies more competitive with the help of enhanced profit and market share while providing ecological response with respect to aim keeping environment safer (van Hock and Erasmus, 2000; Rao and Holt, 2005).

Past researches found to have positive linkage between GSCM practices and performance; especially environmental and economic outcomes (Rao, 2002; Vachon and Klassen, 2008; Rao and Holt, 2005; Zhu et al., 2005).

Regulations to keep environment safer and possible competitive advantages due to boosted significance of GSCM concept force organizations to embrace GSCM practices (Vachon and Klassen, 2006). As outlined in Seuring and Muller (2008) study, collaboration through supply chain partners result in increased environmental performance by decreasing the created waste by production activities of companies while boosting supply chain efficiency.

SCM with environmental targets in terms of GSCM gained attraction from organizations with the aim of lessen harmful environmental effect while acquired higher level operational performance (Zhu et al., 2013).

In recent years, due to regulations and competitive pressures, corporate environmental behavior and performance outcomes linkage is investigated to understand the impacts of GSCM practices effect on corporate outcomes (Zhu and Sarkis, 2004).

GSCM can be considered a concept to decrease the effects on environment (Klassen and Johnson, 2004; Green et al., 2012). In the GSCM concept, supply chain participants must be in a strong collaboration in accordance with application of GSCM practices (Thun and Muller, 2010).

Related with the GSCM practices, since they are still in their early stages in some countries which have emerging economies like Turkey, organizations are not so willing to apply them as voluntary. However, because of environmental regulations and customer stresses, companies try to understand and adopt GSCM practices. In accordance with literature, it can be said that the GSCM practices enable organizations to make their performance outcomes stronger. However, for detailed relationship examination there is still requirement to additional empirical studies (Seman et al., 2019).

With the help of integrated GSCM performance model, our report promoted the previous studies. As discussed previously, because of the existing ambiguity related with the linkage of GSCM practices and performance outcomes, our research provides a more meaningful direction about the relationship (Esfahbodi et al., 2016).

The real target of our report is to understand the linkage between GSCM practices and corporate outcomes within Turkish food industry. Relevant literature for GSCM is reviewed in section two, followed by the GSCM practices details. Performance outcomes is explained in section three, followed the relationships of GSCM practices with performance outcomes from literature in section four. At the end of section four, all hypotheses are developed to be tested. Our report develops conceptual model to understand the linkage between GSCM practices and organizations' outcomes and it is presented in section five. In same section, research objective, sample and data, design of questionnaire, and survey instruments are discussed and presented in detailed. Then, with implementation of confirmatory factor analysis, results are presented. Finally, we conclude with the key findings, the research discussion and contributions, limitations and some recommendations to be reconsidered for future research in GSCM.

## 2 GSCM AND GSCM PRACTICES

### 2.1 GSCM

Both sustainability concept within 'green' context and environmental protection mindset have global effects on emerged and emerging economies. In accordance with the study of Beamon (1999, p. 332), "waste generation and natural resource use, primarily attributed to manufacturing, contribute to environmental degradation". Because of having increased attention of sustainability concept globally, organizations are exposed to reform their greener production strategies; moreover companies are expected to perform take ecological response into consideration (Tseng et al., 2015; Govidan et al., 2014a). For the supply chain manner, GSCM is expressed as a interactive combination of organizational SR, EM, and SCM (Linton et al., 2007, Tseng and Chiu, 2013).

From a holistic perspective, SC includes integration of activities within both forward and reverse flows of knowledge, services, and products from beginning point of consumption (Lambert et al., 1998; Sarkis, 1999). Additional to general framework, greener supply chain takes environmental concern into consideration within producing processes with the help of environmentally friendly activities such as design with environmental targets, product recovery, waste reduction (Hsu et al., 2013; Beamon, 1999).

For both of traditional and greener supply chains, 'closing the loop' is the common goal with the help of some activities like recycling or reusing products within the supply chain (Zhu et al., 2008c). As mentioned by Hsu et al (2013), main goal can be considered as minimization of harmful environmental outcomes.

GSCM concept have created as a productive approach to provide organizations more sustainable management. In the light of these approach, GSCM practices must be implemented beginning from ecologically conscious raw material procurement to customer delivery along the all supply chain, moreover these practices are expected to close the loop with the help of reverse logistics (Zhu et al., 2008).

From a general perspective, in order to greening the supply chains, Rao (2002) considered that organizations should integrate environmental strategies into their organizations' mission. GSCM can be expressed as "a proactive approach for improving the environmental performances of processes and products in accordance with the requirements of environmental regulations" (Hsu and Hu, 2008, p. 205). GSCM concept created as an ecologically responsible approach that makes organizations more competitive by achieving financial goals while makes their processes more efficient with the help of lessen negative impact on environment (van Hock and Erasmus, 2000; Rao and Holt, 2005). As

mentioned by Skjoett-Larsen (2000), the term of ‘‘green’’ encompasses the relationship within supply chain which covers activities (e.g. packaging, processing, shipping) from the origin to the customer reach finalized product. Srivastava (2007) explained GSCM as a holistic consideration of environmental consideration and SCM; in the scope of this definition GSCM consists of design of product, sourcing of materials, production processes, customer delivery, and end-of-life management of the product after its beneficial life (Shang et al., 2010).

A few definitions pertaining to green SC which can be taken from literature directly exist; some of them are in line with followings:

Green supply refers to the way in which innovations in supply chain management and industrial purchasing may be considered in the context of the environment (Green et al., 1996, p. 188).

Environmental supply chain management consists of the purchasing function’s involvement in activities that include reduction, recycling, reuse and the substitution of materials. (Narasimhan and Carter, 1998, p. 6)

Strategic capability that includes strategies, practices, and policies that will focus on managing the environmental impact of supply chain operations (Rauer and Kaufmann, 2015).

This expression indicates that GSCM can be considered an ecosystem philosophy to decrease the waste while protect the financial advantages based on environmental concerns (Zhu and Sarkis, 2004; Griggs et al., 2013).

GSCM crucially impacts the environmental effects of supply chain operations pertaining to corporate sustainability performance.

As discussed previously supply chain management can be considered as environmental consideration integrated management (e.g. Wu and Dunn, 1995; Florida, 1996; Min and Galle, 1997). Because of increased environmentally responsible consideration with the pressure of governments, customers, and stakeholders, organizations are expected to embrace GSCM strategies (Ahmed et al., 2018).

## **2.2 GSCM PRACTICES**

Companies take actions about their activities which are in accordance with their SC participants to be more environmental friendly (Vachon and Klassen, 2006). From a general view, practices related with ‘green’ context should be considered along the value chain to make supply chain sustainable (Vachon and Klassen, 2008; Handfield et al., 1997). GSCM practices enable organizations to support ‘‘closing the loop’’ perspective within the supply chain which included all activities from production to

customers (Zhu et al., 2008a). Environmentally responsible management can be enhanced by the collaborated activities which includes all participants within SC (Yu et al., 2014; Walton et al., 1998).

As per previously discussed studies, cross-functional consolidation for the SC participants is required to obtain continued corporate performance (Aspan, 2000; Green et al., 2012; Vachon and Klassen, 2006; Zhu and Sarkis, 2004; Zhu and Geng, 2001).

Today's stronger and more competitive business environment forces companies to adopt sustainability desire (Huang et al., 2015; Eltayeb et al., 2010). To meet stakeholders', customers', and other partners' expectations within greener SCM, organizations try to accept greener SCM practices. According to previous studies, companies which are firstly adopted to GSCM practices can enhance their capabilities and set up more critical relationships with their partners to enhance their sustainability performances (Pagell and Wu, 2009; Wolf, 2011; Paulraj, 2011).

Prior researches have addressed various practices for GSCM that have been empirically supported (e.g., Zhu et al., 2005; Zhu and Sarkis, 2006; Zhu et al., 2007a; Zhu et al., 2010; Shang et al., 2010; Rusli et al., 2012; Green et al., 2012; Perotti et al., 2012). According to Green et al. (2012), when GSCM is considered as a consolidation of "waste hierarchy" including 3R's (reduce, reuse, and recycle), it embraces ecologically responsible design/production, environmentally conscious management, green purchasing, green packaging and distribution. Therefore, GSCM practices embraces all activities from the beginning of production to customer delivery within each stage of supply chain. Consistent with Sarkis (2003) research, GSCM practices can be initialized with procurement of raw materials and followed with production process which covers utilization of energy and material to control waste caused from distribution and production activities. In accordance with Perotti et al. (2012) study, GSCM practices can be evaluated as an integration of reverse logistics, cooperation with customers, investment recovery, eco-design & packaging, internal environmental management, and green distribution. Zhu et al. (2010) addressed GSCM practices as a combination of IEM, GP, IR, CC, and ECO (Abdallah and Ghwayeen, 2019).

GP, IR, and CC can be considered as external GSCM while ECO and IEM can be considered as internal GSCM practices (Rha, 2010; Zhu et al., 2007). Each of them plays crucial role in shaping GSCM capability of corporation; GSCM adapted corporations need to select suppliers and keep the positive relationships with their supplier and customers within a collaborative approach.

Broadly speaking GSCM encourages organizations to exhort greener environmental activities and consider all activities in the environmentally responsible perspective including all supply chain participants. GSCM contributes directly to increase efficiency and synergy among all SC members in the scope of reinforcement of environmental and economic outcomes (Vachon and Klassen, 2006; Rao and Holt, 2005; Zhu et al., 2008; De Giovanni and Esposito Vinzi, 2012).

Within the green context, SCM contributes the sustainable corporate performance with the help of jointly developed collaborative activities among supply chain participants (Yu et al., 2017).

As mentioned by Darnall et al., 2008, GSCM practices might have consequences in terms of decreased environmental impacts caused by companies' supply chain activities. Additionally, GSCM practices are expected to have an impact on corporate image with enhanced competitive gains (Cosimato and Troisi, 2015).

Procurement, producing, material selection and distribution, product and process design, collaboration with suppliers and customers, reverse logistics are various activities which are GSCM embraces (Porter and van der Linde, 1995; Handfield et al., 2002; Simpson et al., 2007; Zhu et al., 2008; Mitra and Datta; 2014).

All over the world, sustainability has been an important concern which prompt corporations to reshape their environmental behavior according to stakeholders' expectations as well as governments'. Because of customer pressures and government regulations, companies started to take environmental problems into consideration in association with SCM activities (Govindan et al., 2014b). In accordance with Tseng and Chiu (2013) study, in the context of greener SCM, some applications (e.g. GP, ECO) played vital roles to control companies' negative effects on environment. These green management adaptation studies not only provided to meet the customer's domestic requirements, but also it contributed to greener global supply chain management by meeting requirements all over the world which is resulted in competitive global environment. Since companies hasn't enough capability to apply GSCM practices alone, collaborative mindset within supply chain gained more importance in order to gain power providing sufficient ecologically sound resources and know-how to manage SC in a green manner (Matos and Hall, 2007; Paulraj et al., 2008).

From GSCM practices, 'GP' requires collaboration with qualified and proper suppliers for greener management. For instance, IBM and Xerox selected their suppliers which they have a capability to provide jointly developed environmental responsive activities (Fleischmann et al., 2001, Guide et al., 2003).

Eco-design practice of GSCM requires environmentally conscious design of products. This practice encompasses ecological response to customers' eco-requirements. In the light of eco-design practice of GSCM, products are expected to design with reusable raw materials with respect to green context. As mentioned by Mitra and Datta (2014), ecologically conscious product design covers developing product artworks with biodegradable/reusable raw materials by taking life cycle analysis for items into consideration. According to Wong et al. 2012, in order to create environmentally sound products, production processes must be carried on basis of minimum energy/source using up. As a conclusion of minimum energy/source using up, created waste (as liquid and solid) and air emissions

will be minimized (Rao and Holt, 2005; Zhu, Sarkis, and Lai, 2012). Another expectation from organizations is to find environmentally sound sources for energy requirement which can be alternative to old-fashioned ones like coal, oil, or natural gas. Renewable sources like wind energy may be a good alternative to make environment more sustainable (Rao, 2002; Mitra and Datta, 2014; Green et al., 2012a, 2012b). Environmental-sound product design requires reduction of consumed energy, renewable source usage, minimize waste production.

Carter et al. (1998) addressed internal environmental management as a crucial practice which has effect on performance outcomes of company. As mentioned by Zhu and Sarkis (2004) investment recovery is an essential GSCM practice that attempts to decrease the produced waste and enable company to be more environmental-friendly by this way.

In the scope of GSCM practices, distribution, packaging, storage activities are expected to be designed as environmentally conscious to lessen negative effect on environment. For instance, as mentioned by Carter, Kale, and Grimm (2000), packaging materials must be designed with minimum weight in terms of minimum effect on environment.

GSCM practices make companies more powerful towards changing business environment which requires more sensitive environmental approach due to regulations from government as well as from stakeholders. GSCM practices encouraged organizations in terms of achieving enhanced corporate performance by innovations within greener concept (Porter, 2000; Seman et al. 2019).

From the extensively integrative perspective of Zhu and colleagues (Zhu and Sarkis, 2004, 2007; Zhu et al., 2008) taking a broader approach, in this paper, five dimensions of GSCM, namely, IEM, GP, IR, CC, and ECO will be investigated (Zhu et al., 2008; Zhu and Sarkis, 2004; Zhu et al., 2005). Explanations of each practice can be seen from Table 1. It is taken an extensive perspective of GSCM practices that enhance the supply chain to be greener (Zhu and Sarkis, 2004).

**Table 1. Dimensions of green supply chain management**

<b>GSCM Practices</b>	<b>Description</b>	<b>Authors</b>
<b>ECO</b>	Think of outputs for sustainability objectives and impact in mind; practice involves cross-functional teams, supplier input and expertise and technology in response to customer demands. Such practices constitute tacit, firm specific, and inimitable strategic resources	Hart (1995), Mitra and Datta (2014), Perotti et al. (2012), Zhu et al. (2008)
<b>IEM</b>	Pertain to processes and actions reinforcing intra-organizational sustainability targets. Management reinforcement can be expressed as a crucial source for the application of cross-functional cooperation to boost environmental effect of companies' operations	Christmann (2000), Handfield et al. (1997), Walton et al. (1998) and Zhu and Sarkis (2004)
<b>GP</b>	Reflects the significance of supplier relationships to successfully implement upstream green initiatives. Firms collaborate with suppliers to meet sustainability desires, resolve sustainability issues (i.e. waste disposal and inefficiencies in logistics operations), share important green technologies, and lessen the negative effect of products and manufacturing activities on environment; a strategic resource reflecting valuable and specific processes among SC partners	Carter and Dresner (2001), Christmann (2000), Mitra and Datta (2014), Perotti et al. (2012), and Zhu et al. (2008)
<b>IR</b>	Related with resell and reuse of used materials; reverse logistics programs help firms follow product end-of-life and investment recovery operations. Recovery efforts represent strategic resources that require complex coordination efforts with both upstream and downstream supply chain partners	Perotti et al. (2012), and Zhu and Sarkis (2004)
<b>CC</b>	Related with meeting customer expectations in the scope of environmental targets. Includes product development, manufacturing processes, and packaging to reduce environmental impact. Customers are included into decision-making processes to provide lower costs and enhanced customer expectation achievement	Zhu and Sarkis (2007) and Zhu et al. (2008)

Source: Kirchoff, Tate, and Mollenkopf (2016).

