Green Innovation as a Mediating Variable between Green Supply Chain Management and Sustainable Performance An Applied Study

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Abstract

The present research aims to determine the nature relationship between GSCM and SP through GI as a mediating variable at the pharmaceutical companies in Egypt**.** The field study addressed the mediating role of GI in the relationship between GSCM and SP by preparing a survey list and distributing it to a sample of 371 individuals from the employees at the pharmaceutical companies in Egypt where the received and correct lists reached 342 survey lists by response rate of 92%. The statistical analysis was performed by a number of methods and statistical tests which appropriate to the nature of the data such as the alpha correlation coefficient method, the confirmatory factor analysis method, and the multiple regression and correlation analysis method through the SPSS package.

The research concluded a number of results; there is a positive significant correlation between GSCM and GI on one hand and between GSCM and SP on the other hand, also there is a positive significant relationship between GSCM and SP through GI as a mediating variable at the pharmaceutical companies in Egypt.

In light of the results that have been reached, it was possible to reach a set of recommendations that could contribute to enhancing SP at the pharmaceutical companies in Egypt, the most important of which is the pharmaceutical companies that want to shift to GSCM and improve their business must review all current business methods to determine the appropriate change method and tool for the transformation, also the necessity of educating top management and managers about the advantages that both the customer and the company can obtain, and integrating modern practices and trends in the field of environmental conservation, such as GSCM and GI, into the company's plans and strategies, However, the scope of this study, the methods used and the findings indicate that there are areas for further studies.

ملخص البحث

يهدف البحث الحالي إلى تحديد طبيعة العلاقة بين إدارة سلسلة التوريد الخضراء والأداء المستدام من خلال الأبتكار الأخضر كمتغير وسيط في تلك العلاقة بالتطبيق على شركات الأدوية في مصر، وقد تناولت الدراسة الميدانية الدور الوسيط للأبتكار الأخضر في العلاقة بين إدارة سلسلة التوريد الخضراء والأداء المستدام من خلال إعداد قائمة استقصاء وتوزيعها على عينة قوامها ٣٧١ مفردة من العاملين بشركات الأدوية في مصر حيث بلغت القوائم المستلمة والصحيحة ٣٤٢ قائمة استقصاء بنسبة ٩٢%، وقد تم اجراء التحليل الاحصائي عن طريق عدد من الأساليب والاختبارات الإحصائية المناسبة لطبيعة البيانات كأسلوب معامل الارتباط ألفا، وأسلوب التحليل العاملي التوكيدي، وأسلوب تحليل الانحدار والارتباط المتعدد وذلك من خلال حزمة البرامج الإحصائية الجاهزة SPSS.

وقد خلص البحث إلى عدد من النتائج كان من أهمها وجود علاقة ذات دلالة إحصائية بين إدارة سلسلة التوريد الخضراء والابتكار الأخضر من ناحية وبين إدارة سلسلة التوريد الخضراء والاداء المستدام من ناحية أخرى، كذلك وجود علاقة موجبة ذات دلالة إحصائية إدارة سلسلة التوريد الخضراء والأداء المستدام من خلال الأبتكار الأخضر كمتغير وسيط بشركات الأدوية في مصر.

وفي ضوء النتائج التي تم التوصل إليها أمكن التوصل إلى مجموعة من التوصيات التي يمكن أن تساهم في تعزيز تحسين الأداء المستدام بشركات الأدوية في مصر كان من أهمها انه يجب على الشركات التي ترغب في التحول إلى إدارة سلاسل التوريد الخضراء وتحسين أعمالها، مراجعة كافة أساليب العمل المتبعه حالياً لتحديد اداة التغيير المناسبة للتحول، مع ضرورة توعية الإدارةالعليا والمديرين حول المزايا التي سوف تحصل عليها الشركة والعميل معاً، وأيضاً ضرورة دمج الممارسات والاتجاهات الحديثة في مجالات الحفاظ على البيئة مثل إدارة سلسلة التوريد الخضراء والابتكار لأخضر ضمن خطط وسياسات الشركة، إلا أن نطاق هذا البحث والأساليب المستخدمة فيه والنتائج التي توصل إليها تشير إلى وجود مجالات لبحوث أخرى مستقبلية.

1. Introduction

Sustainability and environmental issues are rapidly emerging as one of the most important topics for strategic business, management, manufacturing, and product development decisions. This reflected in the innovative and environmentally conscious products offered to consumers in recent years. Firms develop sustainable programs with "greening" their own product and processes. (Sezen & Cankaya, 2013).

In fact, the green supply chain management (GSCM), which is an effort towards environmental sustainability, can be translated into increased market share and profitability. In brief, the implementation of GSCM enhances the quality of GI activities that are performed to develop green products. (Zailani et al., 2015).

Green innovation (GI) is another concept of environmental management, which has been recently promoted with the goal of eliminating negative environmental consequences (Chen and Chang, 2013). GI may boost the implementation of GSCM, to fulfill the environmental requirements of organizations (Chen et al., 2006).

Accordingly, this research tries to fill this gap and shed new light on how the pharmaceutical companies in Egypt increase their SP which includes environmental, social and economic performance through the GSCM and GI practices.

2. Research Terminologies

2.1. Green Supply Chain Management (GSCM)

GSCM involves the practices that potentially minimize the occurrence of environmental issues during the production process of a final product in the manufacturing organizations (Zhu et al., 2016; Sharma et al., 2017).

2.2. Green Innovation (GI)

GI is defined as the use of novel methods in production, processes or management aiming for an overall decrease in environmental risk and a lessening of environmental pollution and other negative impacts on resources, including the use of energy (Kemp, 2010).

2.3. Sustainable Performance (SP)

SP is promoted as a communication instrument between the main factors involved in the general social, economic and environmental balance on different complexity levels of the informational fields (Aid, 2017).

3. Literature Review

3.1. Green Supply Chain Management (GSCM)

(Quintana-García et al., 2021) the purpose of this research is to gain further knowledge regarding the impact of strategies oriented to GSCM on a firm's corporate reputation. The findings provide strong support for the premise that supplier selection, monitoring and partnership termination based on environmental criteria positively influence corporate reputation. Additionally, the implementation of those strategies in an integral way as well as progressing towards the adoption of GSCM benefits a firm's reputation.

(De Giovanni and Cariola, 2020) analyses whether process innovation can be used as a lever to strengthen the relationships among Leanness, GSCM and performance. The results reveal that leanness facilitates the supplier collaboration on environmental programs and positively contributes to environmental and operational performance. In contrast, it exerts a positive second order effect on economic performance, which should then be pursued as a long term target. Nevertheless, firms can gain higher performance either by collaborating with suppliers on environmental programs or by investing in I4.0 technologies but not with both.

(Nejati et al., 2017) investigate the linkage between GHRM and GSCM, in light of the moderating effect of employees' resistance to change. Research results suggest: (1) the significant and positive impact of GHRM on GSCM, confirming the general call for integration between HRM and green management; (2) "Green Development and Training", "Green Employee Empowerment", and "Green Pay and Reward" have the most positive influence on GSCM, and these practices of GHRM should receive attention from managers; (3) "Resistance to Change" was found to have a moderating effect on the link between GHRM (particularly green recruitment and selection) and GSCM, because it tends to hamper the first step towards building a sustainable corporate culture, which is the recruitment and selection of new employees.

(Zhu et al., 2017) attempt to identify the role of customer relational governance (CRG) in environmental and economic performance improvement through GSCM, and the effects of CRG on the relationships between two GSCM practices (green innovation and green purchasing) and

environmental/economic performance. The results show that the CRG partially mediates the effect of GSCM practices on environmental performance. However, relationship & trust can be detrimental for green innovation to bring environmental performance. If companies aim to improve economic performance through green purchasing, they should establish relationship & trust with customers. Meanwhile, cooperation & reciprocity with customers is needed for companies to gain economic performance through green innovation.

3.2. Green Innovation (GI)

(Zameer et al., 2020) investigate the role of business analytics and environmental orientation toward GI and green competitive advantage. And aims to explore the mediating role of GI in the impact of business analytics and environmental orientation on green competitive advantage. The results indicate that business analytics and environmental orientation have a pivotal role toward GI as well as green competitive advantage, then it can be indicated that the role of business analytics is more powerful compared with the environmental orientation. Although environmental orientation is a key factor of GI, but its direct role toward green competitive advantage is not so strong. Similarly, to check the other mechanisms, the role of GI as a mediator was explored. Thus, the results confirm a mechanism of GI in the impact of business analytics and environmental orientation on green competitive advantage.

(Soewarno et al., 2019) explore whether GI strategy has a positive effect on GI. Furthermore, this study investigates whether both green organizational identity and environmental organizational legitimacy mediate the relationship between GI strategy and GI. This study also demonstrates that GI strategy positively affects GI indirectly via green organizational identity and environmental organizational legitimacy in manufacturing companies in Indonesia as a developing country. This study suggests that firms should develop GI strategy and it must be reflected as green organizational identity to get environmental organizational legitimacy, and then firms will achieve a better GI performance.

