THE IMPACT OF ADOPTING GREEN PROCUREMENT PRACTICES ON COMPETITIVENESS IN SMES.

By

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THESIS ACCEPTANCE CERTIFICATE

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Declaration

I, Nimra Safdar, hereby declare that the following thesis, titled " The Impact of Adopting Green Procurement Practices on Competitiveness in SMEs," is solely my own work and has not been submitted in part or in full for any of other academic purposes. This thesis represents my own research and efforts in pursuit of Master of Science in Logistics and Supply Chain Management (MS L&SCM) in NUST Business School (NBS) at National University of Sciences and Technology (NUST), Islamabad, Pakistan.

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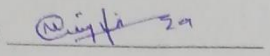
Signature: 

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Abbreviations

Acronyms	Abbreviations
AGPP	Adoption of green procurement practices
GPP	Green procurement practices
SME	Small and Medium Enterprises
CP	Customer Pressure
SSB	Supplier's sustainable behavior
GI	Green innovation
SEM	Structural Equation Modelling
CFA	Confirmatory Factor Analysis
PLS	Partial least square

Abstract

In the previous decade, green procurement practices have become increasingly important for the SMEs to adopt in this highly robust business environment. This paper is about green procurement practices as a new trend towards developing a more sustainable economy across the globe. Green procurement has started to being recognized as an efficient tool of minimalizing the adverse impact on the natural environment when it comes to the manufacturing of the items and their usage. In addition to this, the companies are also held accountable for their conduct, especially the SMEs that are plays a pivotal role in shaping the economy of a country. Which ultimately places specific pressures on the company to adopt green practices. This study investigates the impact of adopting green procurement practices upon competitiveness in SMEs. Although many researchers have discussed the role of GSCM known as Green Supply-Chain Management towards sustainability, the notion in context of green procurement practices is still underexplored. However, there are very few researchers who have discussed the adoption of green procurement practices that as well in context of large organizations or in developed countries. So, this paper aims to investigate the impact of adopting green procurement practices on the competitiveness of SMEs, especially in case of a developing country. To address this gap a hypothesized model is developed. Accordingly, a population of manufacturing SMEs operating in Pakistan are targeted among which 188 responses were received through purposive sampling. As CEOs, managers, assistant managers, and procurement managers are more informed about the status of their companies so they are selected as participants of the study. The Structural Equation Modelling (SEM) analysis was conducted on SmartPLS software. Based upon the results and findings customer pressure has significant influence on the adoption of green procurement practices, the AGPP has significant impact on supplier sustainable behavior and green innovation, AGPP alone have insignificant impact on competitiveness but with supplier sustainable behavior and green innovation it will ultimately have significant impact on competitiveness of SMEs. The suggestions and findings of the results will provide greater insight into the subject matter as well as guides on how managers can enhance the performance of their companies.

Keywords: *Green procurement practices, small and medium enterprises, sustainable supplier behavior, customer pressure, green innovation, firm competitiveness.*

1. Introduction

The first chapter of the dissertation will offer a common ground for reader by providing information about the surroundings and scope of the research. The reader will gain knowledge and information about the study that is being undertaken. Furthermore, this first chapter would contain the overview, the background of the research, the details of small and medium sized enterprises, significance of study, problem statement and the research objectives, along with the outline of research.

1.1. Overview

Over the years, due to the swift advancement in the development of the world's economy and urbanization of industrial sector the carbon footprints and greenhouse gas emissions have risen to a great extent (Zhou, Si, & Tiwari, 2023). With the industrial progress within the economy, companies should also focus on environmental and social development. Numerous nations have recognized the adverse environmental impacts of the industrial revolution. This has increased the concerns of the organizations and has made them consider green operations. Green supply chain management is becoming biggest concern of enterprises these days as the businesses want to incorporate green practices in their day to day businesses. Environmental or sustainable supply chain management are the broader concepts that also contains the green procurement. The criteria for environmental performance has been introduced into the ordinary mechanism of procurement due to the green procurement concept. It is not an easy task to perform green procurement. In order to perform the green procurement practices the buying firm needs specific technical and environmental competencies (Mosgaard, 2015). Green procurement often requires collaboration among all the actors within the supply chain.

Small and medium-sized enterprises are pivotal to the growth of an economy. And are considered to be major drivers in the economic progression of states. As large proportion of the SMEs are involved in the construction, manufacturing, plastic and chemical products, they are producing the most impact on the natural environment as well. The most significant barrier towards green procurement practices implementation is the insufficient awareness among managers. It is very rare that the practitioners or managers consider the impact of procurement on environment. These kind of situations give rise to environmental degradation and the issues like deforestation, pollution, carbon dioxide emissions and climate change (Chan, Tiwari, Ahmad, Zaman, & Sia, 2018). There are different kind of environmental prevention programs and certifications that are being introduced to promote adoption of green practices. Most

companies are compelling themselves towards green supply chain. With increasing awareness of sustainable development a lot of countries are trying to commit themselves towards the sustainable development (Thomson & Jackson, 2007). Along with the governments and businesses customers and general public are also becoming aware of the environmental safety. Therefore in the development of the green economy sustainable or green procurement has become a global trend. but it is still questionable that how show the green procurement practices (GPP) should be implemented in developing countries' SMEs.