### 2.2.1 Eco-Design

Eco-design practice within the greener supply chain context requires to consider eco-requirements along products' design as well as their lifecycle. Eco-design points out production with decreased consumption with biodegradable and recyclable material usage pertaining to environmental protection target (Q. Zhu, Sarkis, Cordeiro, and Lai, 2008). In the light of this special consideration, along with the

production process, the main aim can be expressed as minimizing waste, minimizing negative effect on environment, decreased energy consumption, encouragement of reusable materials (Shi et al., 2012). Companies attempt to develop environmentally responsible products in the concept of eco-design. In accordance with Sarkis et al. (2016) study, the main target of ECO is production of products which can be easily breaking up to be recycled. Deemed aim with this practice is the elimination of unrequired harmful materials spreading on environment. When products contain more biodegradable or recyclable materials they can be easily disposed and/or recycle after consumption (Carter, Kale, and Grimm 2000; Zhu and Sarkis 2004; Rao and Holt 2005; Green et al. 2012b; Mitra and Datta, 2014). Destructive materials can be changed with environmentally friendly materials to provide lessen waste formation.

As it discussed previously, decreased waste enable organizations to increase their environmental performance in association with environmental improvements (Abdallah and Ghwayeen, 2019).

Some of the recent investigations pointed out eco-design as a green practice within the supply chain which encompasses all process from sourcing to throwing away in the context of reshaped environmental behavior (Zhu et al., 2007; Vijayvargy et al., 2017).

As mentioned by Kumar and Chandrakar (2012), eco-design practice can be evaluated a proactive execution which can be reshaped the ecological response as a part of environmental corporate strategy which obtains inner teamwork along departments as well as collaborative thinking with outside participants within the SC. Since companies hasn't enough capability to implement eco-design practice alone, collaborative mindset within supply chain gained more importance in order to gain power providing sufficient ecologically sound resources to manage supply chain in a green manner (Paulraj et al., 2008; Zhu, Sarkis, and Lai, 2006; Zhu et al., 2008). As mentioned by Liu et al., (2018), ecologically conscious behavior pertaining to products is expected to enhance the ecological efficiency and meet the ecological requirements from stakeholders. Eco-design can be described as "the systematic consideration of design issues associated with environmental safety and health over the full product life cycle during new production and process development" (Amemba et al., 2013, p. 54). Jabbour et al. (2015) specified ECO as an instrument for encouraging enhanced corporate EP and for advancing output functionality while reducing the ecological outputs of the output's life circle (Abdallah and Ghwayeen, 2019). Cross-functional coordination includes jointly developed eco-products, greener design of production processes, process optimizations with the reshaped environmental conscious behavior, and products' life circle assessments (Choi et al., 2018).

From a holistic perspective, environmentally sound product & process design encompasses the reduction of energy & material consumption as well as created waste as liquid and solid to be minimized caused by production processes (Mitra and Datta, 2014).

Ecological product design pertaining to environmental protection target is still evaluating depend on fastly changing environmental expectations and trends. Required regulations to make products more

environmentally friendly are still investigating and not enough for now. In fact, eco-design practice for greener perspective is still in its infancy; some ambiguity there is. Even though, there is still ambiguity pertaining to eco-design requirement, it is expected to introducing green innovations related with product design will result in the competitive advantage as first movers (Kleindorfer, Singhal, and van Wassenhove, 2005). Some special tools such as life cycle evaluation are executed to provide designing products with lessen negative environmental effect (Kärnä and Heiskanen 1998; Rebitzer et al. 2004).

Eco-design addressed as the significant green management practice which have positive impact on performance outcomes of companies (Lewis and Gretsakis, 2001; Zhu et al., 2005; Eltayeb et al. 2011). As mentioned by Demirci (2014), incentives to execute the eco-design practice to provide greener management along supply chain are governmental regulations, need for corporate image enhancement, customer pressures related to eco-requirements, increasing waste disposal costs.

### **2.2.2 Green Purchasing**

As per discussed previously, there are a number of definitions pertaining to GSCM; however, one of them to explain linkage of GSCM with green purchasing best is that “integrating environmental thinking into supply-chain management, including product design, material sourcing and selection, manufacturing processes, delivery of the final product to the consumers as well as end-of-life management of the product after its useful life” (Srivastava, 2000). General speaking, from the green purchasing perspective, GSCM can be evaluated the chain of green companies for the meeting of environmental common targets to be more sustainable within the all supply chain and thus, green purchasing requires a strong collaboration to be more powerful along supply chain (De Giovanni and Vinzi, 2014).

Green Purchasing encompasses procurement activities which are in line with ecologically responsive approach that provides decreased waste creation and environmentally sound sources procurement regarding with sources and production processes’ harmful and/or toxic effects on environment (Vijayvargy et al., 2017; Min and Galle, 2001). Since customers are more conscious about environmental problems which require to reconsideration of ecologically responsive products generation, companies attempting to use environmentally conscious products to lessen their impacts on environment to make it more sustainable. That is the reason of why companies need to check their suppliers’ activities in a greener context (Hustvedt & Dickson, 2009; Zsidisin & Siferd, 2001; Petljak, Zulauf, Štulec, Seuring, & Wagner, 2018).

Green purchasing is expressed as “an environmentally conscious purchasing initiative that tries to ensure that purchased products or materials meet environmental objectives set by the purchasing firm, such as reducing the sources of wastages, promoting recycling, reuse, resource reduction, and substitution of materials” (Eltayeb et al., 2011, p. 497). Environmentally responsible procurement

includes all the procurement activities which intended protect the environment like reusable source use, decreased waste formation, decreased energy and water use (Choi et al., 2018). Green purchasing requires supplier selection based on environmental capacity consideration to overcome sustainability requirements. Previous researches pointed out the relationship between suppliers and corporate ecological performance from various aspects (Godfrey, 1998; Rao,2002). Suppliers have a crucial impact on value creation and environmental effect which caused by companies' various activities (Handfield and Nichols, 2002; Darnall, Jolley and Handfield 2008). According to Paulraj (2011), for companies which attempted to be greener through supply chain context, it is essential to follow and check their supply-side practices along their suppliers. Green supply chain management adopted companies select their suppliers regarding with their environmental expectations and keeps their relationships positive within collaborative mindset (Habib and Bao, 2019). Green purchasing for excellent implementation requires close relationships with suppliers to provide jointly developed ecologically responsive products (Carter and Carter, 1998). As such Vachon and Klassen (2008) pointed out, large manufacturing organizations collaborate their suppliers to buy materials and services which are environmentally-sound. According to Preuss (2001), green purchasing can be evaluated as an important green practice within supply chain; because, it provides companies effective control on their suppliers in order to support their ecological performance which includes all flow for creation of green materials and practices. Environmentally responsible procurement enables businesses control ecological potential on the procurement base. Moreover, collaborative studies with suppliers in green context at the procurement side make the production processes cleaner (Zhu and Sarkis, 2004; Abdallah and Ghwayeen, 2019). Collaborative activities caused by green purchasing practice enhance firms' performance outcomes pertaining to sustainability (Green et al., 2012a). Additionally, according to Cao and Zhang (2011), collaborative activities result in continual competitive advantage. Suppliers must be considered as valuable partners along supply chains to share and execute environmental targets in common base while providing developed environmental performance for both of supplier and company within SC (Bowen et al., 2001a; Seuring and Muller, 2008). All in all, supplier selection in the concept of green purchasing collaborated by mutual activities through supply chain enable companies to lessen environmental effects caused by their activities while encouraging synergy among the partners (Geffen and Rothenberg 2000; Klassen and Vachon 2003; Handfield et al. 2004; Markley and Davis 2007; Paulraj, 2011).

Green purchasing practice encompasses various factors such as supplier evaluation with audits, selection of suppliers referencing environmental criteria, encourage suppliers to get environmental certification programs, jointly developed products in the scope of eco-requirements, product/process innovations within greener context, etc. (Lamming et al., 1999; Lloyd, 1994; Zsidisin and Hendrick, 1998). As mentioned by Wu et al. (2011), companies shape their environmental strategies to strength their better ecological response with scope of greener SCM by arranging environmental audits as well

as providing support for their suppliers on the basis common sustainability goals with collaboration (Abdallah and Ghwayeen, 2019). Following and checking the supplier's EP is explained as a part of GSCM. This type of control results in doing business with suppliers which have a capability to meet ecological expectations which caused by some regulatory standards. Green purchasing practice as a part of GSCM concept including collaborative activities with suppliers, arranging education seminars to suppliers, supporting suppliers to create their own environmental strategies is expected to result in with increased environmental performance and enhanced competitive benefits. Along the supply side, awareness of suppliers for better environmental performance can be explained as a feature of responsive business application (Rao, 2002). As example, Ford Motor Company expected ISO 14001 certification from its all suppliers, while Toyota, Mitsubishi, and BMW evaluated their suppliers according to their environmental criteria (Young and Kielkiewicz-Young, 2001). Geffen and Rothenberg (2000) outlined the importance of collaboration among the suppliers within the supply chain to be greener by decreasing waste, pollution, while encouraging suppliers to provide eco-products.

Blome et al. (2014) expressed collaboration along supply chain as intention to strategic sourcing management which can be created by jointly developed activities through partners to make supply chain more sustainable. Sustainable supply chain collaboration requires mutual understanding along partners. This mutual understanding results in effective strategic sourcing management in greener context, effective time management capability, getting know-how, and improved capabilities in the concept of common goals (Vachon and Klassen, 2006; Faisal, 2010; Paulraj, 2011; Blome et al., 2014).

Krause, Vachon, and Klassen (2009) considered that sustainability performance of any firm is expected to in line with their suppliers' sustainability performance. That's why companies are expected to educate their suppliers at the development of stages of their environmentally sound applications (Rao and Holt, 2005). Environment-related criteria must be important to evaluate suppliers in greener context (Min and Galle, 2001; Zhu et al., 2005; De Giovanni, 2012). As discussed previously, as a requirement of green purchasing practice, suppliers' performance in green concept is needed to be monitored and evaluated regularly for conformity (Rao 2002; Zhu and Sarkis 2004; Mitra and Datta, 2014).

As discussed by Zsidisin and Siferd (2001), procurement with the aim of environmental protection is in line with better ecological response by providing reusable, recyclable, and less toxic materials. Procurement with the target of environmental protection requires greener sourcing to lessen waste production by minimizing the harmful/toxic material use on processes (Min and Galle, 2001). Environmentally responsible procurement plays a vital role in supporting supplier's ecological production potential as well as enhanced environmentally concern behavior (Blome, Hollos, and Paulraj 2014). Hines and Jones (2001) pointed out green purchasing practice provides a leading role which could result in a mutual positive linkage between buyer and supplier. In the light of this green purchasing practice management can be considered as a guideline to be followed in order to have improved

sustainability potential within the supply chain (Paulraj, 2011; Blome et al., 2014). Walton et al. (1998) addressed suppliers to enhance EP within whole SC, considering linkage between supplier and environmental performance appropriate supplier selection can be taken as an important practice into green management consideration along the supply side (Yu et al., 2014).

Broadly speaking, if all supply chain players follow green practices and shapes their environmental behaviors on the basis greener management practices, whole chain will be green easier with the help of collaborative activities from all chain participants (Rao and Holt, 2005). As a result, GSCM can be regarded a chain which encompasses green companies whose practices are environmental sound and they have a collaboration to be more sustainable along all chain.

From greener procurement perspective, it is expected to greening supply chain can result in financial advantage by cooperation with suppliers in the concept of common targets to provide better environmental response with the help of ecological innovations (Bowen et al., 2001a; Rao, 2002). GSCM with engagement of suppliers is expected to provide benefit for reduced waste, that, in turn, can benefit for operational performance (Walton et al., 1998; Vachon and Klassen, 2007).

### **2.2.3 Internal Environmental Management**

Within the environmental conscious concept managers are expected to enhance processes which are composite, modern and critically worthwhile (Russo and Fouts, 1997; Gabler et al., 2015). Sustainable concept needs crucial encouragement across the corporation for application of GSCM practices (Kirchoff et al., 2016).

Internal environmental management can be expressed as “the practice of developing environmental sustainability as a strategic organizational imperative through commitment and support of the imperative from senior and mid-level managers” (Diab et al., 2015, p. 150). Another definition for IEM is “a systematic process consisting of a set of environmental policies, internal policies, assessments of environmental impacts, quantifiable environmental targets, plans of action, responsibilities and checks through regular auditing of these elements” (Jabbour et al., 2015, p. 368).

Internal environmental management encompasses sequent practices which are expected to result in achievement of corporate internal goals that are defined previously by top managers of corporation or forced by a legislation (Rao,2002; Wu and Dunn, 1995). Internal environmental management can be considered in line with accommodation of sustainable corporate strategy that constrained by capabilities of organization; thereby environmental activities to prohibit negative effects with corporate activities can be planned (Bowenetal.,2001; Rao, 2002). According to Zhu et al. (2007), environmental conscious company with environmental conformation and monitoring exercises may reduce the environmental

effect with their producing activities. Senior management reinforcement, organizational enthusiasm, and collaborative corporate culture are required for better internal environmental management implementation (Choi et al., 2018). Moreover, internal environmental management practice encompasses quality management inspecting to green the processes (De Giovanni, 2012).

Consistent with prior research from literature it can be said that internal environmental management is an essential practice that has an impact on corporate performance (Carter et al., 1998). As mentioned by Hamel and Prahalad (1989), senior managers' encouragement is required related with application of new technologies. Achievement of better green environmental performance is possible when top management encouragement is totally obtained (Zsidisin and Siferd, 2001; Rice, 2003). Top management perception is related with internal environmental management; they gather knowledge from the external environment and make critical and policy-making decision for corporate operations (Ye, Zhao, Prahinski, & Li, 2013). Therefore, upper management play a crucial role in application of various strategies to create better organizational performance (Habib and Bao, 2019; Zhu et al., 2005).

#### **2.2.4 Investment Recovery**

IR is a developing green management practice which has a significant impact related with GSCM. As a crucial green management practice investment recovery makes life of products and materials longer; because investment recovery as a green practice enable companies to reuse materials and products which are previously used. Within a 'green' context, investment recovery encourages recycled materials and products to make environment more sustainable. Because of the existence at the back end of supply chain sphere, many companies from United States and European countries pointed out the investment recovery as a crucial approach for greener SCM (Zsidisin and Hendrick, 1998; Zhu and Sarkis, 2004).