(Tariq et al., 2019) investigate the influence of green product innovation performance (GPIP) on a firm's financial performance (i.e. a firm's profitability and risk). In addition, it has adopted the resource-based

view and contingency theory to explore how GPIP and a firm's financial performance relationship is manifested when subject to the moderating role of a firm's market resource intensity and certain environmental factors, such as technological turbulence and market turbulence. The findings reveal that GPIP exerts a significant influence on a firm's financial performance, i.e. higher the GPIP, higher the firm's profitability and lower the firm's financial risk. Moreover, findings support the theoretical assertions that the higher level of market resource intensity, market turbulence and technological turbulence further strengthens GPIP and a firm's financial performance relationship.

3.3. Sustainable Performance (SP)

(Hadi & Baskaran, 2021) This paper highlights the study on examining sustainable business performance determinants includes proposed variables of organizational learning culture and digital organizational culture. The results show that supports from organizational learning culture and digital organization culture on sustainable business performance are positive and significant. Digital organizational culture mediates the relationship between organizational learning culture and sustainable business performance.

(Gupta et al., 2021) developed a framework based on concepts of circular economy, sustainable cleaner production and Industry 4.0 standards to assess sustainability performance of manufacturing companies and to guide them in prioritizing investment in potential solutions for enhancing performance on sustainability. Findings suggest that circular economy practices are most important for increasing sustainability performance in manufacturing, followed by practices of cleaner production and Industry 4.0. 'Supply Chain Traceability/Information', 'Reuse and recycling infrastructure', and 'Natural and clean environment', were the top three practices identified for manufacturing organizations aiming to enhance sustainability.

(Belhadi et al., 2021) this paper aims to explore the distinct and combined effects of several approaches such as digital business transformation (DBT), organizational ambidexterity (OA) and circular business models (CBMs) on the relationship between I4.0 capabilities and SP. The findings lead to several important implications concerning the

potential paths linking I4.0 and SP. Notably, the DBT was found to mediate this relationship by integrating circular principles to devise business models. Moreover, OA was found to substitute the CBMs in developing new sustainable business models and reconcile sustainability.

3.4. GSCM and GI

(Yang and Lin, 2020) explores the effects of supply chain collaboration (SCC) on GI performance and considers supply chain collaborative drivers as a crucial part of GI strategy. The study reveals that the relationships between supply chain partners have a very high influence on GI performance. SCC should be deemed as a core component in GI strategies. In addition, environmental regulations, top management commitment and social recognition are among high driving and dependence powers.

(Seman et al., 2019) investigates the relationship between GSCM and GI practices and the influence of these practices on the environmental performance. And the results revealed that there is a significant and positive relationship between GSCM and GI, and the environmental performance. Moreover, GI had a positive effect on the environmental performance. Furthermore, GI had a mediating relationship between GSCM and environmental performance.

(Wu, 2013) explore the relationship between green supply chain integration (GSCI) and GI and to analyze the moderating effects of environmental uncertainty. Supplier, customer and internal integration enhance both green product and process innovations. Demand uncertainty positively moderates each GSCI-green innovation link. However, the moderating effect of technological uncertainty is insignificant.

3.5. GSCM and SP

(Saqib and Zhang, 2021) This study examines how supply chain visibility moderates the effects of sustainable practices on SP. The results show that sustainable practices (for manufacturing, procurement and distribution) significantly influence the firm’s sustainability performance, and this relationship is moderated by supply chain visibility.

(Acquah et al., 2021) This study explores the influence of GHRM and GSCM practices on operational, market, financial, social and environmental performances. The results indicate that GSCM practices play

complementary partial mediating role between GHRM and operational, market, social and environmental performances.

(Han and Huo, 2020) explore the impact of green supply chain integration (GSCI) on SP which includes environmental, social and economic performance. The results show that different dimensions of GSCI have different outcomes. Green internal integration lays the foundation for green supplier integration (GSI) and green customer integration (GCI), and is related to both environmental and social performance. GSI is positively related to economic performance, whereas GCI is positively related to social performance.

3.6. GI and SP

(Ch'ng et al., 2021) investigate the influence of ecologically friendly innovation practices on their sustainable business performance, further tested to examine the moderation of market turbulence toward the relationship. The results show that each dimension of the sustainable business performance (economic, social and environmental) can be obtained by distinguishing an eco-innovation strategy, whether eco-process, eco-product or eco-organizational innovation. Specifically, the economic performance of a technology firm can be enhanced significantly by implementing an eco-organizational management system such as monitoring their eco-innovation trends, and by frequent communication of experiences and information with employees and among various departments.

(Zhang and Ma, 2021) Explore the relationship between environmental management and firm economic performance with the mediating effect of GI and the moderating effect of environmental leadership. The results show an inverted U-shaped relationship between EMB and economic performance; EMD has a positive impact on economic performance; GI mediates the relationship between EMB (EMD) and economic performance; environmental leadership moderates the impact of EMB (EMD) on GI.

(Wang et al., 2021) construct a model of economic performance transmission for green technology innovation and upgrading, and conducts an empirical analysis. The results show that green process innovation and green product innovation can effectively improve the economic performance of enterprises. The environmental performance and market competitiveness

of enterprises are important mediating variables in the paths of economic performance improvement.

Analyzing the Literatures and Concluding the Research Gaps:

Among the most important aspects that have characterized the literatures related to the research variables are the following:

1. Most of the previous studies that dealt with GSCM concerned about studying and analyzing the relationship between GSCM and industry 4.0 technologies, corporate reputation, green human resources management, employee's resistance to change, customer relational governance and environmental & economic performance.
2. As for GI, previous studies indicated that GI has an important effect on improving the level of green competitive advantage, performance and green organizational identity.
3. SP came as one of the important elements for the strength and continuity of organizations. Most of the previous studies that dealt with SP concerned about studying and analyzing the relationship between SP and some variables such as: organizational learning culture, sustainable cleaner production, Industry 4.0 standards and digital business transformation.
4. The current research agrees with the prior studies that supports the relationship of GSCM with either GI (e.g Yang and Lin, 2020 ; Seman et al., 2019 ; Wu, 2013) or SP (e.g Saqib & Zhang, 2021 ; Acquah et al., 2021 ; Han & Huo, 2020) as well as that relate between GI and SP (e.g Zhang & Ma, 2021 ; Ch'ang et al., 2021 ; Wang et al., 2021).
5. There is a scarcity in studies that dealt with the direct relationship between each of the research variables and the other variable in the Arabic region.
6. According to the researcher's knowledge, there is no Arab studies that dealt with the mediating role of GI in the relationship between GSCM as an independent variable and SP as a dependent variable, by applying to the pharmaceutical companies in Egypt, and thus this research comes as a follow-up to recent trends in the field of production and operations management.

Accordingly, the research gap represented in the failure of any of the previous studies to examine the nature of the relationship between GSCM and SP by addressing GI as a mediating variable in that relationship, as it was found that there are clear deficiencies in the studies. This is what the current research will strive to achieve.

4. Research Problem and Questions:

The pilot study conducted by the researcher on a sample of (30) employees at (5) pharmaceutical companies under the research revealed that they are lacking the enough attention for: design of products that allow reuse or recycling, collaborate with suppliers and customers to develop products according to eco-design principles, redesign of production processes and sense opportunities to address changing business needs. This requires studying new methods in management and trying to benefit from them in improvement processes, including (GSCM, GI & SP) to address these problems. In addition to investigating to what extent GSCM can enrich the level of SP in these companies through GI as a mediating variable.

So, the research questions could be formulated as follows:

1. What is the nature relationship between GSCM and GI at the pharmaceutical companies under research?
2. What is the nature relationship between GSCM and SP at the pharmaceutical companies under research?
3. What is the nature relationship between GI and SP at the pharmaceutical companies under research?
4. Does the GI mediate the relationship between GSCM and SP?

5. Research Objectives:

The objectives of this research are represented as follows:

1. Exploring the nature of relationship between the application of GSCM and GI at the pharmaceutical companies under research.
2. Exploring the type of relationship between the application of GSCM and SP at the pharmaceutical companies under research.
3. Identifying the type of relationship between GI and SP at the pharmaceutical companies under research.
4. Investigating whether the GI can mediate the relationship between the application of GSCM and the SP of these companies.

6. Research Hypotheses:

The relationship between GSCM and GI has been investigated in a number of previous studies (Yang and Lin, 2020 ; Seman et al., 2019 ; Wu, 2013), which showed that there is a positive relationship between GSCM and GI. In light of this, the first hypothesis was formulated as follows:

H1: There is a statistically significant relationship between GSCM and GI at the pharmaceutical companies under research.