Investment recovery exhorts the efficient (especially by cost), effective, recycled, recovered production and consumption with the environmental conscious behavior. It encompasses sale of excess or unused inventories in a cost-effective manner. The most important aim with application of investment recovery can be considered as economic and environmental improvement on performance for a company (Zhu et al., 2008; Vijayvargy et al., 2017; Green et al., 2012a). From a holistic perspective, companies strive to close the loop within SC with investment recovery application in order to recycle, reproduce, and reuse of initial products. As mentioned by Zhu et al. (2008a), IR includes the processes of recovering and recapturing the value of unused or end-of-life assets through effective reuse or surplus sales which can result in decreased waste, that, in turn improved environmental and economic outcomes at the end of production activities. Main aim with this application can be considered to get rid of excess equipment and materials (Habib and Bao, 2019). Since efficient oversupply sales can be obtained through successful IR exercises within supply chain, reverse logistics is a significant factor which has association with investment recovery. Reverse logistics alludes to possible remanufacturing processes which

include scrap or excess materials and products recovery which are in the end of their life. Reverse logistics involving investment recovery practices need crucial regard by logistic companies. Collaborative mindset is a requirement among partners in order to have know-how in taking back of used products while following the recycling processes within supply chain (Lai et al., 2013; Esfahbodi, Zhang, and Watson, 2016). Waste management regulations with existence of closed-loop framework are important to carry on efficiently reverse logistics principle which encompasses investment recovery practices. Government plays a crucial role to set and follow regulations about green SCM procedures (Zhu et al., 2007, Soltani et al., 2015).

Consistent with prior researches, IR is expected to have important impact on corporate performance (Zhu et al. 2008a; Green et al. 2012a). Our study will explore the investment recovery effect on environmental, economic, operational, and social performance of organization (Esfahbodi, Zhang, and Watson, 2016).

### **2.2.5 Cooperation with customers including environmental requirements**

By the development of environment sound mindset, environment sound products attracted more attention by consumers, that, in turn, companies took environment-oriented behaviors into consideration within their manufacturing activities (Jiang et al., 2018; Najmi et al., 2019). In GSCM concept, organizations were forced to form their strategies within the ‘green’ context by consumers (Vanalle et al., 2017).

Cooperation with customers can be expressed as “an exchange of technical information and requires a mutual willingness to learn about each other’s operations in order to plan and set goals for environmental improvement” (Vachon and Klassen, 2008, p.301).

Cooperation with customers including environmental requirements alludes to create a collaborative accomplishment to create and advance the ecologically sound products pertaining to environmental protection by cooperating with the suppliers; the goal with this practice is to meet the consumer expectations related with the greener concept, that, in turn, can result in competitive advantage (Vachon and Klassen, 2008; Zhu et al., 2010). As discussed previously, collaborative activities within the supply chain are expected to create many benefits like ease for competition (Vachon and Klassen, 2006).

Consumers can be considered the main pressure source to prompt suppliers related with application of GSCM within the production activities (Khan and Qianli, 2017). Consistent with prior research it can be concluded that environmental collaboration provides many advantages for organizations (Lai et al., 2005; Zhu et al., 2010; Vachon and Klassen, 2008). Most importantly, close relationships with consumers along downstream side of supply chain is crucial to application of GSCM (Green et al., 2012). In association with Christmann and Taylor (2001) study, it can be emphasized that

there is a positive linkage with consumer pressure and enhanced green applications as well as corporate environmental image. Collaborative studies are expected to contribute to enhanced trust and stronger relationships between supplier and customer (Scholtens and Kleinsmann, 2011; Beske, 2012). Consumers can lead to ecological responsive product improvement with their feedbacks and evaluations with suppliers (Choi et al., 2018). Meeting customers' eco-requirements after correctly perceiving them is expected to create value with a synergy as a part of GSCM application. Organizations should design their processes according to consumers' evaluations and feedbacks (Thun and Muller, 2010). In the light of this perspective, environmental cooperation with customers enable organizations to acquire environmental targets with the help of collaboratively developed strategies. (Vachon and Klassen, 2008; Zhu et al., 2010). Moreover, inherently with correct understanding and created synergy, at the end of this type of collaboration, customer satisfaction is expected to be increased (Perotti et al., 2012). Zhu et al. (2008) alluded to collaboration with suppliers with sustainability aims is also crucial to close the loop within the SC (Yu et al., 2014; Abdallah and Ghwayeen, 2019; Pakdeechoho and Sukhotu, 2018).

Previous research implied that collaborative activities can enable companies to develop their environmental, economic, and operational outcomes (Vachon and Klassen, 2006; Lai et al., 2010; Paulraj, 2011). As the contribution to this conjecture, Zhu and Sarkis (2007) alluded to cooperative activities with the scope of eco-design and green packaging result in decreased waste creation and increased cost advantage within green supply chain management (Yu et al., 2014). Cooperation with customers within GSCM concept enables organizations to incorporate technological development into their processes, that, in turn, results in enhanced operational performance. Detailed customer cooperation and performance outcome relationships as environmental, economic, operational, and social performance will be examined at results and conclusions parts of this study.

### 3 OUTCOMES OF PERFORMANCE

GSCM approach can be acquired to decrease ecological effects of companies within their supply chain operations, then, in turn to reach enhanced efficiency within environmental activities (Van Hoek, 1999). In order to acquire expected economic and environmental performance, GSCM philosophy is required to be followed properly by companies (Felice et al., 2013). Organizations are expected to improve their performance to reshape environmental behavior presenting more ecological responses, then, in turn to manage better environmental performance depending on customer expectations in terms of sustainability (Ahmed et al., 2019).

SCM within a 'green' context is considered as an integration of sustainability term into traditional activities of SCM (Linton et al., 2007). It is possible to consider that sustainable improvement can be achieved within organizations based on TBL concept which includes social, environmental, and economic dimensions (Elkington, 1998; Carter and Easton, 2011). It is expected to be more responsible related with the taking environmental and social outcomes into consideration besides economic outcomes for organizations within their all supply chain activities (Walker and Jones, 2012). There is a linkage between supply chain management within a 'green' concept with performance outcomes of company; green practices can guide directly to enhanced performance outcomes (Markley and Davis, 2007; Carter and Rogers, 2008).

Firm performance can be evaluated with environmental, operational, economic, and social outcomes. There are many studies which found the positive relationship of GSCM practices with environmental outcomes (Mitra and Datta, 2014).

Prior research which explored green practice impacts on performance outcomes implied varied consequences (Vijayvargy et al., 2017; Ahmed et al., 2018; Wu et al., 2015; Zhu et al., 2013, Zhu and Sarkis, 2006). GSCM practices are crucial to make operations more effective with lessen waste (Mumtaz *et al.*, 2018). Although GSCM evolved as a significant management instrument recently, due to willingness and adaptation problems, its application is not at the level of expectation especially in emerrging countries (Teixeira et al. 2016). Golicic and Smith (2013) implied crucial impact of GSCM practices on economic and environmental outcomes of the businesses. The relationship with GSCM practices on EC is still inconclusive in literature (Zhu et al., 2012). Research studies explored the effect of GSCM practices on companies' environmental and economic performance, however results are still

inconclusive and that's why there is a requirement to obtain additional empirical investigations in order to get clear relationships (Rao and Holt, 2005; Zhu et al., 2013; Hsu et al., 2013).

### **3.1 Environmental Performance**

Environmental performance has been evolved as a result of ecological expectations and regulations (Zhu et al. and Sarkis, 2004; Theyel, 2001; Green et al., 2012; Jabour et al., 2015; Sharma et al., 2017). According to Hart (1995), environmental performance has evolved in the concept of pollution prohibition.

Environmental performance can be clarified as "the ability of manufacturing plants to reduce air emissions, effluent waste, and solid wastes and the ability to decrease consumption of hazardous and toxic materials" (Zhu et al., 2008a; Vachon and Klassen, 2008). Another definition for environmental performance is "the outcome of a firm's strategic activities that manage (or not) its impact on the natural environment" (Walls *et al.*, 2012, p. 891). Younis et al. (2016) limited environmental performance as an organization's ability to minimize air emissions, effluent and solid wastes, to decrease consumption of toxic and hazardous material and decrease environmental accidents. Broadly speaking, environmental performance aims environmental protection by decreasing material and energy use, as well as waste formation.

From the general view, EP is evaluated as a crucial reason to obtain competitive advantage and sustainable corporate performance (Zailani et al., 2012b; Ulubeyli, 2013). Companies reshape their environmental strategies to obtain enhanced environmental performance creating ecological responses; in order to increase environmental performance proactive consideration associated with the environmental strategy formation is crucial (Russo and Fouts 1997; Vachon and Klassen 2008). With the aim of obtaining competitive advantage many companies develop proactive environmental protection strategies which have the capability of attracting customers. Proactive environmental management is in line with critical source selection which results in enhanced efficiency and competitive advantage for a company (Russo and Fouts, 1997).

Olsthoorn et al., (2001) argued that EP is considered as a tool to measure the relationship between the business and environment. Environmental performance can encompass some dimensions as reduction in energy consumption, environmental pollution, wastes, waste water emissions, and greenhouse gases (e.g. CO<sub>2</sub>) emissions (Daugherty et al., 2002). Companies are expected to have strong adaptation capability of green practices in order to have higher environmental performance (Zhu and Sarkis, 2004). Prior research argued that critical strategies related with organizations' environmental management capability not only prohibit companies from facing environmental disagrees, but also enable companies to decrease costs, enhance revenue, attract customers and meet their expectations, enhance competitive advantage (Henriques and Sadorsky, 1996; Berry and Rondinelli, 1998; Stock et al., 2002).

As discussed previously supply chain management within in 'green' context has become more popular than it did the past; because environmental awareness and greener supply chain management expectations from supply chain partners are crucial topics within the sustainability concept (Zhu et al., 2008). This awareness in line with environmental protection aim can result in reducing environmental impact on world. Green supply chain management encompasses lessen negative environmental impacts of products and production activities along with all supply chain activities beginning with design & procurement of raw material and raw material selection to postconsumer waste treatment (Zhu et al., 2005). With many reason companies attempt to accept GSCM practices to enhance their eco-responsible processes which result in increased positive environmental outcomes (Hasan, 2013). Companies adopt to GSCM practices to fulfil consumers' eco-responsible expectations and comply with government regulations (Testa and Iraldo , 2010). As a challenging activity, in line with ecological pressures, companies are forced to rearrange their environmental strategies by complying with greener practices to enhance their EP (Diab et al., 2015; Abdallah and Ghwayeen; 2019).

Various scales have been manifested to measure environmental performance. For instance, Maxwell and van der Vorst (2003) measured EP with reduction of material used, elimination and/or reduction in waste generation and use of hazardous substances, reducing energy, and reducing pollution sent into air and water items. Maxwell et al. (2006) proposed various indicators (e.g., reduction in the amount of materials used, elimination and/or reduction in the generation of waste, elimination and/or reduction in the use of hazardous substances, lower energy consumption, and reduced emission of pollutants into the air and water) to measure environmental performance. Huenting and Reijnders (2004) adopted indicators of environmental bottom line that included the source of the natural capital in terms of the annual withdrawal of water resources and forest resources as a percentage of original forest, the CO<sub>2</sub> emissions/capita, the CO<sub>2</sub> emissions/dollar of GDP and maximum concentration of lead in gasoline. Rao (2002) developed a scale including indicators such as the reduction of solid/liquid waste and emissions and improvement which encompasses legal compliance. Environmental performance concept encompasses the items which including reduction of energy and pollution, decreasing consumption of natural sources and harmful materials, reduced environmental accidents (De Giovanni, 2012; Zhu et al. 2013). After detail consideration of scales developed in the literature, for this study it is decided to measure environmental performance by reducing of air emissions (EP1), reducing of waste water (EP2), reducing of solid wastes (EP3), reducing of consumption for hazardous/harmful/toxic materials (EP4), reducing of frequency for environmental accidents (EP5), enhance a company's environmental status (EP6) (Zhu et al., 2013). This scale is in line with green SCM practices and collaboration with suppliers pertaining to environmental protection by decreasing the harmful effect. This is enhanced by implementing crucial environmental practices attempted to decrease the amount of waste sent into the environment and decrease the amount of energy used in production processes; moreover, use of green materials lessen the overall environmental effect of a supply chain while

exhorting greener production processes. Within ‘green’ context, the adoption of SCM practices permits companies to have superior protection against environmental accidents with the potential linked negative impacts (De Giovanni, 2012).

Consistent with the literature, environmental performance contributes the target of economic and environmental sustainability of companies, because improved environmental performance encourages sustainable life style in the absence of harming resources (Yusuf et al., 2013). Green innovations through production processes and services which attempt to environmental protection with lessen harmful activities contribute to companies’ enhanced EP (Honkasalo et al., 2005). Adoption of GSCM applications is a necessity to get various environmental and social advantages (Carter and Rogers, 2008; Govindan, 2015). With the help of environmental risk reduction, environmental image development, environmental protection enhancement, green production practices permit companies to improve environmental performance (Halme, 2002).

Collaborative mindset plays important role on to be ‘green’ which results in lessen emissions and harmful waste, lessen pollution, and ecologically designed products (Geffen and Rothenberg, 2000). Bowen et al. (2003) highlight companies’ willingness to create cooperated activities with their suppliers’ including collaborations to implement green management, while Rao and Holt (2005) outline the benefits of GSCM practices to enhance corporate image, make companies more competitive, performance improvements. Although several findings of investigations have pointed out the positive relationship of green practices on the environment (Florida, 1996, Handfiled et al., 2002, Green et al., 1996, Sarkis, 1995) as well as on economic performance (Bowen et al., 2001; Maxwell and van der Vorst, 2003; Rao and Holt, 2005), some investigations – such as the study of Rao, 2002, De Giovanni, 2012, De Giovanni and Esposito Vinzi, 2012 – have differ some of those results. It can be considered that the disjointed consequences may exist because of sectoral dissimilarities or the negligence of some parameters which may affect the linkage between environmental strategies and performance outcomes (Ateş et al., 2012).

### **3.2 Economic Performance**

EC can be one of performance outcomes that motivate a company to be environmentally sound. Economic performance can be the most important pillar for organizations that are willing to apply the green management strategies, especially in countries which have emerging economies. According to Hansmann and Kroger (2001), environmental protective activities can make companies more competitive while providing value creation to core competencies of organizations. In their study, Bowen et al (2001a) argued that economic performance achievement is hard in short-term consideration, to reap expected profitability and sales performance long-term examination can be required. However, there is powerful expectation associated with the effect of GSCM applications on EC improvement. GSCM practices permit companies obtain long term performance thanks to enhanced strategic management

capability by elimination of environmental risks. Because of being ‘green’ is important through its relationship with long-term economic perspective green supply chain management practices attracted attention recently by many companies (Tate et al., 2010; Zhu et al., 2013). Previous investigations pointed out organizations’ green management practices (internal and external) have a positive linkage with an organizations’ EC (Gil et al., 2001, Rao and Holt, 2005; Zhu et al., 2013; Vanalle et al., 2017).

Alvarez Gil et al. (2001) pointed out green environmental management practices has a significant linkage with a companies’ EC (Zhu and Sarkis, 2005). Through GSCM practices, suppliers intend to follow and apply environmental practices in order to have improved performance in line with higher profits and market share which are indicators of economic performance (De Giovanni and Vinzi, 2014).

Through previous research in literature, ‘economic performance’ has measured using different scales. Zhu et al. (2005) measured the cost reduction within the application of internal and external programs; Rao (2002) used economic indicators (e.g., profit, sales, growth margins). Green et al. (1998) used market share, return on investment, growth in market share, growth in sales, growth in return on investment, profit margin on sales, and overall competitive position to measure economic performance. Vickery et al. (2003) outlined pre-tax return on assets, return on investment, and return on sales while evaluating economic performance. Robb et al. (2008) used sales growth, profit and market share, while Rao and Holt (2005) highlighted economic measures associated with increased efficiency, improvement in productivity, new market opportunities, and cost savings. For this study, the selected items to measure Economic Performance are sales (EC1), net profits (EC2), increase in market share (EC3), increase in organizational growth (EC4), enhancement of corporate image (EC5), new market opportunities (EC6), and acquisition of new customers (EC7) (Rao, 2002; Mitra and Datta, 2014).

GSCM practices permit companies produce more with lessen impacts which affect environmental performance. Production with less harmful environmental impact means reaching economies of scale leading to higher demand finally higher profits. From this perspective, having GSCM practices is expected to affect reduce the waste generation which enable companies to reach economies of scale (Ahmed et al., 2018). At the end of successful green management strategy, companies’ image and reputation is enhanced. All green management practices enable firms to obtain long-term benefits within all supply chain activities, that, in turn can result in higher market share (De Giovanni and Vinzi, 2014). As discussed previously, GSCM practices with a longer term adaptation may contribute critical sales growth, return on assets, profit before taxation, and cash flows through working (Ameer and Othman, 2012). Also, effective supplier collaboration has direct effect on EC (Holloos et al., 2012).

Another approach, as a boundary to green supply chain management (e.g. green purchasing practice), companies can face challenging problems which affect the organization economically (Min and Galle, 1997; Cox et al., 1999). While implementing some of green management practices (e.g. eco-design, green purchasing), firms can face some limitations which can bring some additional cost, then,

in turn, bring a negative effect to EC (Cordeiro and Sarkis, 1997; Walley and Whitehead, 1994). Depending on corporate green management practices economic performance results may be conflicting (Wagner et al., 2001). Even though some studies have found positive linkage between EC and green management strategies (Klassen and McCloughlin, 1996; Russo and Fouts, 1997; Judge and Douglas, 1998), other studies have found negative linkage (Cordeiro and Sarkis, 1997; Worrell et al., 1995; Zhu and Sarkis, 2005). The conflicting results may be because of various explanations like data used for the analysis to the definitions of performance that have been run.

### **3.3 Operational Performance**

In today's dynamic and unstable environment, organizations are expected to find new ways to make their production processes efficient and effective in order to enhance their operational performance (Slack et al., 2004).

As discussed previously, taking consideration of environmental concerns into SCM has gained increasing importance by firms in order to obtain competitive advantages and improved corporate performance (Rao and Holt, 2005; Zhu et al., 2008a). Operational performance encompasses the consequences acquired through inimitable operational features (Tan et al., 2007). Furthermore, operational performance outlines some developments accepted by companies as a response to challenging business environment (Flynn et al., 2010). Ho et al. (2002) argued that operational performance consists of features and sources for production activities that can bring competitive advantages which are associated with companies' strategical management capabilities. Operational performance is consistent with the strategic dimensions selected to better competition by any firm (Narasimhan and Das, 2001). It has been concluded that GSCM is a crucial tool to support competitive activities in terms of delivery and quality within SC (Yang et al., 2010). Companies should prefer following collaborative activities with their partners to enhance organizational potential (Lorenzoni and Lipparini, 1999), that, in turn results in enhanced operational outcomes (Porter and van der Linde, 1995; Hart, 1997). Lai and Wong (2012) argued that executing green logistics management (e.g. internal general EM practices) enhance organizations' OP such as product quality and delivery expectations (Yu et al., 2014).

Operational performance can be identified as the performance outcome related with companies' inner operations, such as productivity, product quality, and customer satisfaction (Yu et al., 2014). Green et al. (2012) argued that OP is measured making use of various indicators such as quality, delivery, flexibility, innovation, inventory levels, product quality, product line, capacity utilization, improved efficiency, decreased lead times and improved employee motivation. There is consistency in the literature that quality, delivery, flexibility and cost are the most significant competitive areas (Ward

et al., 1998; Narasimhan and Jayaram, 1998; Pagell and Krause, 2002). For this study, the selected items to measure Operational Performance are increase amount of goods delivered on time (OP1), decrease inventory levels (OP2), decrease scrap rate (OP3), promote products' quality (OP4), increased product line (OP5), improved capacity utilization (OP6) (Zhu et al., 2005; Zhu et al., 2013).

Even though there has been recently developed investigations to express the linkage of GSCM practices with enhanced operational performance; empirical findings to specify this linkage is conflicting (Zhu et al., 2007; Vachon and Klassen, 2008; Green et al., 2012; Lai and Wong, 2012; Zailani et al., 2012). There has not been so many researches to make the GSCM practices effect on operational performance clear. In their study, Vachon and Klassen (2008) concluded positive linkage between environmental collaboration with customers and suppliers and multiple OP measures which are quality, delivery, flexibility and cost (Yu et al., 2014). Tooru (2001) argued that having environmental management system has effect on enhancement of organizations' operational performance. Previous studies implied that a significant linkage between operational and environmental practices within SC (Rothenberg et al., 2001, Simpson and Power, 2005; Seuring and Muller, 2008).

### **3.4 Social Performance**

As previously explained environmental bottom line have been attracting important attention for a long time; however, social bottom line can be considered as a new concept along the SC (Seuring and Muller, 2008). SP is explained as the interpretation of companies' social targets with movements in accordance with the expected social values. Social values consist of development of quality, development of the economic and social conditions of customers, consideration of social responsibilities related with customers, employees, and the community which socially responsible companies' assisted (<http://tblmicrofinance.com>). As mentioned by Lonzano (2008), social sustainability concern has become significant to provide business continuity which including companies' goals additionally to triple bottom line consideration. Social bottom line consideration is expected to contribute companies' competitiveness in line with companies' green practice adaptation (Koplin et al., 2007). Companies are expected to evaluate social concerns in order to reach common value creation targets with their partners (e.g. suppliers and stakeholders) (Dyllick and Hockerts, 2002). With the adaptation of green practices, companies can reach their social goals (e.g. consumer protection and environmentally sound behavior) (Koplin et al., 2007).

Companies can encourage various pillars to involve the community in the 'green' context. Supporting of recyclable products usage providing lessen waste, then, in turn extending communities' health can be considered as examples in this manner. These type of social concern applications permit organizations to achieve environmental and social goals. Companies taking GSCM practices into

consideration to lessen environmental effects are more likely to have positive contribution to society (De Giovanni, 2012).

As mentioned by Khursid and Darzi (2016), incorporating green practices contribute enhanced level of employee satisfaction, better stakeholder affinity, and better employee holding while enhancing the environmental image of company. It is argued that those firms which consider social concerns reinforced their advantages pertaining to customer and employee satisfaction while encouraging the organizations' social performance (Wagner, 2013). According to Pullman et al. (2009), in accordance with social performance companies should make sure that all manufacturing activities encompass the social concerns in line with internal and external communities' (e.g. employees, suppliers, customers) expectations (Zaid, Jaaron, and Bon, 2018).

Corporate social responsibility can be explained in terms of companies' economic, legal, ethical, and discretionary expectations regarding with all stakeholders (Carroll, 1979). Corporate social responsibility can be included three processes as environmental assessment, stakeholder management, and social issues management (Wood, 1991). Environmental assessment permits companies to determine social, economic, and environmental issues and respond to them accordingly (Fahey and Narayanan, 1984). According to Frederick (1994), high standard in corporate social responsibility means higher level of corporate social performance (Bansal, 2005).

As mentioned by Schaltegger et al. (2014), since indicator specification related with the measurement of social performance is not so easy due to complexity of effective items depending on social conditions, it is attempted to establish a set of well-forecasted measures for social performance (Esfahbodi, Zhang, and Watson, 2016). As mentioned by De Giovanni (2012) and Abdullah et al. (2015) employees' health and safety level, improvement societies' health and safety, lessen the adverse impact of products and processes on the local community can be indicators to measure social performance. Maxwell et al. (2006) used the indicators of health and safety benefits to employees and customers, social economy initiatives that have been enhanced, and developed working conditions for employees to measure social performance (De Giovanni, 2012). Maxwell and Van der Vorst (2003) studied the advantages of the sustainable products and utility improvement advance relating with the SP by investigating the starting point of sources used and the equitability of trading arrangements, employment, conditions, impact on the local community, investments in the local community, and adverse impact on health/safety.

It is argued that growing customer awareness on social concern cannot be limited with the careful examination of firms' production activities (Deephouse and Heugens, 2009; Wilkes, 2008). Significantly, continuous outlined media coverage and increasing legal expectations for customer information force companies' supplier management deals to be more transparent. These arrangements

permit consumers to consider social standards in their procurement activities. Within the sustainability concept, customers' expectations related with the social concerns such as workplace safety and operation conditions play crucial role on customers' procurement activities (Drumwright, 1994; Christmann, 2004; Sen and Bhattacharya, 2001; Wilkes, 2008). Carter and Jennings (2004) argued that it is an expectation to shape supplier management policies in a consistency with transparency to customer. In accordance with this expectation, the companies are more likely not only to follow its management activities, but also to determine suppliers based on similar social criteria. Within the sustainability concept, due to stricter customer expectations, companies' social standards related with the supplier selection can be influenced within the greener concept.

Past research alluded to GSCM is not just a tool relating with lessen the environmentally harmful production activities, but also an essential approach to obtain advantages improving social welfare (De Giovanni, 2012). There is also evidence that is a link with green management practices with social performance improvements (De Giovanni, 2012; Zaid, Jaaron, and Bon, 2018).

Lai et al. (2012) pointed out that collaborative mindset formation along with supply chain partners can be crucial in order to select most important GSCM practices that can have effect on improvement of SP of organizations.

In order to provide additional support related with economic advantages of green supply chain management, additionally environmental and operational performance relationships with economic performance will be investigated, separately.

### **3.5 EP and EC**

A companies' capacity points out a greener SCM performance to lessen utilization of materials, energy or water, and to create more ecologically sound settlements by heightening the management of their SCs (Ortas et al., 2014). The most important advantages of environmental management applications along with supply chain is encouraging cost reduction, decreased resource usage and creation of critical competitive advantages (Routroy, 2009). Economic performance can be outlined as a top management priority for companies. Consistent with prior research, it is argued that ecologically responsive activities can enhance companies' goals related with trading (Sharma et al. 2017). Using ecologically sound materials result in reduced energy consumption which means creation of cost advantage, in turn higher level of profit achievement (Rao and Holt, 2005; Melville, 2010; Watson et al., 2010). Ryoo and Koo (2013) argued that organizations can enhance their productivity, cost reduction, and profitability by addressing sustainable performance improvement. Research pointed out a positive linkage between EP and EC (Klassen & Whybark, 1999; Seuring & Muller, 2008; Solovida et al., 2017). Environmental management practices reinforce companies' EC (Tang et al., 2012). Broadly speaking, EC enhancement results from EP enhancement because of waste reducing and sources protection. Even though literature

has some conflicting results related with EM and EC relationship (Klassen and McLaughlin, 1996, Cordeiro and Sarkis, 1997, Rao, 2002), it is expected that environmentally friendly materials usage for minimizing negative impact on environment permit companies to obtain more economic gains by decreasing waste formation. Studies outlined that environmental responsiveness is linked with enhanced financial performance (Orlitzky, Schmidt, and Rynes 2003; Golicic and Smith 2013). Moreover, enhancement of environmental performance can result in enhanced environmental (green) image, in turn, higher profits and sales in a longer term. Due to conflicting results from literature additional investigations must be required (Pakdeechoho and Sukhotu, 2018; Koo, Chung, and Ryoo, 2014; De Giovanni and Vinzi, 2012; Abdallah and Ghwayeen, 2019).

Thus, making use of the literature findings the following hypothesis can be posited:

***H<sub>5</sub>: Environmental performance has a positive effect on economic performance.***

### **3.6 OP and EC**

OP can be evaluated as another performance outcome, but there has not been so many research on it (Corbett and Klassen, 2006). Consistent with prior research it can be highlighted that GSCM practices can enhance EP and EC (Chien and Shih, 2007). Companies ecological responsive practices contribute their operational performance while supporting environmental protection by decreasing consumption of materials and waste production (Porter and Vanderlinde, 1995). Green management practices can enhance resource efficiency which can result in developed EC (Zhang et al., 2012). Operational performance enhancement results from decreased inventory levels and developed product quality in environmentally improved SC collaborative activities can also provide support to companies' EC development (Zhu et al., 2005). Therefore, as mentioned by Zhu et al. (2013), GSCM practices can reinforce EC with the help of improved both of EP and OP development. (Zhu et al. 2013).

Thus, making use of the literature findings the following hypothesis can be posited:

***H<sub>6</sub>: Operational performance has a positive effect on economic performance.***

Companies can make use of GSCM practices to achieve environmental and operational enhancements which result in making more profits (Singh, 2010).

#### 4 EFFECTS OF GSCM ON CORPORATE PERFORMANCE

Principal corporate initiatives including GSCM practices are crucial variables affecting business outcomes (Noble et al., 2002). It is essential within the SC manner since having principal initiatives leads benefits, conducts, and decision-making inner and along the SC (Kirchoff, Tate and Mollenkopf, 2016; Mello and Stank, 2005). In today's competitive and stricter business environment GSCM practices are attracting more attention by researchers, practitioners, and professionals (Saeed et al. 2018; Namagembe, Ryan, and Sridharan, 2019).

Firstly, making use of 186 participants' answer, Zhu and Sarkis (2004) explored associations between GSCM practices and corporate outcomes. Zhu et al. (2005), making use of 314 participants' answer, derived groupings of GSCM practices and outcomes. Using previous research (Zhu and Sarkis, 2004; Zhu et al., 2005), Zhu et al., 2008 developed a conceptual model to explore GSCM practices effect on corporate performance outcomes.

In harmony with older research it is considered that there are associations between GSCM practices and performance outcomes consisting of environmental, economic, operational, and social performance.

Studies have pointed out that GSCM practices are essential to provide advantages for both environmental and economic developments (Chien and Shih, 2007; Ameer and Othman, 2012). As mentioned by Seuring and Muller (2008) all practices of GSCM can be concluded with environmental, economic, and operational developments. Foo et.al (2018) argued that green supply chain management practices have positive effects on economic, environmental and social outcomes.

A review of recent literature revealed that most studies attempted to explore the linkage between green practices and environmental performance (Bowen et al., 2001; Menguc and Ozanne, 2005; Rao and Holt, 2005; Simpson et al., 2007; Vachon and Klassen, 2006; Zhu and Sarkis, 2006). The results of recent studies have evidences that GSCM has positive effects on environmental performance (Zhu et al., 2005; Green et al., 2012; Diab et al., 2015; Kumar et al., 2017). It can be outlined that green supply chain management practices can lessen the final environmental effect by encouraging ecologically sound production within greener context (Peng and Lin, 2007). Therefore, it is argued that environmental management practices have significant association with improved corporate EP (Rao,2002; Vachon and Klassen,2008; Rao and Holt, 2005; Zhu et al., 2005; Green et al., 2012a; Sharma et al., 2017; Theyel, 2000). Literature support for such positive relationship can be said relatively strong. Studies from existing literature has also revealed that supply-chain relations have power on enhanced EP (Florida, 1996; Geffen and Rothenberg, 2000; Sarkis, 1995). In the light of this perception, Geffen and

Rothenberg (2000) argued collaboration with suppliers uphold the acceptance and enhancement of greener common strategy creation with the help of developing technology to provide innovative production. Moreover, close relationships with customers to meet their eco-requirements can result in reinforcements in EP (Zhu et al., 2005). It is stated that closer relationships between suppliers and customers encourage cleaner production which is specified as a trend in manufacturing industry (Florida, 1996a). Understanding partners' expectations, some agreements and jointly developed R&D studies to be greener is expected to result in boosted EP (Zhu and Sarkis, 2004; Zhu et al. 2007b). Green supply chain management applications uphold the EP reducing the consumed water, energy, harmful materials through fabrication while reducing creation of wastes, environmental accidents and enhancement of the health and safety of employee and society (Green et al., 2012; Wilburn Green et al., 2015).