The relationship between GSCM and SP has been studied in a number of previous studies (Saqib and Zhang, 2021; Acquah et al., 2021; Han and Huo, 2020), which showed that there is a positive relationship between GSCM and SP. In light of this, the second hypothesis was formulated as follows:

H2: There is a statistically significant relationship between GSCM and SP at the pharmaceutical companies under research.

The relationship between GI and SP has been investigated in a number of previous studies (Ch'ng et al., 2021; Zhang and Ma, 2021; Wang et al., 2021), which showed that there is a positive relationship between GSCM and SP. In light of this, the third hypothesis was formulated as follows:

H3: There is a statistically significant relationship between GI and SP at the pharmaceutical companies under research.

H4: There is no statistically significant relationship between GSCM and SP through the GI as a mediating variable.

7. Research Importance:

The pharmaceutical industry is a major strategic industry. Since it contributes to achieving social peace and provides an important dimension to the concept of national security, and the pharmaceutical industry is one of the basic human rights; because it is related to his health and life. Therefore, the pharmaceutical industry in Egypt will enter an important stage in the framework of global competition, whether in terms of importing basic raw materials and intermediate materials involved in the manufacture Medicinal preparations, or in terms of exporting locally produced medicine to global markets (Information and Decision Support Center, 2003).

8. Research Variables and Measurement

8.1. Independent Variable: Green Supply Chain Management

It will be measured through five-practices, internal GSCM (IEM and ECO) and external GSCM (EC, GP and RL) (Zaid et al., 2018). This measure consists of 25 statements: six statements for IEM, five statements for ECO, six statements for EC, five statements for GP, and three statements for RL.

8.2. Mediating Variable: Green Innovation

It will be measured through two-dimensions (green product innovation and green process innovation) (Chiou et al., 2011). This measure consists of 9 statements. There were four items measuring green product innovation, and five items measuring green process innovation.

8.3. Dependent Variable: Sustainable Performance

It will be measured through three-dimensions 20-item scale adopted based on (Saqib & Zhang, 2021). Environmental performance will be measured by 7 statements, social performance will be measured by 8 statements, and economic performance will be measured by 5 statements.

9. Research Population and Sample

9.1 Research Population

The research population involves the employees at the pharmaceutical companies in Egypt which include (64) companies, this according to the (Medicines Planning and Policy Center, 2018). This research will be limited to just (5) companies at Cairo City (Novartis, Amoun, Sanofi, Glaxo and Pharco) with a total number of employees (10200), and the researcher selected these companies as a field of research for the following reasons:

These companies are the top selling companies in Egypt during the first half of the year 2022, and there is a significant growth in drug sales during that period, and drug sales during the first 6 months of the year amounted to 54 billion pounds, with a growth rate of 11% (Information and Decision Support Center, 2022).

Cairo City is one of the most important industrial cities in Egypt, which contains a large number of the industrial sectors, and the large number of companies contained under these sectors.

The large number of the population items.

Related to all of the above, time and cost constrains.

It was decided to rely on the sampling method and procedures to collect the primary data necessary for the research.

9.2. Research Sample

The researcher used the simple random sample formula in order to calculate the size of the selected sample from the employees at the pharmaceutical companies at Sadat city and 6th of October City under the research. The following formula is used (Tryfos, 1996).

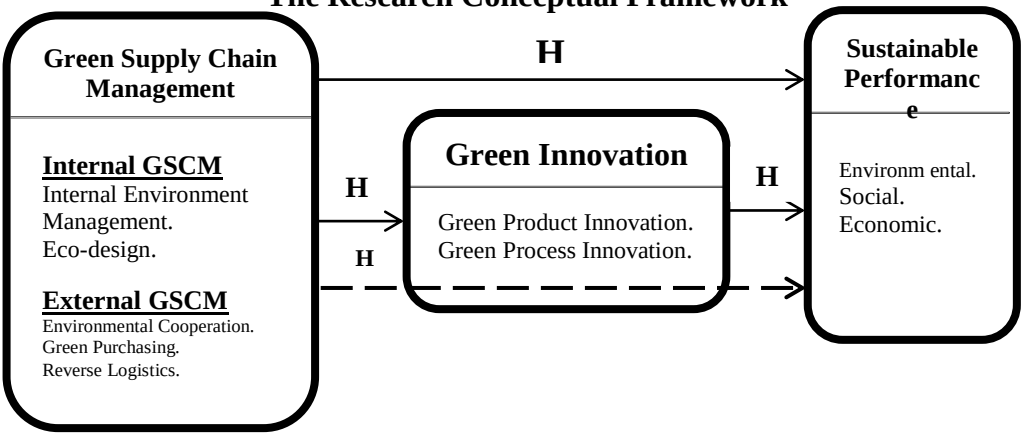
$$n = \frac{NZ^2\,p(1-p)}{Ne^2 + Z^2\,p(1-p)}$$

$$n = \frac{10200 \times (1.96)^2 \times 0.25}{10200 \times (.05)^2 + (1.96)^2 \times 0.25} = 371$$

10. Research Conceptual Framework

The conceptual framework of this research encompasses three main constructs as shown in figure (1):

Figure (1)
The Research Conceptual Framework



Source: by the researcher according to the literature review.

11. Theoretical Framework for the Research Variables

11.1. Green Supply Chain Management Definition

GSCM is the integration of environmental thinking into SCM from the extraction of raw materials to product design, manufacturing processes, delivery of the final product to the consumers, and end-of-life management of the product after its useful life (Worku & Virdi, 2019).

GSCM is transverse to the supply chain and includes all stakeholders, the internal and external clients, the government and all the society (Martínez & Mathiyazhagan, 2020).

GSCM means reducing the environmental impact in all stages of customer–supplier business transactions which are not limited to design, purchase, manufacturing, packing, marketing, and distribution, reverse logistics, and end-of-life disposal (Shetty & Bhat, 2022).

GSCM involves green procurement, green manufacturing, green packaging, green marketing, reverse logistics making it a closed system in the sense that an organization takes back the materials that are produced at the end of the product's life so that the materials can be disposed of in the most environmentally feasible manner (Shetty & Bhat, 2022).

Based on what has been mentioned previously, the researcher suggests that GSCM can be defined as: the integration of environmental practices (e.g. green design, green purchasing, green manufacturing, green distribution and reverse logistics) to eliminate waste and other negative impacts on resources (e.g. emissions, energy, solid wastes, and chemical/hazardous) in all stages of the supply chain.

11.2. Green Supply Chain Management Practices

The GSCM does not have processes that make it a standard. There are relatively new practices that make up the GSCM, (Internal Environment Management and Eco-design), and, (Environmental Cooperation, Green Purchasing and Reverse Logistics) (Zaid et al., 2018). They are as follows:

- **Internal GSCM:**

Internal Environmental Management (IEM)

IEM is the generation of environmental protection policies and environmental objectives by the company itself to ensure environmental conservation (Chan et al., 2012; Darnal et al., 2008).

Eco-Design (Green Design)

Eco-design, also called green design or environmental design, includes activities that aim to minimize the environmental impact of products in the whole life cycle (Govindan et al., 2015).

This process begins with supply of resources and continues with production and ends with the disposal of the product which has completed its life cycle (Rostamzadeh et al., 2015).

Eco-design is the precautions taken during the stage of product development in order to decrease the environmental impact caused by the product during its life cycle without making any concessions from basic production criteria such as performance and costs (Johansson, 2002).

- **External GSCM**

Environmental Cooperation

Environmental cooperation can be defined as actions taken by company and the supplier together in the context of a common plan for environmental management and environmental solutions. In this context, the buyer and the seller plan the activities that can be undertaken to minimize the environmental impact caused by the production process and the products (Vachon & Klassen, 2008).

Environmental cooperation activities are more proactive practices compared to the environmental performance evaluation of the supplier because this practice involves the participation of the supplier at each stage of the production process (Vachon & Klassen, 2008).

As a result of environmental cooperation, the parties better understand each other's responsibilities and capacities in environmental issues (Vachon & Klassen, 2008).

Customers may play critical roles to transform supply chain into green supply chain (Kumar et al., 2014).

Short and long term relationships with customers are rather important for successful implementation of GSCM (Zhu & Sarkis, 2004).

Environmental cooperation with customers means company efforts to develop customers 'environmental performances. Customer environmental collaboration comprises activities such as interchanging of technical information between a firm and its customers, in addition to willingness to learn about each other's operations in order to plan and set goals for environmental improvement.

Green Purchasing

Purchasing function, which was previously regarded as a tactical function, has gained a different status in recent years along with the globalization. While purchasing function plays a crucial role in providing companies with a competitive advantage, it also affects the environmental

performance through the selection of environmentally conscious supplier and purchase of environmentally friendly materials (Sarkis, 2003).

"Green Purchasing is the set of purchasing policies held, actions taken, and relationships formed in response to concerns associated with the natural environment". In short, green purchasing can be defined as integrating environmental problems and concerns into the process of purchasing (Handfield et al., 2002; Rao & Holt, 2005).