Adoption of GSCM practices lead to reduced waste and hazardous materials, lessen operational costs, encouraged reusing and recycling raw materials, and more efficiently usage of sources (Chien and Shih, 2007; Tsoufas and Pappis, 2006; Sarkis, 2003). GSCM applications within organizations synergistically encourage to thrived EP (Darnall et al., 2008; Zhu et al., 2013). EC development can be derived from EP development because of waste elimination and raw material safekeeping. OP progress in the scope of environmentally protective SC collaborative activities can lead to EC enhancement (Zhu et al., 2005; Zhu et al., 2013).

It is considered that organizations are taking actions in order to shape their environmental behavior within a 'green' context, that in turn, impacts companies' commercial targets (Sharma et al. 2017). Rao and Holt (2005) outlined that as customers are more conscious about environmental protection, environmental behavior attracted attention as a source of competitive advantage. It can be put forward that achievement of increased efficiency, increased market share and corporate profits, enhanced brand image can be latest expectations for companies in order to support their trading objectives. Green supply chain management practices can raise corporate image, boost market share and new market advantages, then, in turn provide improved financial performance (Klassen and McLaughlin 1996; Carter, Kale, and Grimm 2000). EC is considered as top management priority for manufacturers. GSCM is related with EC (Rao and Holt, 2005). Those practices which are associated with GSCM are expected to conclude by increased capability reinforcing economic performance development (Yang et al., 2010). Studies implied that there is a direct connection with increased EP and financial utility (Orlitzky, Schmidt, and Rynes, 2003). Alvarez et al. (2001) argued that EM like GSCM has a precise effect on corporate EC (Zhu et al., 2005). GSCM practices encourage 'win-win' advantages with both EP and economic advantages (Chien and Shih, 2007). Another extent of corporate performance outcomes is OP which has limited study on literature (Corbett and Klassen, 2006; Zhu et al., 2013). Consistent with previous studies, it is implied that GSCM practices have positive effects on economic and operational corporate performances (Klassen and McLaughlin, 1996, Seuring and Muller, 2008). As mentioned by Schoenherr (2012), it is a precise association between SCM practices and OP besides

supporting competitive benefit. Rao (2002) argued that each of internal and external green initiatives can play essential role to shape competitiveness and corporate outcomes. Shi et al. (2012) also pointed out environmental applications are precisely connected with operational and financial corporate outcomes. In the light of above discussions, organizations can make use of GSCM practices to achieve environmental and operational enhancements which result in making more profits (Singh, 2010; Abdallah, and Ghwayeen, 2019).

Even though not so much investigation to point out the precise association between EM and OP, there is still some evidences to express such relationship (Green et al., 2012; Zailani et al., 2012; Zhu et al., 2007). Szwilski (2000) argued that an EM system can be creative environmental policy and information management instrument for development of corporate operational performance. Tooru (2001) considered that EM systems can contribute OP (Zhu et al., 2005). Consistent with previous research it is argued that there is a connection between green supply chain management applications and OP (Zhu et al., 2010; Laosirihongthong et al., 2013; Yu et al., 2014). GSCM practices can enhance the operational performance by contributing output quality, lower inventory levels and desired lead time (Zhu et al., 2010). For example, CWC as a GSCM practice can be effective to minimize process errors and customer complaints. Then, in turn, GSCM practices are expected to result in developed quality and improved delivery time (Yu et al., 2014). Besides, cooperation with partners like customers and suppliers encourages to enhanced response systems. GSCM practices are expected to be efficient in order to provide decreased inventory levels in the scope of operational performance enhancement. GSCM practices permit companies to create cost advantages and decrease lead time with the effect of cooperation with partners, and decrease inventory levels, then, in turn raising operational performance (Zailani et al., 2012a; Laosirihongthong et al., 2013). Improved OP is expected to results in boosted quality, lowered cost, enhanced productivity, and desired product handing over (Kafetzopoulos et al., 2015).

As mentioned by Schaltegger et al. (2014), since indicator specification related with the measurement of social performance is not so easy due to complexity of effective items depending on social conditions, it was attempted to establish a set of well-forecasted dimensions for SP (Esfahbodi, Zhang, and Watson, 2016). ‘‘Triple Bottom Line’’ is a specified idea which overlaps the social and economic performance in companies’ success besides with their traditional economic bottom line. Social dimensions of TBL can be evaluated by considering firms which are trying to adopt GSCM practices, being viewed as socially responsible firms furnishing to the SP (Lee et al., 2012).

The enhancement in companies’ outputs depend on the acceptance of GSCM practices (Jabbour et al., 2015). Klassen and McLaughlin (1996), Zhu and Sarkis (2004), Rao and Holt (2005), Gunasekaran and Spalanzani (2012), Hollos, Blome, and Foerstl (2012), and Zhu, Sarkis, and Lai (2012) also found a precise influence of green supply chain management practices on corporate performance

outcomes. Golicic and Smith (2013), with the help of their meta-analysis, pointed out a crucial positive linkage between green supply chain management practices and corporate performance outcomes (Mitra and Datta, 2014). Zhu and Sarkis (2004) pointed out a precise association between GSCM practices and corporate performance (De Giovanni, 2012).

Thus, making use of the literature findings the following hypotheses can be posited:

***H<sub>1</sub>*: There is a positive effect of GSCM practices on firms' environmental performance.**

***H<sub>2</sub>*: There is a positive effect of GSCM practices on firms' economic performance.**

***H<sub>3</sub>*: There is a positive effect of GSCM practices on firms' operational performance.**

***H<sub>4</sub>*: There is a positive effect of GSCM practices on firms' social performance.**

## 5 RESEARCH DESIGN AND METHODOLOGY

### 5.1 Research Model

Making use of the previous studies, the conceptual model, depicted in Fig. 1, is flourished to identify the associations linking five underlying green supply chain management practices (IEM, ECO, GP, IR, and CC) to the performance outcomes which are gained from the application of these practices by food manufacturing businesses.

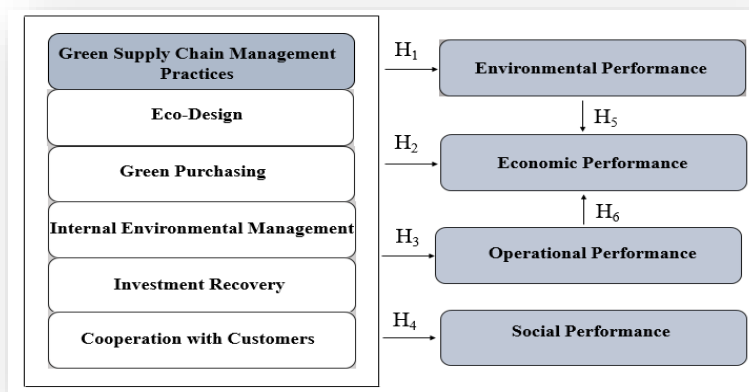


Figure 1. Proposed Research Model

### 5.2 Research Objective

This study developed a research model linking GSCM practices to a firm's performance. The relationships between GSCM practices and performance outcomes are proposed to assess the effect of GSCM application on the firm's performance. The proposed model is a path analytical framework with five scales (outlined in Fig. 1): GSCM practices, EP, EC, OP, and SP. The five GSCM practices outline main internal and external activities and functions within green SCM, while other constructs lie on performance outcomes (Zhu and Sarkis, 2004; Rao, 2002; Zhu et al., 2008a; Paulraj, 2011; Mitra and Datta, 2014). Each of the hypotheses is proposed as being direct and positive.

To sum up, this research outlines the body of knowledge on GSCM and performance through a conceptual model that appraises the strength of GSCM practices on performance outcomes.

### **5.3 Sample and Data**

Sample was gathered from executives who employ in different companies within food industry. 180 employees participated to the questionnaire. Executives who participated to instrument development study were invited for their voluntary participation and data collection was in line with voluntary survey research. Google Forms Survey was conducted for data collection. Three questionnaire forms were exhort to each respondent. Due to adaptation of measurement scales to the literature in English, real scales were initially created in English and then translated to Turkish for survey application process. After this translation process was completed, the last version of the questionnaire was presented to executives from real industry to get their recommendations related with the survey items to make it clear (face validity). Based on real executives' feedbacks, if required, wordings of some questions were modified. All this process ensured the reliability of prepared survey.

### **5.4 Design of Questionnaire**

Five scales were used to measure variables. The first questionnaire consisting of 34 questions was to measure GSCM practices. GSCM practices consist of five subgroups namely eco-design, composed of four questions; internal environmental management, composed of seven questions; green purchasing, composed of thirteen questions; investment recovery, composed of four questions, and cooperation with customers, composed of six questions. The second scale was intended to measure firms' environmental performance level composed of 6 questions. The third scale was intended to measure firms' economic performance level composed of 7 questions. The fourth scale was intended to measure firms' operational performance level composed of 6 questions. The last 5 questions were to measure social performance scale.

Participants were invited to assess the effectiveness level of performance development provided by application of GSCM practice indicators by using 5-point Likert scale ranging from 1=Strongly disagree, to 5=Strongly agree.

### **5.5 Survey Instruments**

In terms of association between GSCM practices and firm performance, previously-conducted studies was surveyed to select valid measures and decide theoretical constructs. In the scope of this study, GSCM practice and performance indicators mostly were adopted from older studies. Following the past research, the measurement items for GSCM practices, namely eco-design, IEM, GP, IR, and CC were adopted from Zhu and Sarkis (2004), Zhu et al. (2005), Zhu et al. (2008) and Zhu et al. (2013), which converged on the EM practices applied by businesses. In order to determine measures of GSCM practices, measurement items for ECO, IEM, IR, and CC were adopted directly from Zhu et al. (2008)

and Zhu et al. (2013). In order to develop the measurement items of green purchasing, additionally to Zhu et al.'s studies Paulraj (2011) and Mitra and Datta (2014) studies were utilized.

The measures for performance outcomes were adopted from Zhu et al. (2005), Zhu et al. (2008), Zhu et al. (2013). These studies developed measurement models to examine GSCM practices on performance outcomes for any firm. According to the results of these studies, three performance outcomes were underlied as environmental, economic, and operational performances. In this study, three dimensions of performance outcomes were selected, but as discussed previously, it is recognised that additionally to these three dimensions there is one more dimension of performance which is social performance. It is utilized additional items from additional studies (which explained as follows) and added to the proposed model as a social dimension of performance.

In the scope of measurement of economic performance Rao (2002) used indicators of new market opportunities, profit margins, market share, sales, and increase in product price. Four indicators were extracted from this study to measure economic performance scale which are sales, net profits, market share, and new market opportunities. Mitra and Datta (2014) followed the study of Rao (2002) and used items of increase in market share, penetration of new markets, acquisition of new customers, increase in organizational growth, enhancement of corporate image. Green et al. (1998) used items of market share, growth in market share, growth in sales, profit margin on sales. Robb et al. (2008) used items of sales growth, profit and market share, To explain economic measures linked to improved efficiency, in the light of all these studies, the indicators selected to measure economic performance are sales, net profits, increase in market share, increase in organizational growth, enhancement of corporate image, new markets opportunities, and acquisition of new customers.

EP can be measured by indicators covering improvements along dimensions such as air emission, waste, consumption of hazardous materials, environmental accidents and energy savings. OP can be measured by indicators tapping the dimensions of increased amount of goods delivered on time, decreased inventory levels, decreased scrap rate, promoted products' quality, increased product lines, improved capacity utilization. Finally, SP can be measured using improved indicators covering improvements along dimensions including social welfare and betterment, community health and safety, risks to the general public and occupational health and safety of employees, improved awareness and protection of the claims and rights of people in community served.

Making use of above explanations, environmental performance was measured with 6 items which were adopted from Zhu and Sarkis (2004), Zhu et al. (2005), Zhu et al. (2008), and Zhu et al. (2013). Similarly, 6 items of operational performance were adopted from Zhu et al. (2005) and Zhu et al. (2013).

Economic performance was measured with 7 items as explained previously. Finally, 5 items of social performance were adopted from Bansal (2005) and Paulraj (2011).

At the end of literature review, to develop the measures, it is embraced totally 58 items in the constructed questionnaire set. The concluded measurement items for assessment of GSCM practices and performance outcomes are reported in Table 2 with their sources.