It is immensely important for a company to select the appropriate supplier in order to realize its environmental objectives. However, selection of the suitable supplier is not sufficient by itself to develop environmental performance. Following the selection, it is necessary to manage the supplier by adopting a strategic approach that is based on cooperation. This approach called environmental cooperation helps developing supplier's environmental performances. Green purchasing cycle includes the evaluation of whether the supplier adapts to the conditions/criteria of the company in addition to selection and management of the supplier. Supplier evaluation is monitoring the suppliers to assess to what degree they undertake voluntary or obligatory activities (Paulraj, 2011).

Reverse Logistics

Reverse logistics involves activities that aim reverse products or materials for reuse, recycle, re-manufacturing, repair, refurbish and safe disposal (Eltayeb et al., 2011).

In the first stage reverse logistics includes moving goods from the last user to the producer. The next stage includes transforming the returned goods to a product that can be used by the producer again. Reverse logistics involves the transportation and stock management process of traditional logistics. However, it focuses more on return of the goods from the consumers rather than product mobility for consumers (Eltayeb et al., 2011).

11.3. Green Innovation Definition

GI is a new or modified processes, techniques, systems, and products that are environmentally safe (Ma et al., 2017).

GI is a strategy used to support and create new environmental processes by organizational leaders that produce environmentally sustainable products and services. Creation of environmental products and process innovations enable organizational leaders to utilize strategic and

organizational resources efficiently for competitive advantage (Kawai et al., 2018).

GI is focusing on the reduction of waste and prevention of pollution, along with the adoption of systems focusing on environmental management (Song & Yu, 2018).

GI is the measures taken to mitigate the unfavorable effects that production and operations may have on the environment, with emphasis on the improvement of the processes, technologies, systems, products, as well as management methods (Chen et al., 2018).

GI is not only a new idea to achieve green development but also the inevitable choice for enterprises to upgrade (Cao and Chen, 2019).

GI is a continuous ways to innovate each stage of supply chain in order to gain competitive advantage. Therefore, all members in the supply chain must be actively involved (Seman et al., 2019).

GI is encouraged through green innovation procedures, since their adoption can decrease the pressure put on firms by government guidelines (Asadi et al., 2020).

GI is the most significant environmental strategies, involving transformation in production procedures, consisting of reduced resource consumption, preventing pollution, and adopting environmental management systems in the field of business operations (Asadi et al., 2020).

GI is the promotion of green development and addressing the issues associated with the protection of the environment are possible through the efficient use of product and process innovations (Asadi et al., 2020).

GI is the creation or performance of new, or altogether improved, products, processes, promoting techniques, authoritative structures and institutional courses of action which - with or without plan - lead to natural upgrades contrasted with pertinent other options (Olowoyin, 2021).

GI is a means of averting the aggravation of environmental degradation because GI is associated with pollution reduction, resources efficiency, and wastage and waste reduction (Le, 2022).

Hence, the researcher defined the GI as: a new method to innovate or redesign products and create new environmental technologies for processes by the organization to achieve green development, decrease the overall environmental risk and lessen environmental pollution.

11.4. Green Innovation Dimensions

Green Product Innovation

GPI is a process driven by mechanical headway, changing client needs and expanding worldwide rivalry. For effective product innovation, there must be solid collaboration inside the firm, between the firm and its clients and providers. Firms present new products or change the current products as indicated by the necessities of the clients (Olowoyin, 2021).

There is a need to do statistical surveying on green product innovation so as to satisfy and satisfy the need and desire for all clients in the market. The shorter product life pattern of the products powers the organizations to acquire innovation the products (Olowoyin, 2021).

Green Process Innovation

Green process innovation is the turn of events and determination of thoughts for innovation and the change of these thoughts into innovation (Rennings, 2000).

Green processes innovation can be new or modified production, equipment together, or procedures that are environmentally sustainable (Ma et al., 2017).

Green process innovation can be proposed to diminish unit expenses of production or conveyance, to build quality, or to create or convey new or fundamentally improved products. Process innovation implies improving the production and calculated strategies altogether or acquiring huge enhancements the supporting exercises, for example, buying, bookkeeping, upkeep and figuring (Olowoyin, 2021).

Green process innovation is an inside core interest. It is creating capabilities and schedules that improve process adequacy and boost benefit. Process innovation is a viewpoint vital to the accomplishment of any business. It is a coordinated idea that includes changes in the production process which are planned for diminishing the costs, wastage and lead time or at improving production proficiency (Olowoyin, 2021).

11.5. Sustainable Performance Definition

SP is the ability to meet the needs of the present without compromising the ability of future generations to meet their needs, and it became important to business research and practice over the past decades as

a result of rapid depletion of natural resources, concerns over wealth disparity and corporate social responsibility (Hart & Milstein, 2003).

SP is the meeting point of the three dimensions of economy, environment, and society in the Triple Bottom Line (TBL) model (Asadi & Dahlan, 2017).

SP is a company's performance related to economic, environmental and social aspects. These aspects are assessed and monitored concerning their impacts through different methods (Zimek & Baumgartner, 2017).

SP is the actual output from the implementation of GSCM practices on the organization's environmental, economic, and social performance (Zaid et al., 2018).

SP is a challenging task, as it requires broad consensus and collective efforts of all stakeholders (Jawaad & Zafar, 2020; Koirala & Pradhan, 2020).

SP is the prime concern of business organizations, as it provides long-term growth and development opportunities, financial viability and competitive advantages (Kim & Hall, 2021; Wang et al., 2021).

SP is considered as organizations achievements regarding stakeholders' expectations in three main areas, i.e., economic, social, and environmental performances. It reflects organizations endeavors towards accomplishment of economic, social, and environmental aspects (Vural-Yavas, 2021).

SP is the effort to "meet the needs of present generations without compromising the needs of future generations" (Permatasari et al., 2022).

Hence, SP, for the purposes of the present research, is defined as: the actual output from the implementation of both GI and GSCM practices on the organization's environmental, economic, and social performance.

11.6. Sustainable Performance Dimensions

Environmental Performance

Environmental performance is the firm's capability of decreasing emissions and waste generation, along with the reduction of dangerous and poisonous substances, and also a lower level of environmental incidents (Zhu et al., 2008).

Environmental performance is supposed to provide good opportunities toward the improvement of the competitive advantages of organizations,

since a combination of environmental performance, business strategies, and green innovation is currently regarded as a strategic organizational prospect (Dangelico & Pujari, 2010).

Environmental performance is the outcome based on the firm's ecological goals to generally improve the environmental situation of a company and its system (Zimek & Baumgartner, 2017).

Environmental performance is the initiatives that include ISO 14000 certification, pollution prevention, recycling of materials and waste reduction (Hibadullah et al., 2013).

Environmental performance is the evaluation of organizational reduction for emissions, decrease of consumption for hazardous or harmful materials and efficient energy or resources use (Abidin et al. 2016).

Environmental performance is the outcome based on the firm's ecological goals to generally improve the environmental situation of a company and its system (Zimek & Baumgartner, 2017).

Environmental performance is viewed as a firm's capability to cause reductions in pollution and solid waste and its ability to reduce the use of unsafe materials and the occurrence of environmental accidents (Abdul-Rashid et al., 2017).

Environmental performance is an initiatives related to the environment, e.g. the protection of natural resources, pollution prevention and waste reduction. On a company's level it is strongly related to environmental business targets, e.g. reduction of greenhouse gas emissions, resource efficiency as well as decrease of water consumption and waste output (Zimek & Baumgartner, 2017).

Environmental performance is the ability of the organization to reduce air emissions and effluent waste, decrease consumption of hazardous and toxic material, as well as lower the frequency of environmental accidents (Zaid et al., 2018).

Environmental performance is the development of sustainable practices that assure that stakeholders are encouraged to understand the impact the business has on the environment (Phillips et al., 2019).

Environmental performance is the ability of a firm to reduce pollution, reduce waste, prevent use of hazardous substances and reduce environmental accidents, and it is necessary for the firm to identify the

sources of environmental problems in its scope (such as production, transportation, procurement and the product) (Cankaya & Sezen, 2019).

Environmental performance can be determined by the quality of eco-friendly products, green process and product innovation and incorporation of green sustainability matters into a firm's operation (Singh et al., 2020).

Environmental performance is a firm's capability to cause reductions in pollution and solid waste and its ability to reduce the use of unsafe materials and the occurrence of environmental accidents (Afum et al., 2020).

Economic Performance

Economic performance is the improvement in the financial and marketing capabilities due to the implementation of green strategies which help organizations to raise their position above the industry average (Green & Inman, 2005).

Economic performance is the effect that organizations have on their own economic situation as well as on the economic system across which they operate and can result from green innovation as the main driver (Asadi et al., 2020).

Economic performance is the profitability, revenue growth, increase in market share, and increase in productivity. A sustainable approach can lead to internal cost saving, open new markets and find beneficial uses for waste (Han and Huo, 2020).

Economic performance is the degree to which a firm can optimize its financial outcomes (Afum et al., 2020).

Economic performance is the financial profits that result from greening the supply chain and it includes profitability, revenue progression, increased market share, and productivity development (Malti, 2021).

Economic performance is determined by production, price, and cost. Exploration and development require heavy investment, while in the production stage, managing operations is the key to business performance (Bento et al., 2021).

Social Performance

Social performance is a product development and working conditions of partner companies within supply chain in a sustainable and safe mannar (Zimek & Baumgartner, 2017).

Social performance is a corporate performance to the social systems within which a company operates (Cooper, 2017).

Social performance is the employee safety and health, improvement in the quality of life of the community, vocation training for community members and training of employees among others (Abdul-Rashid et al., 2017).

Social performance is the real effects of green practices on the social aspects related to the image of firm and their goods from the viewpoint of various stakeholders such as suppliers, employees, customers, and the public (Zaid et al., 2018).

Social performance is the ethical understanding of an organization's responsibility for the impact of its business activities on society (Phillips et al., 2019).

Social performance is associated with improving the overall welfare of stakeholders and the community and protecting employee health and safety (Han and Huo, 2020).

Social performance is measured by employee safety and health, improvement in the quality of life of the community, vocation training for community members and training of employees among others (Afum et al., 2020).

Organizations must work with diverse actors, including donors, beneficiaries, suppliers and government agencies, their public and social performance are vital to long-term sustainability (Dwivedi et al., 2022).

12. Discuss the Results of the Statistical Analysis

12.1. Evaluation of the Reliability for the Research Variables

The alpha correlation coefficient method was applied to each of the GSCM scale, GI and SP, in total for the single scale as a whole and for each set of variables from the groups that make up each scale separately. As for the GSCM scale at the pharmaceutical companies in Egypt, it has the results of the reliability analysis showed that the alpha coefficient for the scale as a whole represents about 0.951, which is an indicator of a high degree of reliability, as the acceptable limits for the alpha coefficient range from 60.0 to 0.80, according to the levels of reliability used in social sciences.

Through the following table, it is clear that the initial result of the reliability assessment reflects that the scale subject to the test can be relied upon in measuring GSCM at the pharmaceutical companies in Egypt.

Table (1)
Outputs of the Reliability Analysis for GSCM (Independent Variable)

N	GSCM Variables	Number of Statement	Alpha Coefficient
1	IEM	6	0.851
2	ECO	5	0.792
3	EC	6	0.821
4	GP	5	0.795
5	RL	3	0.701
Total		**25**	**0.951**

Source: by the researcher according to the results of statistical analysis.

Table (2)
Outputs of the Reliability Analysis for GI (Mediating Variable)

N	GI Variables	Number of Statement	Alpha Coefficient
1	Green product innovation	4	0.676
2	Green process innovation	5	0.774
Total		**9**	**0.850**

Source: by the researcher according to the results of statistical analysis.

According to the previous table, it is clear that the results of the reliability analysis showed that the alpha coefficient for the GI scale at the pharmaceutical companies in Egypt as a whole is about 0.850, which is an indicator of a high degree of reliability, and that the initial result of the reliability assessment reflects that the scale subject to the test can be relied upon in measuring GI at the pharmaceutical companies in Egypt.

Table (3)
Outputs of the Reliability Analysis for SP (Dependent Variable)

N	SP Variables	Number of Statement	Alpha Coefficient
1	Environmental performance	7	0.842
2	Social performance	8	0.878
3	Economic performance	5	0.844
Total		**20**	**0.947**

Source: by the researcher according to the results of statistical analysis.

According to the previous table, it is clear that the results of the reliability analysis showed that the alpha coefficient for the SP scale at the

pharmaceutical companies in Egypt as a whole is about 0.947, which is an indicator of a high degree of reliability, and that the initial result of the reliability assessment reflects that the scale subject to the test can be relied upon in measuring SP at the pharmaceutical companies in Egypt.

These results support confidence in the research variables and confirm their validity for the following stages of statistical analysis.

12.2. Confirmatory Factor Analysis for Research Variables

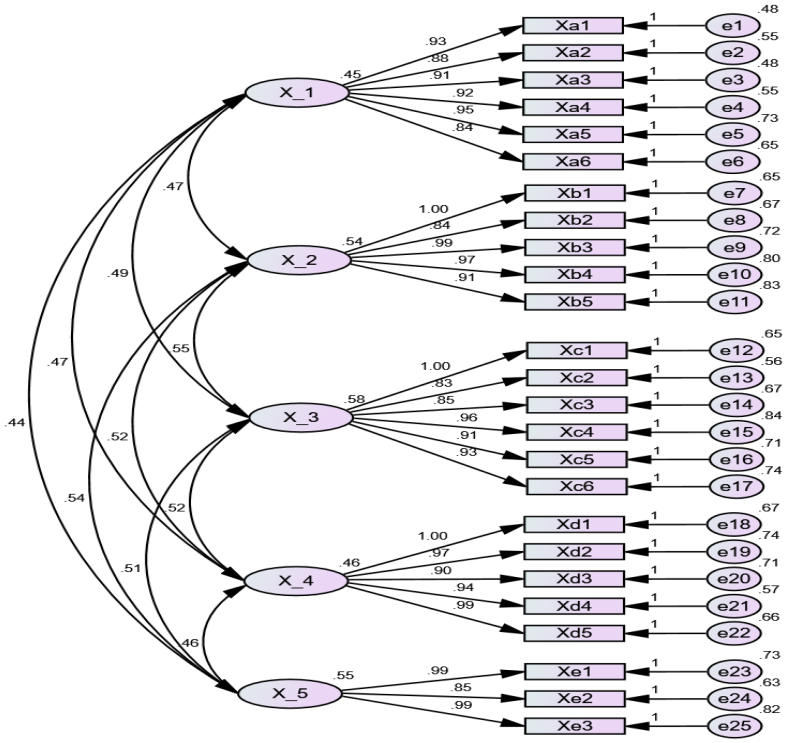
CFA is used to verify the extent to which the practices of the standard model of GSCM match with the data collected from the research sample about those practices, by studying the relationship between the practices of GSCM and the statements they express, and the ability of the statements to express each practice, and to filter each practice from measurement errors.

Therefore, the CFA is considered as a tool for interpreting the data, and answering an important question, which is why and how a group of variables and their dimensions were related in the research population? with the aim of reaching a model that simulates reality, and is characterized by efficiency and simplicity at the same time, therefore, through this analysis, the extent of conformity of the sample data for the GSCM measurement model, which was previously determined based on most previous studies, will be revealed as a concept consisting of five practices, and verification of the validity of this structure.

12.2.1 Confirmatory Factor Analysis for GSCM

Where GSCM scale tests the relationship between 25 statements by (6) phrases for the practice IEM, (5) phrases for the practice ECO, (6) phrases for the practice EC, (5) phrases for the practice GP and (3) phrases for the practice RL. The following figure (2) shows the results of the confirmatory factor analysis for the GSCM scale.

Figure (2)
Confirmatory Factor Analysis for GSCM



Source: by the researcher according to the results of statistical analysis.

Figure (2) shows that the standard load coefficients for phrases at the IEM practice ranged between (0.84) and (0.95), while the ECO practice ranged between (0.84) to (1.00), the EC practice ranged between (0.83) and (1.00), while the GP practice ranged between (0.90) to (1.00) finally, the RL practice ranged between (0.85) and (0.99), and all of these coefficients are acceptable as they must be greater than or equal to (0.5) (Hooper et al., 2008).

It also became clear that the correlation coefficients between the five dimensions of the independent variable and each other ranged between (0.44) and (0.55), which are higher than (0.2) this reflects the convergent

validity of the phases and the scale as a whole, and its ability to measure what it was prepared for.

Table (4)
Conformity Indicators for GSCM

N	Fit indices and their acceptable thresholds	Test Value
1	(Chi-Square) / (Degree of freedom)	5.630
2	P. value	0. 000
3	Goodness of fit Index (GFI)	0.885
4	Tuker-Lewis Index (TLI)	0.921
5	Comparative Fit Index (CFI)	0.930
6	Normed Fit Index (NFI)	0.877
7	Incremental Fit Index (IFI)	0.931
8	Relative Fit Index (RFI)	0.860
9	Root Mean Square Residual (RMR)	0.048
10	Root Mean Square Error of Approximation (RMSEA)	0.057

Source: by the researcher according to the results of statistical analysis.