**Table 2. Questionnaire Items**

Constructs		Items and Abbreviations	Source
<b>Green Supply Chain Management Practices</b>	Eco-Design	Our company emphasizes design of products for reduced consumption of material/energy ( <b>ECO1</b> )	Zhu et al,2004
		Our company emphasizes design of products for reuse, recycle, recovery of material, component parts ( <b>ECO2</b> )	Zhu and Sarkis,2004
		Our company emphasizes design of products to avoid or reduce use of hazardous products/or their manufacturing process ( <b>ECO3</b> )	Zhu et al,2008
		Our company emphasizes design of processes for minimization of waste ( <b>ECO4</b> )	Zhu et al, 2013
	Internal Environmental Management	Our managers in our company support for green supply chain management ( <b>IEM1</b> )	Zhu et al,2004
		Our company emphasizes special training for workers on environmental issues ( <b>IEM2</b> )	
		Our company emphasizes Eco-labeling of products ( <b>IEM3</b> )	Zhu and Sarkis,2004
		Our company emphasizes cross functional cooperation for environmental improvements ( <b>IEM4</b> )	
		Our company has pollution prevention plans ( <b>IEM5</b> )	Zhu et al,2008
		Our company's internal performance evaluation system incorporates environmental factors ( <b>IEM6</b> )	Zhu et al, 2013
		Our company generates environmental reports for internal evaluation ( <b>IEM7</b> )	
	Green Purchasing	Providing design specification to suppliers that include environmental requirements for purchased item ( <b>GP1</b> )	Zhu et al,2008
		Suppliers are selected based on their ability to support our environmental objectives ( <b>GP2</b> )	
		We encourage our suppliers to get their ISO 14000 certification ( <b>GP3</b> )	
		Our company emphasizes adopting just-in-time logistics system ( <b>GP4</b> )	Paulraj,2011
		Suppliers are selected using environmental criteria ( <b>GP5</b> )	Zhu et al, 2013
		Our company cooperates with supplier to reduce packaging ( <b>GP6</b> )	
		It is important to use environmental packaging (degradable and non-hazardous) as a supplier selection criteria ( <b>GP7</b> )	Mitra and Datta,2014
		We select suppliers based on their technical and eco-design capability ( <b>GP8</b> )	
		We encourage our suppliers to develop new source reduction strategies ( <b>GP9</b> )	

		We collaborate with our suppliers to provide materials,equipment, parts and/or services that support our environmental goals <b>(GP10)</b>		
		We periodically evaluate our suppliers' environmentally friendly practices <b>(GP11)</b>		
		Our company emphasizes educating and generating awareness among suppliers <b>(GP12)</b>		
		Our company emphasizes helping suppliers set up environment-friendly practices <b>(GP13)</b>		
	Investment recovery	Our company emphasizes investment recovery (sale) of excess inventories/materials <b>(IR1)</b>		<b>Zhu et al,2004 Zhu and Sarkis,2004 Zhu et al,2008 Zhu et al,2013</b>
		Our company emphasizes sale of scrap or used materials/equipment <b>(IR2)</b>		
		Our company emphasizes collecting and recycling end-of-life products and materials <b>(IR3)</b>		
		Our company emphasizes establishing a recycling system for used and defective products <b>(IR4)</b>		
	Cooperation with Customers including environmental requirements	Our company cooperates with customers for eco design <b>(CC1)</b>		<b>Zhu et al,2008  Zhu et al,2013</b>
		Our company cooperates with suppliers for cleaner production <b>(CC2)</b>		
		Our company cooperates with customers for green packaging <b>(CC3)</b>		
		Cooperation with customers for using less energy during product transportation <b>(CC4)</b>		
		Our company cooperates with customers for product take back <b>(CC5)</b>		
Cooperations with customers for reverse logistics relationships <b>(CC6)</b>				
<b>Environmental Performance</b>	Reduction of air emission <b>(EP1)</b>	<b>Zhu et al,2004 Zhu and Sarkis,2004 Zhu et al,2008 Zhu et al,2013</b>		
	Reduction of waste water <b>(EP2)</b>			
	Reduction of solid wastes <b>(EP3)</b>			
	Decrease of consumption for hazardous/harmful/toxic materials <b>(EP4)</b>			
	Decrease of frequency for environmental accidents <b>(EP5)</b>			
	Improve a company's environmental situation <b>(EP6)</b>			
<b>Operational Performance</b>	Increase amount of goods delivered on time <b>(OP1)</b>	<b>Zhu et al,2005  Zhu et al,2013</b>		
	Decrease inventory levels <b>(OP2)</b>			
	Decrease scrap rate <b>(OP3)</b>			
	Promote products' quality <b>(OP4)</b>			
	Increased product line <b>(OP5)</b>			
	Improved capacity utilization <b>(OP6)</b>			
<b>Economic performance</b>	Sales <b>(EC1)</b>	<b>Rao, 2002  Mitra and Datta,2014</b>		
	Net Profits <b>(EC2)</b>			
	Increase in Market Share <b>(EC3)</b>			
	Increase in organizational growth <b>(EC4)</b>			
	Enhancement of corporate image <b>(EC5)</b>			
	New Market Opportunities <b>(EC6)</b>			
	Acquisition of new customers <b>(EC7)</b>			
<b>Social performance</b>	Improvement in overall stakeholder welfare or betterment <b>(SP1)</b>	<b>Bansal,2005  Paulraj,2011</b>		
	Improvement in community health and safety <b>(SP2)</b>			
	Reduction in environmental impacts and risks to general public <b>(SP3)</b>			
	Improvement in occupational health and safety of employees <b>(SP4)</b>			
	Improved awareness and protection of the claims and rights of people in community served <b>(SP5)</b>			

## 6 RESEARCH FINDINGS

In this section, depending on answers of implemented online questionnaire, descriptive statistics to analyze demographic variables are presented in the scope of understanding profiles of respondents' in detail and hypotheses are tested to understand real relationships.

### 6.1 Descriptive Statistics for Demographic Variables

Descriptive statistics were applied for demographic variables starting with gender variable. Other variables, marital status, education level, income level, age, experiences in related positions, operating markets, positions were measured, respectively. Frequencies and percentages of the data are displayed in the following tables.

#### 6.1.1 Gender

Female respondents consisted of 77 subjects (42.8%) and male respondents consisted of 103 subjects (57.2%). Gender representation of the sample is displayed in the Table 3.

**Table 3. Gender**

	Gender	
	Frequency	Percentage
Female	77	42.8
Male	103	57.2
<b>Total</b>	<b>180</b>	<b>100</b>

#### 6.1.2 Marital Status

Marital status of the sample consisted of 130 married participants (72.2%), while single participants consisted of 50 (27.8%). The frequencies and percentages of the marital status are displayed in the Table 4.

**Table 4. Marital Status**

	Marital Status	
	Frequency	Percentage
Married	130	72.2
Single	50	27.8
<b>Total</b>	<b>180</b>	<b>100</b>

### 6.1.3 Education Level

Education level of the respondents consist of five groups. The groups were determined as high school, associate, bachelor, master's degree and doctorate. In the sample 96 participants (53.3%) hold bachelor's degrees. Percentages of high school, associates, masters and PhD were 7 (3.9%), 4 (2.2%), 71 (39.4%), and 2 (1.1%) respectively. Frequencies and percentages of education level are stated in the Table 5.

**Table 5. Education Level**

	Education Level	
	Frequency	Percentage
High School	7	3.9
Associate	4	2.2
Bachelor	96	53.3
Master's Degree	71	39.4
Doctorate	2	1.1
<b>Total</b>	<b>180</b>	<b>100</b>

### 6.1.4 Income Level

Five groups were determined for income level. Income level ranged from 5000 TL and less to 20001 TL and more. Most of the participants have 5001-10000 TL income level (38.3%). The rest of them were 5000 TL and less, 10001-15000 TL, 15001-20000 TL and 20001 TL and more with participants numbers as 27 (15%), 36 (20%), 22 (12.2%) and 26 (14.4%) respectively. Frequencies and percentages are displayed in the Table 6.

**Table 6. Income Level**

	Income Level	
	Frequency	Percentage
5000 TL or less	27	15.0
5001-10000	69	38.3
10001-15000	36	20.0
15001-20000	22	12.2
20001 TL or more	26	14.4
<b>Total</b>	<b>180</b>	<b>100</b>

### 6.1.5 Age

The Table 7 shows the mean and standard deviation values of age distribution for the survey respondents.

**Table 7. Age Distribution**

	<b>Mean</b>	<b>Std. Deviation</b>
<b>Age</b>	37.81	8.81
<b>Total</b>	<b>180</b>	

### **6.1.6 Experience in related position**

Five groups were determined for experience in related positions. Year of experience ranged from 5 years or and less to 21 years and more. Majority of the participants have 5-10 years of experience (55%). The rest of them were 5 years or less, 11-15 years, 16-20 years and 21 years and more with participants numbers as 48 (26.7%), 38 (21.1%), 21 (11.7%) and 18 (10.0%) respectively. Frequencies and percentages are stated in the Table 8.

**Table 8. Experience in related position**

	<b>Experience</b>	
	<b>Frequency</b>	<b>Percentage</b>
5 years or less	48	26.7
5-10 years	55	30.6
11-15 years	38	21.1
16-20 years	21	11.7
21 years or more	18	10.0
<b>Total</b>	<b>180</b>	<b>100</b>

### **6.1.7 Market**

Three groups were determined for market as domestic, overseas, and both of them. Majority of the participants have operations as domestic and overseas, both of them (88.9%). The rest of them were only domestic and only overseas as 15 (8.3%) and 5 (2.8%) respectively. Frequencies and percentages are stated in the Table 9.

**Table 9. Market**

	<b>Market</b>	
	<b>Frequency</b>	<b>Percentage</b>
Domestic	15	8.3
Overseas	5	2.8
Both	160	88.9
<b>Total</b>	<b>180</b>	<b>100</b>

### 6.1.8 Position

To appraise reliance to their answers, participants were invited to point out how long they had worked in the food industry. Six groups were determined for positions: assistant specialist/specialist, CEO, director, general manager, manager, senior executive. Majority of the participants were assistant specialist/specialist (63%) and managers (52%). The rest of them were CEO, director, general manager and senior executive with participants numbers as 4 (2.2%), 17 (9.4%), 11 (6.1%) and 33 (18.3%), respectively. Frequencies and percentages are stated in the Table 10.

**Table 10. Position**

	Position	
	Frequency	Percentage
Assistant Specialist/Specialist	63	35.0
CEO	4	2.2
Director	17	9.4
General Manager	11	6.1
Manager	52	28.9
Senior Executive	33	18.3
<b>Total</b>	<b>180</b>	<b>100</b>

## 6.2 Factor and Reliability Analyses

Factor analysis was employed to reduce the data in order to determine key dimensions that explained the variance. In this study, with the aim of minimization the complexity of the constructs EFA was implemented using SPSS 23.0. According to Hair et al. (2006), factor loadings of 0.50 or more can be evaluated particularly to be significant. The validity and reliability of the multiple-item constructs were confirmed by testing each scale with Cronbach's alpha and EFA. The total variance percentage can be utilized to explain how well a significant factor accounts for what all the variables together correspond. According to Hair et al. (2006), reliability can be controlled using Cronbach's alpha test, which depicted a value larger than 0.70, ensuring an acceptable degree of internal consistency for all constructs. Cronbach alpha values above the limit of 0.70 posited by Nunnally (1978) to check the constructs' internal consistency and validity. Kaiser-Meyer-Olkin and Bartlett's test of sphericity were used to test the suitability of the correlation among variables. KMO=0.50 and higher indicate that factor analysis is suitable to be performed. Significance level of Bartlett's test of sphericity should be lesser than 0.05, showing that the correlation among variables are adequate.

### 6.2.1 Factor and Reliability Analyses of GSCM Practices

GSCM Practices variables were reduced into five factors by using an exploratory factor analysis. In order to extract a common score, however, eight of the items that had low factor loadings were determined. The items which are stated in the Table 11 were excluded respectively. Item; 'Our company

emphasizes design of processes for minimization of waste” (ECO4), in eco-design. Items “Our managers in our company support for green supply chain management” (IEM1), “Our company emphasizes cross functional cooperation for environmental improvements” (IEM4), and “Our company has pollution prevention plans” (IEM5) in internal environmental management. Items; “Suppliers are selected based on their ability to support our environmental objectives” (GP2), “We encourage our suppliers to get their ISO 14000 certification” (GP3), “Our company emphasizes adopting just-in-time logistics system” (GP4) in green purchasing. Cooperation with customers construct one item; “Cooperation with customers for using less energy during product transportation” (CC4).

**Table 11. Excluded Items of Green Supply Chain Management Practices**

<b>Items</b>
“Our company emphasizes design of processes for minimization of waste” (ECO4)
“Our managers in our company support for green supply chain management” (IEM1)
“Our company emphasizes cross functional cooperation for environmental improvements” (IEM4)
“Our company has pollution prevention plans” (IEM5)
“Suppliers are selected based on their ability to support our environmental objectives” (GP2)
“We encourage our suppliers to get their ISO 14000 certification” (GP3)
“Our company emphasizes adopting just-in-time logistics system” (GP4)
“Cooperation with customers for using less energy during product transportation” (CC4)

Factor analysis was implemented again after every item was deleted. Kaiser-Mayer-Olkin test measured sampling adequacy for each variable and for the complete model yielding the result as (KMO=0.948), while Bartlett’s test yielded adequate value (p=0.000) of the significance level indicating the appropriateness for factor analysis. 25 highly correlated items were grouped under five factors where the items were found to be correlated within factor level. Five factors, namely Eco-Design, IEM, GP, IR, and CC. The five key green supply chain management dimensions identified labeled for approximately 77 percent of total variance. For each factor reliability analyses were applied, separately. The total variance identified by the factors for all the construct confirms the realistic denotation of the factors (Hair et al., 2010). Cronbach’s alpha scores for the GSCM practices are high, ranging from 0.85 to 0.95. As a conclusion, the overall reliability for the constructs on green SCM practices found as acceptable (Nunnally, 1978; Litwin, 1995).

The details of the factor and reliability analyses are displayed in the Table 12 as follows.

**Table 12. Factor and Reliability Analyses of Green Supply Chain Management Practices**

Factor Name	Factor Item	Factor Loading	Variance (%)	Reliability
Green Purchasing (GP)	GP10	0.768	24.545	0.954
	GP11	0.760		
	GP13	0.753		
	GP9	0.740		
	GP12	0.729		
	GP8	0.631		
	GP7	0.614		
	GP5	0.605		
	GP6	0.574		
	GP1	0.538		
Cooperation with Customers including environmental requirements(CWC)	CC3	0.744	15.347	0.937
	CC2	0.716		
	CC1	0.695		
	CC5	0.649		
	CC6	0.629		
Investment Recovery (IR)	IR2	0.864	15.295	0.905
	IR3	0.810		
	IR4	0.796		
	IR1	0.739		
Internal Environmental Management (IEM)	IEM2	0.731	12.535	0.825
	IEM6	0.722		
	IEM3	0.621		
Eco-Design (ECO)	ECO1	0.821	9.409	0.851
	ECO2	0.631		
	ECO3	0.532		
<b>Kaiser-Meyer-Olkin Measure of Sampling Adequacy.</b>				0.948
<b>Bartlett's Test of Sphericity</b>	<b>App. Chi-Square</b>		4255.46	
	<b>df</b>		300	
	<b>p-value</b>		0.000	

### 6.2.2 Factor and Reliability Analyses of Environmental Performance

Factor analysis extracted only one component for 6 items of environmental performance as expected.

Only one dimension was determined, (KMO=0.898), and Bartlett's test yielded small value (p=0.000) of the significance level. 79.772% of the total variance was explained with that factor, which found to be consistent in terms of Cronbach's Alpha value ( $\alpha=0.949$ ). The details of the factor and reliability analyses are displayed in the Table 13.

**Table 13. Factor and Reliability Analyses of Environmental Performance**

Factor Name	Factor Item	Factor Loading	Variance (%)	Reliability
Environmental Performance (EP)	EP2	0.923	79.772	0.949
	EP4	0.917		
	EP3	0.905		
	EP1	0.874		
	EP6	0.872		
	EP5	0.867		
<b>Kaiser-Meyer-Olkin Measure of Sampling Adequacy.</b>				0.898
<b>Bartlett's Test of Sphericity</b>	<b>App. Chi-Square</b>			1091.054
	<b>df</b>			15
	<b>p-value</b>			0.000

### 6.2.3 Factor and Reliability Analyses of Economic Performance

Factor analysis extracted only one component for 7 items of economic performance as expected.

Only one dimension was determined, (KMO=0.905), and Bartlett's test yielded small value ( $p=0.000$ ) of the significance level. 76.117% of the total variance was explained with that factor, which found to be consistent in terms of Cronbach's Alpha value ( $\alpha=0.946$ ). The details of the factor and reliability analyses are indicated in the Table 14.

**Table 14. Factor and Reliability Analyses of Economic Performance**

Factor Name	Factor Item	Factor Loading	Variance (%)	Reliability
Economic Performance (EC)	EC3	0.911	76.117	0.946
	EC2	0.890		
	EC7	0.889		
	EC6	0.886		
	EC1	0.854		
	EC4	0.840		
	EC5	0.834		
<b>Kaiser-Meyer-Olkin Measure of Sampling Adequacy.</b>				0.905
<b>Bartlett's Test of Sphericity</b>	<b>App. Chi-Square</b>			1243.47
	<b>df</b>			21
	<b>p-value</b>			0.000

### 6.2.4 Factor and Reliability Analyses of Operational Performance

Factor analysis extracted only one component for 6 items of operational performance as expected.