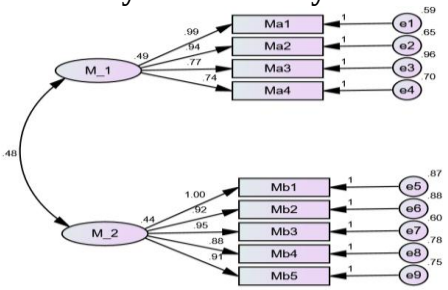
Table (4) shows that the results of the indicators used indicate a good conformity test, as they provide good and acceptable estimates to indicate the constructive validity of the GSCM scale, and that the phrases measure what they were prepared for.

In light of the previous results, the GSCM model is completely identical to the sample data, meaning that GSCM maintains its global structure consisting of the following five practices (IEM, ECO, EC, GP and RL) of the research sample. From the above, we conclude that the GSCM model under research has a great deal of validity in representing data, as well as a high level of stability.

12.2.2. Confirmatory Factor Analysis for GI

Where GI scale tests the relationship between 9 statements by (4) phrases for the dimension green product innovation and (5) phrases for the dimension green process innovation. The following figure (3) shows the results of the confirmatory factor analysis for the GI scale.

Figure (3)
Confirmatory Factor Analysis for GI



Source: by the researcher according to the results of statistical analysis.

Figure (3) shows that the standard load coefficients for phrases at the green product innovation dimension ranged between (0.74) and (0.99), and the green process innovation dimension ranged between (0.88) to (1.00), and all of these coefficients are acceptable as they must be greater than or equal to (0.5) (Hooper et al., 2008).

It also became clear that the correlation coefficients between the two dimensions of the mediating variable and each other (0.48), which are higher than (0.2) this reflects the convergent validity of the phases and the scale as a whole, and its ability to measure what it was prepared for.

Table (5)
Conformity Indicators for GI

N	Fit indices and their acceptable thresholds	Test Value
1	(Chi-Square) / (Degree of freedom)	4.599
2	P. value	0. 000
3	Goodness of fit Index (GFI)	0.885
4	Tuker-Lewis Index (TLI)	0.957
5	Comparative Fit Index (CFI)	0.969
6	Normed Fit Index (NFI)	0.942
7	Incremental Fit Index (IFI)	0.969
8	Relative Fit Index (RFI)	0.920
9	Root Mean Square Residual (RMR)	0.042
10	Root Mean Square Error of Approximation (RMSEA)	0.057

Source: by the researcher according to the results of statistical analysis.

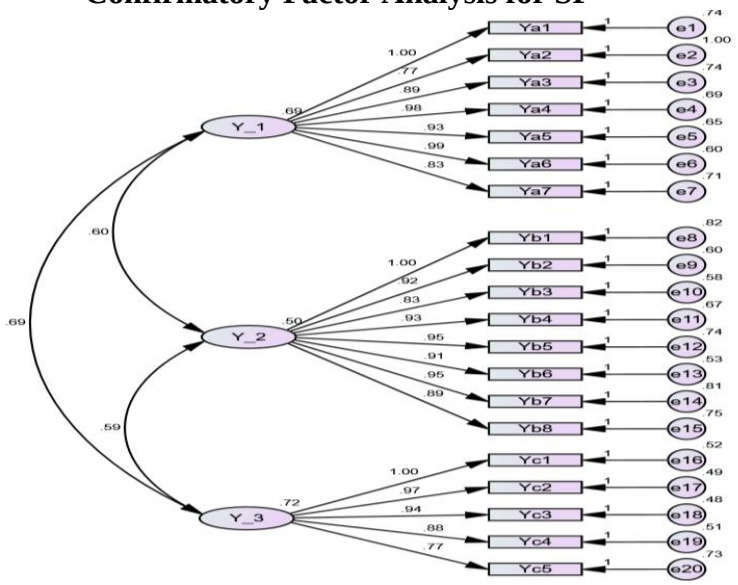
Table (5) shows that the results of the indicators used indicate a good conformity test, as they provide good and acceptable estimates to indicate the constructive validity of the GI scale, and that the phrases measure what they were prepared for.

In light of the previous results, the GI model is completely identical to the sample data, meaning that GI maintains its global structure consisting of the following two dimensions (green product innovation and green process innovation) of the research sample. From the above, we conclude that the GI model under research has a great deal of validity in representing data, as well as a high level of stability.

12.2.3 Confirmatory Factor Analysis for SP

Where SP scale tests the relationship between 20 statements by (7) phrases for the dimension environmental performance, (8) phrases for the dimension social performance and (5) phrases for the dimension economic performance. The following figure (4) shows the results of the confirmatory factor analysis for the SP scale.

Figure (4)
Confirmatory Factor Analysis for SP



Source: by the researcher according to the results of statistical analysis.

Figure (4) shows that the standard load coefficients for phrases at the environmental performance dimension ranged between (0.77) and (1.00), the social performance dimension ranged between (0.83) to (1.00), and the economic performance dimension ranged between (0.77) to (0.73), and all of these coefficients are acceptable as they must be greater than or equal to (0.5) (Hooper et al., 2008).

It also became clear that the correlation coefficients between the three dimensions of the independent variable and each other ranged between (0.59) and (0.69), which are higher than (0.2) this reflects the convergent validity of the phases and the scale as a whole, and its ability to measure what it was prepared for.

Table (6)
Conformity Indicators for SP

N	Fit indices and their acceptable thresholds	Test Value
1	(Chi-Square) / (Degree of freedom)	3.140
2	P. value	000.0
3	Goodness of fit Index (GFI)	0.914
4	Tuker-Lewis Index (TLI)	0.951
5	Comparative Fit Index (CFI)	0.957
6	Normed Fit Index (NFI)	0.915
7	Incremental Fit Index (IFI)	0.957
8	Relative Fit Index (RFI)	0.903
9	Root Mean Square Residual (RMR)	0.045
10	Root Mean Square Error of Approximation (RMSEA)	0.052

Source: by the researcher according to the results of statistical analysis.

Table (6) shows that the results of the indicators used indicate a good conformity test, as they provide good and acceptable estimates to indicate the constructive validity of the SP scale, and that the phrases measure what they were prepared for.

In light of the previous results, the SP model is completely identical to the sample data, meaning that SP maintains its global structure consisting of the following three dimensions (environmental performance, social performance and economic performance) of the research sample. From the above, we conclude that the SP model under research has a great deal of validity in representing data, as well as a high level of stability.

12.3. The Relationship between GSCM and GI

The simple correlation coefficient (Spareman) was calculated between the research variables, except for the demographic variables, in order to identify the strength, direction and significance of the relationship between the research variables, the positive sign indicates that the relationship is positive, and the negative sign indicates that the relationship is inverse. We explain this in the following table:

12.3.1. MCA for GSCM and GI

Table (7)
MCA for GSCM and GI

	IEM	ECO	EC	GP	RL
IEM	1.000				
ECO	0.688**	1.000			
EC	0.652**	0.665**	1.000		
GP	0.629**	0.688**	0.695**	1.000	
RL	0.548**	0.586**	0.544**	0.520**	1.000
GI	0.723**	0.636**	0.679**	0.652**	0.585**

Source: by the researcher according to the results of statistical analysis.
** Correlation is significant at 0.01 level n= 342

It is clear from the matrix of correlation coefficients between GSCM practices and GI that:

1. There is a significant direct correlation between the practices of GSCM and each other. The correlation coefficients ranged between (0.695) and (0.520), all of which are statistically significant at a significant level of 0.01.
2. IEM as a practice of GSCM is directly and statistically significant with GI, and the value of the correlation coefficient between IEM and GI (0.723).
3. Eco as a practice of GSCM is directly and statistically significant with GI, and the value of the correlation coefficient between Eco and GI (0.636).
4. EC as a practice of GSCM is directly and statistically significant with GI, and the value of the correlation coefficient between EC and GI (0.679).
5. GP as a practice of GSCM is directly and statistically significant with GI, and the value of the correlation coefficient between GP and GI (0.652).

6. RL as a practice of GSCM is directly and statistically significant with GI, and the value of the correlation coefficient between RL and GI (0.585).

Based on the above, it can be said that the correlation analysis gives an initial indication of the extent of the impact of GSCM practices on GI, but the judgment of the extent of the impact of each practice of GSCM on the GI is left to the results of the multiple regression analysis.

12.3.2. MRA for GSCM and GI

This section attempts to provide an answer to the first question in this research which is related to the type and effect of the relationship between GSCM and GI. This is through testing the first hypothesis of this research which is:

"H1: There is a statistically significant relationship between GSCM and GI at the pharmaceutical companies under research."

To achieve this, the researcher applied a MRA method to verify the type and degree of this relationship between the GSCM as an independent variable and GI as a dependent variable. The results of applying the (MRA) method can be illustrated as follows:

Table (8)
MRA Results for GSCM and GI

	Variables of GSCM	Beta	R	R^2	Sig.
1	IEM	0.399**	0.824	0.678	0.000
2	ECO	0.053	0.745	0.555	0.296
3	EC	0.237**	0.772	0.595	0.000
4	GP	0.108*	0.774	0.599	0.042
5	RL	0.169**	0.695	0.483	0.000
R		0.867			
R^2		0.752			
Calculated F value		204.269			
Tabulated F value		2.24085427			
Degree of Freedom		5-336			
Significant level		0.000			

Source: by the researcher according to the results of statistical analysis.
** Statistical significance at the level 1%.
* Statistical significance at the level 5%.

The previous table (8) shows the following:

1. There is a positive linear relationship with statistical significance between the variables of GSCM and GI at the pharmaceutical companies

in Egypt under research (taken totally), and this relationship represented 86.7% (according to the multiple correlation coefficient in the model "R"), and this relationship is positive, where the greater interest with the GSCM practices, the greater GI for employees at pharmaceutical companies in Egypt under research.

2. It became clear that the interest of GSCM practices at pharmaceutical companies under research can explain about 75.2% (according to the coefficient of determination in the model "R^2") of the total variance in the level of GI among employees at pharmaceutical companies in Egypt under research.
3. It is clear from the analysis that there are four variables related to GSCM that enjoy a positive linear relationship with statistical significant between them and between the variable of GI at pharmaceutical companies in Egypt under the current research, and these practices are (IEM - EC - GP – RL).
4. It is also clear that there is only one practice of GSCM is not statistically significant in its relationship to GI, and this practice is (ECO), and it has a low contribution in explaining the variance of GI at pharmaceutical companies in Egypt under research.

It was decided to reject the null hypothesis which states that "There is no statistically significant relationship between GSCM and GI at the pharmaceutical companies under research" and accept the alternative hypothesis which states that "There is a statistically significant relationship between GSCM and GI at the pharmaceutical companies under research" and this is according to results of MRA that had shown that there was a relationship at a statistical significance level of 0.01 and 0.05 (according to F-Test) between GSCM and GI.

12.4. The Relationship between GSCM and SP

The simple correlation coefficient (Spareman) was calculated between the research variables, except for the demographic variables, in order to identify the strength, direction and significance of the relationship between the research variables, the positive sign indicates that the relationship is positive, and the negative sign indicates that the relationship is inverse. We explain this in the following table:

12.4.1. MCA for GSCM and SP

Table (9)
MCA for GSCM and SP

	IEM	ECO	EC	GP	RL
IEM	1.000				
ECO	0.688**	1.000			
EC	0.652**	0.665**	1.000		
GP	0.629**	0.688**	0.695**	1.000	
RL	0.548**	0.586**	0.544**	0.520**	1.000
SP	0.735**	0.674**	0.672**	0.712**	0.634**

Source: by the researcher according to the results of statistical analysis.
** Correlation is significant at 0.01 level n= 342

It is clear from the matrix of correlation coefficients between GSCM practices and SP that:

1. There is a significant direct correlation between the practices of GSCM and each other. The correlation coefficients ranged between (0.695) and (0.520), all of which are statistically significant at a significant level of 0.01.
2. IEM as a practice of GSCM is directly and statistically significant with SP, and the value of the correlation coefficient between IEM and SP (0.735).
3. Eco as a practice of GSCM is directly and statistically significant with SP, and the value of the correlation coefficient between Eco and SP (0.674).
4. EC as a practice of GSCM is directly and statistically significant with SP, and the value of the correlation coefficient between EC and SP (0.672).
5. GP as a practice of GSCM is directly and statistically significant with SP, and the value of the correlation coefficient between GP and SP (0.712).
6. RL as a practice of GSCM is directly and statistically significant with SP, and the value of the correlation coefficient between RL and SP (0.634).

Based on the above, it can be said that the correlation analysis gives an initial indication of the extent of the impact of GSCM practices on SP, but the judgment of the extent of the impact of each practice of GSCM on the SP is left to the results of the multiple regression analysis.

12.4.2. MRA for GSCM and SP

This section attempts to provide an answer to the second question in this research which is related to the type and effect of the relationship between GSCM and SP. This is through testing the second hypothesis of this research which is:

"H2: There is a statistically significant relationship between GSCM and SP at the pharmaceutical companies under research."

To achieve this, the researcher applied a MRA method to verify the type and degree of this relationship between the GSCM as an independent variable and SP as a dependent variable. The results of applying the (MRA) method can be illustrated as follows:

Table (10)
MRA Results for GSCM and SP

	Variables of GSCM	Beta	R	R^2	Sig.
1	IEM	0.354**	0.837	0.700	0.000
2	ECO	0.077	0.770	0.592	0.105
3	EC	0.109*	0.757	0.573	0.015
4	GP	0.228**	0.810	0.656	0.000
5	RL	0.224**	0.731	0.534	0.000
R		0.887			
R^2		0.786			
Calculated F value		247.543			
Tabulated F value		2.24085427			
Degree of Freedom		5-336			
Significant level		0.000			

Source: by the researcher according to the results of statistical analysis.
** Statistical significance at the level 1%.
* Statistical significance at the level 5%.

The previous table (10) shows the following:

1. There is a positive linear relationship with statistical significance between the variables of GSCM and SP at the pharmaceutical companies in Egypt under research (taken totally), and this relationship represented 88.7% (according to the multiple correlation coefficient in the model "R"), and this relationship is positive, where the greater interest with the GSCM practices, the greater SP for employees at pharmaceutical companies in Egypt under research.

2. It became clear that the interest of GSCM practices at pharmaceutical companies under research can explain about 78.6% (according to the coefficient of determination in the model "R^2") of the total variance in the level of SP among employees at pharmaceutical companies in Egypt under research.
3. It is clear from the analysis that there are four variables related to GSCM that enjoy a positive linear relationship with statistical significant between them and between the variable of SP at pharmaceutical companies in Egypt under the current research, and these practices are (IEM - EC - GP – RL).
4. It is also clear that there is only one practice of GSCM is not statistically significant in its relationship to SP, and this practice is (ECO), and it has a low contribution in explaining the variance of SP at pharmaceutical companies in Egypt under research.

It was decided to reject the null hypothesis which states that "There is no statistically significant relationship between GSCM and SP at the pharmaceutical companies under research" and accept the alternative hypothesis which states that "There is a statistically significant relationship between GSCM and SP at the pharmaceutical companies under research" and this is according to results of multiple regression analysis that had shown that there was a relationship at a statistical significance level of 0.01 and 0.05 (according to F-Test) between GSCM and SP.

12.5. The Relationship between GI and SP

The simple correlation coefficient (Spareman) was calculated between the research variables, except for the demographic variables, in order to identify the strength, direction and significance of the relationship between the research variables, the positive sign indicates that the relationship is positive, and the negative sign indicates that the relationship is inverse. We explain this in the following table:

12.5.1. MCA for GI and SP

Table (11)
The Matrix of Correlation Coefficients between GI and SP

	Green Product Innovation	Green Process Innovation
Green Product Innovation	1.000	
Green Product Innovation	0.622**	1.000
SP	0.668**	0.696**

Source: by the researcher according to the results of statistical analysis.
** Correlation is significant at 0.01 level n= 342

It is clear from the matrix of correlation coefficients between GI dimensions and SP that:

1. There is a significant direct correlation between the dimensions of GI and each other. The value of the correlation coefficient between the two dimensions of green product innovation and green process innovation (0.622) which is statistically significant at a significant level of 0.01.
2. Green product innovation as a dimension of GI is directly and statistically significant with SP, and the value of the correlation coefficient between green product innovation and SP (0.668).
3. Green process innovation as a dimension of GI is directly and statistically significant with SP, and the value of the correlation coefficient between green process innovation and SP (0.696).

Based on the above, it can be said that the correlation analysis gives an initial indication of the extent of the impact of GI dimensions on SP, but the judgment of the extent of the impact of each dimensions of GI on the SP is left to the results of the multiple regression analysis.

12.5.2. MRA for GI and SP

This section attempts to provide an answer to the third question in this research which is related to the type and effect of the relationship between GI and SP. This is through testing the third hypothesis of this research which is:

"H3: There is a statistically significant relationship between GI and SP at the pharmaceutical companies under research."

To achieve this, the researcher applied a MRA method to verify the type and degree of this relationship between the GI as an independent

variable and SP as a dependent variable. The results of (MRA) method can be illustrated as follows:

Table (12)
MRA Results for GI and SP

	Variables of GI	Beta	R	R^2	Sig.
1	Green Product Innovation	0.355**	0.779	0.606	0.000
2	Green Process Innovation	0.570**	0.834	0.695	0.000
R		0.867			
R^2		0.751			
Calculated F value		511.946			
Tabulated F value		3.0223621			
Degree of Freedom		2-339			
Significant level		0.000			

Source: by the researcher according to the results of statistical analysis.
** Statistical significance at the level 1%. * Statistical significance at the level 5%.