Only one dimension was determined, (KMO=0.892), and Bartlett's test yielded small value ( $p=0.000$ ) of the significance level. 73.821% of the total variance was explained with that factor, which

found to be consistent in terms of Cronbach's Alpha value ( $\alpha=0.927$ ). The details of the factor and reliability analyses are indicated in the Table 15.

**Table 15. Factor and Reliability Analyses of Operational Performance**

Factor Name	Factor Item	Factor Loading	Variance (%)	Reliability
Operational Performance (OP)	OP1	0.886	73.821	0.927
	OP4	0.884		
	OP3	0.875		
	OP6	0.853		
	OP5	0.831		
	OP2	0.824		
<b>Kaiser-Meyer-Olkin Measure of Sampling Adequacy.</b>				0.892
<b>Bartlett's Test of Sphericity</b>	<b>App. Chi-Square</b>		818.132	
	<b>df</b>		15	
	<b>p-value</b>		0.000	

### 6.2.5 Factor and Reliability Analyses of Social Performance

Factor analysis extracted only one component for 5 items of social performance as expected.

Only one dimension was determined, (KMO=0.866), and Bartlett's test yielded small value ( $p=0.000$ ) of the significance level. 82.506% of the total variance was explained with that factor, which found to be consistent in terms of Cronbach's Alpha value ( $\alpha=0.943$ ). The details of the factor and reliability analyses are indicated in the Table 16.

**Table 16. Factor and Reliability Analyses of Social Performance**

Factor Name	Factor Item	Factor Loading	Variance (%)	Reliability
Social Performance (SP)	SP2	0.947	82.506	0.943
	SP3	0.935		
	SP4	0.927		
	SP5	0.924		
	SP1	0.801		
<b>Kaiser-Meyer-Olkin Measure of Sampling Adequacy.</b>				0.866
<b>Bartlett's Test of Sphericity</b>	<b>App. Chi-Square</b>		947.451	
	<b>df</b>		10	
	<b>p-value</b>		0.000	

### 6.3 Regression and Correlation Analysis

In order to determine how variables are related with each other, both bivariate correlation and simple/multiple regression analyses were conducted.

### 6.3.1 Correlation Analysis

As it is stated below in the Table 17, ECO, GP, IEM, IR, and CC show linear and strong correlation with EP, EC, OP, and SP.

**Table 17. Pearson Correlation Results of the Constructs**

	GP	CC	IR	IEM	ECO	EP	EC	OP	SP
GP	1								
CC	0.830**	1							
IR	0.597**	0.642**	1						
IEM	0.766**	0.706**	0.539**	1					
ECO	0.764**	0.719**	0.603**	0.681**	1				
EP	0.584**	0.658**	0.573**	0.567**	0.575**	1			
EC	0.424**	0.501**	0.564**	0.481**	0.446**	0.605**	1		
OP	0.507**	0.564**	0.675**	0.492**	0.477**	0.736**	0.786**	1	
SP	0.526**	0.554**	0.559**	0.551**	0.511**	0.669**	0.732**	0.758**	1

\*\* . Correlation is significant at the 0.01 level (2-tailed).

### 6.3.2 Regression Analysis

Hierarchical regression analysis can be used to test the hypotheses, as the method which can be suitable for testing a simple model with a few independent and dependent variables (Lowry and Gaskin, 2014). After completion of factor analysis, in order to determine how variables are related, also with the aim of test the hypothesised relationships, simple/multiple regression analyses were conducted.

#### 6.3.2.1 Multiple Regression Analysis of GSCM Practices and EP

Regression analysis which tests statistically the relationship between variables was applied. Multiple regression analysis was used to measure the impact of independent variables on EP. The results are stated in the Table 18.

**Table 18. Multiple Regression Analysis of CC, IR, IEM and EP**

<b>Dependent Variable: Environmental Performance</b>				
<b>Independent Variables:</b>	Beta	t-value	p-value	VIF
Cooperation with Customers	0.393	4.622	0.000	2.471
Investment Recovery	0.232	3.253	0.001	1.745
Internal Environmental Management	0.164	2.124	0.035	2.047

**R= 0.697; R<sup>2</sup>= 0.485; F value=55.279; p value=0.000**

Table 18 shows statistically significant results with the values (R=0.697, R<sup>2</sup>=0.485, p=0.000) that indicate a correlation between independent variables CC, IR, IEM and EP, explaining 48.5% variation

of the environmental performance.  $R^2$  values of the dependent variable can be evaluated as the explanatory power of proposed model. Independent variables have a positive effect on EP. Therefore,  $H_1$  is partially supported.

Table 18 above includes that VIF values are 2.471, 1.745, and 2.047 for CC, IR, and IEM. Since VIF values are less than the value of 10, there is no multicollinearity problem between independent variables. Further, according to regression coefficients it can be concluded that cooperation with customers ( $\beta=0.393$ ) is a more affective variable to explain environmental performance, rather than investment recovery ( $\beta=0.232$ ). But, results show that cooperation with customers and investment recovery are together more affective variables to explain environmental performance, rather than internal environmental management which of the Beta value is 0.164.

### 6.3.2.2 Multiple Regression Analysis of GSCM Practices and EC

Regression analysis which tests statistically the relationship between variables was applied. Multiple regression analysis was used to measure the impact of independent variables on EC. The results are stated in the Table 19.

**Table 19. Multiple Regression Analysis of IR, IEM and EC**

<b>Dependent Variable:</b> Economic Performance				
<b>Independent Variables:</b>	Beta	t-value	p-value	VIF
Investment Recovery	0.430	6.029	0.000	1.410
Internal Environmental Management	0.249	3.489	0.001	1.410
<b>R=0.602; R<sup>2</sup>=0.362; F value=50.208; p value=0.000</b>				

Table 19 shows statistically significant results with the values ( $R=0.602$ ,  $R^2=0.362$ ,  $p=0.000$ ) that indicate a correlation between independent variables IR, IEM and EC, explaining 36.2% variation of the economic performance. Therefore, it can be considered as independent variables investment recovery and IEM have a positive impact on EC. Independent variables have a positive effect on economic performance. Therefore,  $H_2$  is partially supported.

Table 19 above includes that VIF value is 1.410 for both of independent variables. Since VIF values are less than the value of 10, there is no multicollinearity problem between independent variables. Further, according to regression coefficients it can be considered that investment recovery ( $\beta=0.430$ ) is a more affective variable to explain economic performance, rather than internal environmental management ( $\beta=0.249$ ).

### 6.3.2.3 Multiple Regression Analysis of GSCM Practices and OP

Regression analysis which tests statistically the relationship between variables was implemented. Multiple regression analysis was used to measure the impact of independent variables on OP. The results of analysis are stated in the Table 20.

**Table 20. Multiple Regression Analysis of IR, CC and OP**

<b>Dependent Variable:</b> Operational Performance				
<b>Independent Variables:</b>	Beta	t-value	p-value	VIF
Investment Recovery	0.532	7.567	0.000	1.702
Cooperation with Customers	0.222	3.160	0.002	1.702

**R=0.696; R<sup>2</sup>=0.485; F value=83.357 p value=0.000**

Table 20 shows statistically significant results with the values (R=0.696, R<sup>2</sup>=0.485, p=0.000) that indicate a correlation between independent variables IR, CC and OP, explaining 48.5% variation of the operational performance. Therefore, it can be concluded as independent variables investment recovery and CC have a positive effect on OP. Independent variables have a positive effect on operational performance. Therefore, H<sub>3</sub> is partially supported.

Table 20 above includes that VIF value is 1.702 for both of independent variables. Since VIF values are less than the value of 10, there is no multicollinearity problem between independent variables. Further, according to regression coefficients it can be concluded that investment recovery ( $\beta=0.532$ ) is a more affective variable to explain operational performance, rather than cooperation with customers ( $\beta=0.222$ ).

### 6.3.2.4 Multiple Regression Analysis of GSCM Practices and SP

Regression analysis which tests statistically the relationship between variables was implemented. Multiple regression analysis was used to measure the impact of independent variables on SP. The results are stated in the Table 21.

**Table 21. Multiple Regression Analysis of IR, IEM and SP**

<b>Dependent Variable:</b> Social Performance				
<b>Independent Variables:</b>	Beta	t-value	p-value	VIF
Investment Recovery	0.369	5.334	0.000	1.410
Internal Environmental Management	0.352	5.092	0.000	1.410

**R=0.632; R<sup>2</sup>=0.40; F value=58.992; p value=0.000**

Table 21 shows statistically significant results with the values (R=0.632, R<sup>2</sup>=0.40, p=0.000) that indicate a weak correlation between independent variables IR, IEM and SP, explaining 40% variation of the social performance. Therefore, it can be concluded as independent variables investment recovery and

IEM have a positive impact on SP. Independent variables have a positive effect on SP. Therefore,  $H_4$  is partially supported.

Table 21 above includes that VIF value is 1.410 for both of independent variables. Since VIF values are less than the value of 10, there is no multicollinearity problem between independent variables. Further, according to regression coefficients it can be concluded that investment recovery ( $\beta=0.369$ ) is a more affective variable to explain social performance, rather than internal environmental management ( $\beta=0.352$ ).

### 6.3.2.5 Simple Regression Analysis of Environmental Performance and EC

The proposed impact of EP on EC was found as statistically significant since p-value is 0.000 showing that the hypothesis  $H_5$  should be accepted.

**Table 22. Simple Regression Analysis of Environmental Performance and Economic Performance**

<b>Dependent Variable: Economic Performance</b>			
<b>Independent Vairable:</b>	Beta	t-value	p-value
Environmental Performance	0.605	10.144	0.000
<b>R=0.605; R<sup>2</sup>=0.366; F value=102.909; p value=0.000</b>			

Table 22 shows statistically significant results with the values (R=0.605, R<sup>2</sup>=0.366, p value=0.000) indicating relationship between EP and EC. Therefore, hypothesis below is supported.

**$H_5$ : EP has a positive effect on EC.**

According to regression coefficient it can be considered that environmental performance ( $\beta=0.605$ ) is an affective variable to explain economic performance, as expected. Economic performance can be explained by environmental performance.

### 6.3.2.6 Simple Regression Analysis of OP and EC

The proposed effect of OP on economic performance was found as statistically significant since p-value is 0.000 showing that the hypothesis  $H_6$  should be accepted.

**Table 23. Simple Regression Analysis of Operational Performance and Economic Performance**

<b>Dependent Variable: Economic Performance</b>			
<b>Independent Vairable:</b>	Beta	t-value	p-value
Operational Performance	0.786	16.948	0.000
<b>R=0.786; R<sup>2</sup>=0.617; F value=287.248 p value=0.000</b>			

Table 23 shows statistically significant results with the values (R=0.786, R<sup>2</sup>=0.617, p value=0.000) indicating association between OP and EC. Therefore, hypothesis below is supported.

***H<sub>6</sub>: Operational performance has a positive effect on EC.***

In accordance with regression coefficient it can be considered that environmental performance ( $\beta=0.786$ ) is an affective variable to explain economic performance, as expected. Economic performance can be explained by operational performance.

***6.3.2.7 Summary of the Research Hypotheses***

It was found that GSCM practices are significantly and positively linked with performance outcomes (partially support to  $H_1-H_4$ ). According to the results of this study, GSCM practices were found to be positively associated with the firms' performance.

The relationship between environmental and economic performance was found to be positive. These result produces adequate support for hypothesis  $H_5$ .

The connection between operational and economic performance was found to be positive as well. This result produces adequate support for hypothesis  $H_6$ .

The conclusions of hypotheses can be seen from Table 24 as follows.

**Table 24. Summary of the Research Hypotheses**

<b>Hypotheses</b>	<b>Conclusion</b>
There is a positive effect of GSCM practices on firms' environmental performance	<b>Partially Supported</b>
There is a positive effect of GSCM practices on firms' economic performance	<b>Partially Supported</b>
There is a positive effect of GSCM practices on firms' operational performance	<b>Partially Supported</b>
There is a positive effect of GSCM practices on firms' social performance	<b>Partially Supported</b>
Environmental performance has a positive effect on economic performance.	<b>Supported</b>
Operational performance has a positive effect on economic performance.	<b>Supported</b>

## 7 DISCUSSION

### 7.1 Discussion and Conclusion

In recent years, with the increasing regulative policies in order to eliminate environmental degradation, concern for environmental issues are increasing in the scope of sustainability concept. Management strategies of companies are redesigned based on sustainability issues. Zhu and others in a lot of researches (Zhu and Sarkis, 2004, Zhu and Sarkis, 2006, Zhu et al., 2005, Zhu et al., 2007a, Zhu et al., 2007b, Zhu et al., 2008a, Zhu et al., 2008b) investigated the GSCM that is really popular topic today. Some of previous studies outlined that concerns with environmental issues help firms decrease the environmental harmful effect and these concerns empower companies to be more competitive (Jaffe et al., 1995). GSCM gained more importance recently and companies discover the competitive dimension of having GSCM capability (Rao and Holt, 2005). Even though companies realize that green supply chain management context gaining attention more and more, still there is no real evidence to decide whether it “pays” to be green (Marcus and Fremeth, 2009). In future, it is expected to GSCM strategies will be real competitive issues (Cooke, 1991, Lambert and Stock, 1993, Handfield and Nichols, 1999).

Because of today’s unstable business conditions, constitution of closer relationships with suppliers, partners, and customers can be seen a requirement to make companies stronger (Zhao et al., 2011). Collaboration with all partners is expected to result in boosted firm performance.

This study examines the relationships of GSCM practices with companies’ performance. With help the results of online survey investigation which includes 180 answers from executives employing food manufacturing industry from Turkey, this investigation contributes to literature as well as real business environment to improve firms’ performance. First, GSCM practices are found to have the effect on corporate performance outcomes which can be categorized as environmental, economic, operational, and social. Second, both of companies’ environmental and operational performance are found to have a strong impact on companies’ EC. Consistent with our findings, it can be simply said that corporate performance is influenced by green supply chain management practices. Therefore, all hypotheses were supported. Detailed discussion of these relationships can be examined below.

Previous researches imply that GSCM practices associated positively with EP (Zhu and Sarkis, 2004; Green et al., 2012). When a company manage its behavior in line with ecological responsibilities, these environment-friendly activities is expected to result in the decreased degradation on world by preventing excess consumption.

Our survey research empirical findings show that IEM, IR, and CC are associated with environmental performance. GSCM can be explained as an essential management strategy which requires to understand customer expectations for ecologically designed products. In this context, GSCM practices helps companies to empathize with customers to meet their expectations. For that reason, Jabbour et al. (2015) stated that internal environmental management is the most significant application that have an influence on environmental performance (Abdallah and Ghwayeen, 2019). According to our findings, investment recovery is found to has the effect on environmental performance in conformance with Zhu et al. (2008a) study from literature. Due to utilization of recycled material and excess material sales, investment recovery results in lessen waste which leads to improved EP (Zhu et al., 2008a). Additionally, IR is connected directly with the EC caused by excess materials and equipment sales (Zhu et al., 2008a). Zhu and Sarkis (2007) found positive relationship IR with both environmental and economic performance. Customer cooperation is also crucial practice to provide boosted EP which is logical for our study. With cooperation support, expectations of customers can be met with the minimization of negative environmental effects (Vachon and Klassen, 2008).