The previous table (12) shows the following:

1. There is a positive linear relationship with statistical significance between the variables of GI and SP at the pharmaceutical companies in Egypt under research (taken totally), and this relationship represented 86.7% (according to the multiple correlation coefficient in the model "R"), and this relationship is positive, where the greater interest with the GI dimensions, the greater SP for employees at pharmaceutical companies in Egypt under research.
2. It became clear that the interest of GI dimensions at pharmaceutical companies under research can explain about 75.1% (according to the coefficient of determination in the model "R^2") of the total variance in the level of SP among employees at pharmaceutical companies in Egypt under research.
3. It is clear from the analysis that there are a positive linear relationship with statistical significant between GI and the variable of SP at pharmaceutical companies in Egypt under the current research.

It was decided to reject the null hypothesis which states that "There is no statistically significant relationship between GI and SP at the pharmaceutical companies under research" and accept the alternative hypothesis which states that "There is a statistically significant relationship between GI and SP at the pharmaceutical companies under research" and

this is according to results of multiple regression analysis that had shown that there was a relationship at a statistical significance level of 0.01 and 0.05 (according to F-Test) between GI and SP.

12.6. The Indirect Relationship between GSCM and SP through GI as a Mediating Variable

The researcher deals with the answer of the fourth question, which is related to determining the type and degree of indirect relationship between GSCM and SP through GI as a mediating variable and the analysis of this relationship was used path analysis method, and the researcher used the Structural Equation Modeling (SEM) method using the path analysis program, which is one of the regression programs, through which it is possible to test the mediating effect of GI on the relationship between GSCM and SP, because this method has the advantage of being able to use it in the case of missing data where AMOS efficiently estimates this data through the Maximum Likelihood Estimates (MLE) method, instead of relying on human deletion or calculating the average, in order to validate the fourth hypothesis that states on **"There is no statistically significant relationship between GSCM and SP through the GI as a mediating variable"**

- **Determining the Form and Significance of the Relationship between GSCM at the Pharmaceutical Companies in Egypt and SP through GI as a Mediating Variable**

This part of the analysis discusses testing the fourth hypothesis, which states that "There is no statistically significant relationship between GSCM and SP through the GI as a mediating variable". Table (13) shows the effect of GI as a mediating variable in the relationship between GSCM and SP at the pharmaceutical companies in Egypt under research:

Table (13)

AMOS Model for the Impact of GI as a Mediating Variable in the Relationship between GSCM and SP

Variables		Direct Effect	Indirect Effect	Total Effect	Sig.
Independent	Dependent				
GSCM	GI	0.838	0.000	0.838	0.000
GSCM	SP	0.574	0.347	0.921	0.000
GI	SP	0.414	0.000	0.414	0.000

Source: by the researcher according to the results of statistical analysis.

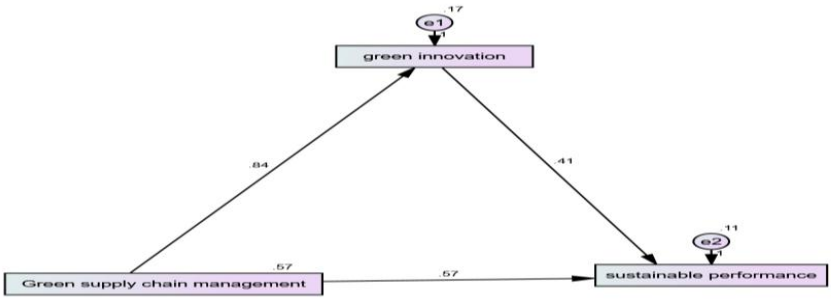
** Statistical significance at the level 1%. * Statistical significance at the level 5%.

Table (14)
Conformity Indicators for GSCM and SP through GI as a Mediating Variable

N	Fit indices and their acceptable thresholds	Test Value
1	(Chi-Square) / (Degree of freedom) > 5	4.626
2	P. value < 0.05	0.000
3	Goodness of fit Index (GFI) > 0.95	0.921
4	Tuker-Lewis Index (TLI) > 0.95	0.980
5	Comparative Fit Index (CFI) > 0.90	0.972
6	Normed Fit Index (NFI) > 0.95	0.968
7	Incremental Fit Index (IFI) > 0.95	0.922
8	Relative Fit Index (RFI) > 0.90	0.904
9	Root Mean Square Residual (RMR) < 0.05	0.020
10	Root Mean Square Error of Approximation (RMSEA) < 0.09	0.098

Source: by the researcher according to the results of statistical analysis.

Figure (5)
AMOS Model for the Impact of GI as a Mediating Variable in the Relationship between GSCM and SP



Source: by the researcher according to the results of statistical analysis.

The previous tables (13,14) and figure (5) show the following:

- That there is a degree of agreement between GSCM and SP, and that all regression coefficients are highly significant, which confirms that GI with its two dimensions plays a mediating role between GSCM and the SP at the pharmaceutical companies under research, and it was clear from the results that the mediating effect explains the relationship more. It supports the effect of the dimensions of GI, as the value of the Goodness of Fit Index (GFI) reached 92.1%, and the value of the comparative conformity index

(CFI) reached 97.2%, the higher the value of these two indicators, indicates better agreement, and the value of the root mean square residual (RMR) is 0.020, and the smaller the value of that indicator, indicates greater agreement, and thus it becomes clear to us the quality of the estimated model.

- Also, the Tuker-Lewis Index (TLI), which reached the value (0.980), was an indication of the good matching of the data to the model, in addition to the RMSEA index, which is the most important indicator in the constructive model, which reached the value (0.098), which is a good value and close to zero where it is completely identical. The Normed Fit Index (NFI) also reached (0.968).
- It also clear that the value of IFI was (0.922), and this indicates that the model matches, and finally the value of RFI (0.904), and this value is a good value for matching, as the best match is when the value is equal to (0.950), and the exact match is when the value is equal to one.
- Since all the indicators have good values of conformity, the model is acceptable as indicated in the study of (Bentler & Bonett, 1980) thus, the values of the coefficients of validity or saturation are accepted for the paragraphs, as the given estimates by the AMOS program indicate good criteria for accepting the model. And all of these indicators confirm the high quality of model conformity, and that the regression coefficients are significant, which confirms that GI has a mediating effect between GSCM and SP.

It was decided to reject the main fourth null hypothesis which states that "There is no statistically significant relationship between GSCM and SP through the GI as a mediating variable" and accept the alternative hypothesis which states that "There is a statistically significant relationship between GSCM and SP through the GI as a mediating variable" and this is after the path analysis model showed that there is a significant indirect relationship at a significant level of 0.01 and 0.05 between GSCM and SP through the GI as a mediating variable.

13. Research Findings

1. There is a positive significant correlation between GSCM as a whole and GI, this means that the higher interest with the level of GSCM practices, the higher GI at the pharmaceutical companies in Egypt under

research. MRA shows that R value between GSCM and GI (86.7%) and R^2 (75.2%).

2. There is a positive significant correlation between GSCM as a whole and SP, this means that the higher interest with the level of GSCM practices, the higher SP at the pharmaceutical companies in Egypt under research. MRA shows that R value between GSCM and SP (88.7%) and R^2 (78.6%).
3. There is a positive significant correlation between GI as a whole and SP, this means that the higher interest with the level of GI dimensions, the higher SP at the pharmaceutical companies in Egypt under research. MRA shows that R value between GI and SP (86.7%) and R^2 (75.1%).
4. The dimensions of GI have contributed to strengthening the relationship between GSCM and SP at the pharmaceutical companies in Egypt, where there is an indirect relationship between GSCM practices (IEM, ECO, EC, GP and RL) as an independent variables in the model and SP, which means that GI plays a mediating role in the relationship between GSCM and SP at the pharmaceutical companies in Egypt.

14. Research Recommendations

1. Pharmaceutical companies that want to shift to GSCM and improve their business must review all current business methods to determine the appropriate change method and tool for the transformation.
2. Pharmaceutical companies should provide information to customers about the possibility of cooperating with them in environmentally friendly design and supply of green supply chains.
3. Pharmaceutical companies must follow a strategy to reach green pharmaceutical industries and work to achieve green environmental sustainability.
4. It is necessary to design pharmaceutical products in a way that facilitates easy assembly of materials at the lowest possible cost.
5. Pharmaceutical companies should follow the zero-level approach to storage, in order to reduce the amount of raw materials and finished products available in stores.
6. Pharmaceutical companies should share with all parties in the green supply chains all information related to the expected demand for pharmaceutical products.

15. Suggested for Future Researches

There is a need to conduct more future studies on the subject of GSCM, to verify the extent to which different variables can be generalized to other sectors. Among the proposed studies are the following:

1. A study explaining the relationship of green supply chain management to beneficiary satisfaction under e-government - by application to any of the (traffic departments - civil registry - real estate registration) in the Arab Republic of Egypt.
2. Conducting a study to demonstrate the impact of sustainable supply chain management on digital procurement systems.
3. Study the role of GSCM in increasing profitability.

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