According to results of survey investigation, only two GSCM practices were found to be associated directly with EC, one is investment recovery, the other one is internal environmental management. At the end of empirical analyses, we have not found direct relationship the eco-design with economic performance. When considered the reason in detailed, eco-design requires the capital investment but also it results in cost savings with the help of energy savings, decreased cost for waste treatment etc. In Turkey, eco-design mindset is still in its infancy. That's why we found no relationship between eco-design and EC (Zhu et al. 2005; Zhu and Liu, 2010). Before real cost advantage achievement, some investments related with start-up may be required. Although short-run advantage may not be achieved, long-run advantage is expected to be achieved. Similar to the eco-design mindset, green purchasing is still in its infancy in Turkey. In its early stages, green purchasing can increase the cost of materials in a short-run consideration. For the long-run consideration, with the eco-design and green purchasing mindset adaptations, companies can achieve economic benefits as well as competitive advantage (Zhu et al., 2013).

Companies' environmental improvements lead to enhanced corporate image, also result in increased market share and sales. Environmental performance improvement leads to directly economic performance improvement. In consistent with Rao and Holt (2005), when environmentally sustainable supply chain management is not considered reliable, customers would consider stop the procurement activities. In this perspective, we expected to find the customer cooperation effect on firms' economic performance, but we only found the direct relationship of IEM and IR with economic performance in line with survey investigation.

It can be said that internal environmental management is the strategic practice to enhance companies' performance in accordance with previous research (Carter et al., 1998). We outlined that internal environmental management has a precise connection with environmental, economic, and social performance.

Previous researches imply that GSCM practices associated positively with operational performance (e.g. Yu et al., 2014; Zhu et al., 2010; Zailani et al., 2012a). Zhu et al. (2008a) stated that to close the supply chain loop, cooperation with customers with environmental scope has crucial effect. Companies is expected to consider the expectations of consumers to manage their ecological response (Thun and Müller, 2010). Cooperation with customers enable companies understanding expectations of customers, adopting the requirements of technology and innovation developments, therefore results in corporates' improved operational performance (Lai et al., 2010 ; Vachon and Klassen, 2008) that is consistent with our study. Operational performance development consists of improved quality and delivery time in the context of customer satisfaction. For that reason, cooperation with customers is expected to have the effect on organizations' operational performance. Vachon and Klassen (2008) also studied the supplier relationships for environmental improvements in the context of enhanced operational performance and found the positive impact of green supplier collaborations on companies' OP. However, we found no direct relationship between green purchasing with operational performance. While working the relationship between the GSCM practices with operational performance, Zhu et al. (2007) outlined no crucial association between GP and OP consistent with our research. These inconsistent results require to more investigation in a longer term to evaluate the real effect of performance related with the green purchasing practice (Yu et al., 2014).

Green management practices (especially investment recovery) also contributes to operational performance by decreasing inventory levels to prohibit usage of excess materials, therefore result in improved economic performance additionally to improved operational performance.

Collaborative activities with partners result in improved performance (Sarkis et al., 2011). Consistent with prior research, our results imply that collaborative activities among supply chain partners can be exhorted to enhance firms' performance outcomes.

“Triple Bottom Line” is a specified idea which overlaps the social and economic performance in companies' success besides with their traditional economic bottom line.

This investigation has essential contribution to explain the influence of GSCM practices not only affect companies' environmental, economic, and operational performance but also play role on companies' social performance.

The positive connection between GSCM practices with SP can enhance formation of environmental standards to increase social awareness for companies.

Another contribution of our investigation is to recognize the directions, and to identify if, GSCM practices can contribute to EC or conduct supplementary advantages through improved environmental and operational performance (Zhu et al.,2013).

According to our survey findings and prior research from literature, it is possible to accomplish the economic performance after environmental and operational performance developments gained. Collectively, because of decreasing material, waste, energy, and emissions, EP caused by GSCM practices is expected to conclude cost reduction, therefore resulted in improved economic performance (Rao,2002).

## **7.2 Limitations and Further Implications**

Existing literature supplies contradictory outcomes pertaining the impression of GSCM on corporate performances. Eltayeb et al. (2011) pointed out the association between GSCM practices and corporate performances had become the main interest for a lot of studies, however the findings are not decisive. Jabbour et al. (2015) argued that there is a lack of studies related with GSCM and performance focusing on emerging countries. GSCM is a new tendency along emerging countries (Diabat et al., 2013). For those reasons, it is needed to get further studies to make clear this relationship.

A once in a century pandemic environment we had some limitations asking participation to research survey. However, we attempted to get answer as soon as possible in online environments and even though pandemic environment (Covid-19) limitations (e.g. remote working) we collected enough answers in hard conditions. More answers would be available if there was no pandemic environment.

Our study outlines the application of GSCM practices result in enhanced corporate performance. With the contribution of our posited and finally supported framework, it can be recommended that all supply chain respondents need to follow GSCM practices to enhance their performance by decreasing environmental effect on world.

When the prior researches were examined, it can be seen that company based studies were not so much. This study examined senior executives' and managers' perspective within GSCM. Thus, our study fills the gaps to point out effects of GSCM practices on firms' performance in order to lead application of these practices in real-world businesses which make organizations more sustainable. Although prior investigations were limited with performance outcomes of managerial practices within organizations (e.g., Judge and Douglas, 1998; Sharma and Vredenburg, 1998), our study outlined the comprehensive effects of some practices within 'green' context for Turkey's emerging food industry.

Although the adoption of GSCM practices is still in its beginning status in Turkey, it is believed that the findings of this study will be beneficial for implementation of GSCM to provide improved

environmentally friendly approach by considering greener strategies. To provide more decisive results, investigations with larger samples from different industries in longer term can be recommended.

Additionally, it is expected to find positive relationship between social and economic performance is also significant. Firms applying GSCM will enhance their SP as supported with our hypothesis, then, in turn contributes customer happiness, while also creating financial advantages. Investigation of the relationship of social performance on economic performance can be recommended for future studies; with this aim additional research is needed for future research. This can be a call for further investigation.

Although all hypotheses of this study supported positively, some limitations should be considered. First, in the scope of this investigation only food industry is evaluated from Turkey. Participants from different sectors and different countries should be exhorted to validate the findings. Multi-national & multi-industrial context with cross-comparison will be more beneficial to test results. To provide more generalizable results, scope of the investigation must be extended with its constructs and target sample. Second, in our study GSCM practices is considered as one construct which consists of five dimensions (eco-design, IEM, GP, IR, CC). Future studies might work on effects of all these dimensions on performance outcomes, separately. Third, this study includes the direct relationships of GSCM practices on performance outcomes; however, for future researches some additional constructs can be considered which have the moderating effect on performance outcomes, such as market dynamism, innovation, institutional pressure, etc. Additional limitation is the pandemic issue which we have been facing in survey investigation period. Due to pandemic disease, participant number is limited. Number for participants may be increased for future examinations. Even though all these constraints we hope that this study will be a motivation source to researchers and professionals for business life. For longer period, after making the inconsistencies about GSCM practices on performance outcomes clear, additional measurement models could be developed for enhanced performance requirements. Finally, the mindset of organizations for greener approach is still in its infancy in Turkey. To extend literature and see the real applications of greener supply chain management longer-time is still required. Because of integration of sustainability practices into supply chain management takes respectable time, longitudinal studies must be followed in emerging countries like Turkey while sustainability concept gaining more attention.

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## APPENDIX

### QUESTIONNAIRE

Bu anket formu Marmara Üniversitesi Sosyal Bilimler Enstitüsü'nde yürütülmekte olan "Yeşil Tedarik Zinciri Uygulamalarının Şirket Performansına Etkisi" başlıklı yüksek lisans tez çalışması için düzenlenmiştir.

**Bu bölümde yeşil tedarik zinciri yönetiminde bilimsel araştırmalarla geçerliliği kanıtlanmış beş farklı uygulamanın (ekolojik tasarım, yeşil satın alma, pozitif üst yönetim yaklaşımları, yatırım geri kazanımı, müşterilerle iş birliği) soruları yer alacaktır. Şirketinizde geçerli olan yeşil tedarik zinciri yönetimi uygulamaları konusunda aşağıdaki ifadelere ne derece katıldığınızı ilgili kutucuklara işaret koyarak belirtiniz.**

	Hiç Katılmıyorum	Katılmıyorum	Ne Katılıyorum Ne Katılmıyorum	Katılıyorum	Kesinlikle Katılıyorum
1 Şirketimiz için ürünlerin malzeme ve enerji tüketimini azaltacak şekilde tasarlanması önemlidir.					
2 Geri dönüştürülebilir ve yeniden kullanılabilir ürünlerin tasarımı şirketimiz için önemlidir.					
3 Ürünlerimizin tasarımında çevreye zararlı olabilecek kaynakların ve üretim süreçlerinin kullanımından kaçınılmaktadır.					
4 Proseslerimiz atık miktarını minimize edecek şekilde dizayn edilmiştir.					
5 Üst yönetimimiz yeşil tedarik zinciri yönetimine yönelik uygulamaları desteklemektedir.					
6 Çevresel farkındalık oluşturabilmek için çalışanlarımıza çevre problemleri ile ilgili eğitimler veririz.					
7 Geri dönüştürülebilir ürünlerin etiketlenmesi, sürdürülebilirlik çalışmalarının ürün etiketinde yer alması (yeşil etiketleme) şirketimiz için önemlidir.					
8 Sürdürülebilirlik çalışmalarımız kapsamında farklı departmanlar arasında kurulan işbirliği önem arz eder.					
9 Şirketimiz çevre kirliliğini önleyici plan ve politikalara sahiptir.					
10 Performans değerlendirme sistemlerimiz çevresel faktörleri kapsamaktadır.					
11 Şirketimizin sürdürülebilirlik raporları iç değerlendirme akabinde yayınlanmaktadır.					
12 Malzemelerin satın alınırken ekolojik tasarım doğrultusunda spektlerimiz tedarikçilerimizle paylaşılmaktadır.					
13 Şirketimiz sürdürülebilir bir çevre hedefi doğrultusunda tedarikçileri ile iş birliği içerisindeyiz.					
14 Tedarikçilerimizin ISO 14000 sertifikasına sahip olmasını teşvik ederiz.					

15 Talep edilen ürünün doğru zamanda doğru yere teslimatı şirketimiz için önemlidir.					
16 Tedarikçilerimiz sürdürülebilirlik kapsam ve gerekliliklerine uygun olarak seçilir.					
17 Tedarikçilerimizle kullanılan paket sayısının en aza indirilmesi için iş birliği yaparız.					
18 Tedarikçilerimizin doğada çözünebilir, çevre dostu paketleme yöntemlerini kullanması bir seçim kriteri olarak göz önünde bulundurulmaktadır.					
19 Tedarikçilerimizin teknik ve ekolojik tasarım yetkinlikleri bir seçim kriteri olarak göz önünde bulundurulur.					
20 Tedarikçilerimizin kaynak kullanımını azaltmaya yönelik stratejilerini destekleriz.					
21 Tedarikçilerimizle ortak sürdürülebilirlik hedeflerimiz doğrultusunda ekipman, malzeme kullanımı ve hizmet alımı gibi konularda iş birliği yaparız.					
22 Tedarikçilerimizin izlediği çevre dostu uygulamaları takip ederek değerlendiririz.					
23 Tedarikçilerimizde çevresel farkındalık oluşturmak ve tedarikçilerimizi bu doğrultuda eğitmek şirketimiz için önemlidir.					
24 Tedarikçilerimize çevre dostu stratejiler oluşturmaları için destek oluruz.					
25 Yatırım geri kazanımı (ihtiyaç fazlası envanter & malzeme eliminasyonu) şirketimiz için önemlidir.					
26 Kullanılmayan (hurda) malzeme ve ekipmanların satılması yatırım geri kazanımı kapsamında göz önünde bulundurulur.					
27 Kullanım ömrünü doldurmuş ekipman, ürün ve malzemelerin toplanması ve geri dönüştürülmesi şirketimiz için önemlidir.					
28 Kusurlu ve kullanılmış ürünler için geri dönüşüm sistemlerinin kurulması şirketimizin izlediği çevre dostu stratejiler arasında değerlendirilebilir.					
29 Şirketimiz ekolojik tasarım çalışmalarında müşterileri ile iş birliği içerisinde hareket eder.					
30 Daha sürdürülebilir üretim kapsamında müşterilerimiz ile iş birliği yaparız.					
31 Daha sürdürülebilir paketleme çalışmalarımızda müşterilerimizin beklentilerini karşılamaya yönelik olarak müşterilerimizle iş birliği yaparız.					
32 Lojistik faaliyetlerimizde daha az enerji kullanımını müşterilerimize taahhüt ederiz.					
33 Kullanılmış ürünlerin geri dönüştürülmesi kapsamında müşterilerimizle iş birliği içerisinde hareket ederiz.					
34 Tersine lojistik faaliyetlerimiz kapsamında müşterilerimiz ile iş birliği içerisinde hareket ederiz.					

**Bu bölümde şirketinizde geçerli olan yeşil tedarik zinciri yönetimi uygulamalarının şirketinizin çevresel, ekonomik, operasyonel ve sosyal performansı üzerindeki etkileri incelenecektir. Şirketinizde geçerli olan yeşil tedarik zinciri yönetimi uygulamalarının şirketinizin performansı üzerinde ortaya çıkardığı gelişmeler ile ilgili aşağıdaki ifadelere ne derece katıldığınızı ilgili kutucuklara işaret koyarak belirtiniz.**

	Hiç Katılmıyorum	Katılmıyorum	Ne Katılıyorum Ne Katılmıyorum	Katılıyorum	Kesinlikle Katılıyorum
1 Hava emisyonlarının azaltılması					
2 Atık su miktarının azaltılması					
3 Katı atık miktarının azaltılması					
4 Kullanılan tehlikeli ve zararlı madde miktarının azaltılması					
5 Çevre kirliliğine neden olacak kaza miktarının azaltılması					
6 Şirketin çevresel performansında gelişme					
7 Zamanında teslim edilen ürün miktarının artırılması					
8 Envanter seviyesinin azaltılması					
9 Hurda malzeme ve ekipman yüzdesinin düşürülmesi					
10 Ürün kalitesinin artırılması					
11 Tesislerin ve hatların iyileştirilmesi, sayılarının artırılması					
12 Satış miktarının artması					
13 Net karlılığın artması					
14 Pazar payının artması					
15 Şirket büyümesi					
16 Şirket imajının pekiştirilmesi					
17 Yeni pazarlara giriş fırsatları					
18 Yeni müşterilerin kazanılması					
19 Paydaşların refah seviyesinin artırılması					
20 Toplum sağlık ve güvenlik seviyesinin artırılması					
21 Toplum sağlığı için risk oluşturabilecek çevresel tehditlerin azaltılması					
23 Çalışanların iş sağlığı ve güvenliğinin artırılması					
24 Hizmet edilen toplumun hak ve çıkarlarının korunması, farkındalık seviyesinin artırılması					