The increasing focus of the organizations and the corporate sector towards the green procurement provides procurement the central role when the environmental efforts of the organizations are concerned. This makes procurement a very crucial function of the organization which typically involves the buying of the products and services. Many companies are shifting their focus to convert their procurement activities into green procurement, meaning to be involved in the purchasing of greener products. As stated by Rais, Bidin, Bohari, and Saferi (2018), an effective tool to reduce the environmental impact is green procurement that is being widely adopted by many countries. However, as far as the developing countries like Pakistan is concerned that implementation of green practices are yet at the preliminary phase. Most SMEs in Pakistan are still not concerned of concept of green procurement. Due to this the managers of the SMEs makes the decisions that has adverse effects on the natural environment such as they purchase or procure those products and services that are not ecofriendly (Chan et al., 2018). These poor decisions made by the management of SMEs are resulting in the environmental deterioration of the planet.

To mitigate the effect of procurement operations on natural assets, SMEs are urged to adopt green procurement related practices. It is believed that adoption of green procurement practices in the SMEs will help the firms achieve better performance as well as reduce the impact on environment. The adoption and implementation of GPP the social development as well as increase the level of competitiveness for the firms. As well as the adoption of GPP aims to achieve the goal of reduced environmental impact and increased sustainable development. In addition, demand for the environmental friendly products from customers are compelling SMEs to adopt GPPs. Its is emphasized that the demand from the buyers regarding ecofriendly products will itself create awareness and educate the businesses towards issue of sustainability (Michelsen & de Boer, 2009).

1.2.Background

In the drive for the sustainability globally, the green business practices and the

environmental sustainability has received extraordinary prominence within the past few years. The small and medium-sized enterprises i-e the SMEs are fundamental arenas where these concepts are embraced and tested. As SMEs plays the most substantial role in the economy worldwide. Statics has shown that in most of the countries 99% of the businesses belongs to small and medium-sized companies category (Alexander, Antony, & Cudney, 2022). The technical definition of SMEs varies from country to country. The most common variables that are used globally to define SMEs are assets, the number of employees and the annual turnover (SMEDA, 2021). According to European Commission small and medium-sized enterprises are business firms that have 250 fulltime employees and create an annual turnover of 50,000,000 euro. According to the National SME Policy 2021, small and medium enterprise is defined as any business entity that has capital of Rs. 25,000,000, annual sales of Rs. 250,000,000 and a workforce of 250 employees. According to Iftikhar Ahmad and and Fizzah Khalid Butt (2022), the State Bank of Pakistan (SBP) defined SMEs as follows:

Table 1.1. Criteria of SMEs

Enterprise Category	**Criteria**	
	Turnover	**Employees**
Small Enterprise	Rs. 150 million	≤ 50
Medium Enterprise	Rs. 150 M to Rs. 800 M	> 50, < 250

Source: Author

The National SME Policy 2021 Provided the definition of the SME that should be adopted across all over the country:

Table 1.2. Definition of SME

Enterprise Category	**Criteria**
	Turnover
Small Enterprise	Rs. 150,000,000
Medium Enterprise	Rs. 150,000,000 to Rs. 800,000,000
Start-up	Any SME i-e older than 5 years

Source: (SMEDA, 2021)

In the UK 99.8% of the firms has less than 250 employees and they contributes more than half of the country's revenue (Analoui & Karami, 2003). According to the OECD, over 95% of all the firms are accounted to be in the category of SME creating about 60% to 70% of the employment. In Pakistan, SMEs serve as the backbone of economy. In Pakistan SMEs

forms 90% of the business sector (Khalique, Bontis, Abdul Nassir bin Shaari, & Hassan Md. Isa, 2015). According to estimates by SMEDA, more than 5,000,000 SMEs are operating in Pakistan (State Bank of Pakistan, 2022). Pakistan has 3.3 million SMEs operating within it. providing 99% of employment; of which 90% is from industrial and 78% is from non-agriculture labor (Matloob, Limón, Montemayor, Raza, & Rodriguez, 2023). The GDP contribution of the SMEs in Pakistan is around 40% , providing 30% of the exports (Matloob et al., 2023). Out of the 3.3 million SMEs that exists in Pakistan over 400,000 are the manufacturing firms, 1,000,000 retailers and 600,000 are the service units (M. W. J. Khan & Khalique, 2014). Therefore, it is seen that the growth of SMEs are directly proportional to the country's economic progress. Moreover, The firms that are in the industrial sector can employee the non-agricultural labor force of nearly 78%, contains 25% of manufactured goods exports along with sharing 35% value addition to the manufacturing (S. A. H. Shah, 2018).

Table 1.3. Contribution of SMEs towards the Economy

Pakistan's SME Sector	
Total number	33,00,000
As % of total business	90%
Share in industrial employment (non-agriculture)	78%
Share in value addition (manufacturing)	35%
Export earnings (Manufacturing)	25%

Table 1.3 significantly shows the role of manufacturing SMEs contribution in growth of country's economy. Within the industrial sector of Pakistan, the most dominant position is held by manufacturing SMEs contributing 12.01 to the GDP of Pakistan (PBS, 2023). The Pakistan's manufacturing industry relies heavily on the textiles because the most extended chain of production. Approximately 25% of the value added in the industry is due to textile with a share in country's export of 59.53 %. Whereas, the fertilizer industry also contributes approximately 30% to 50% to the crop yield (PBS, 2023). In Pakistan, it is evident that among the SMEs the major contribution is made by the SMEs that operates in dairy products, furniture or wood, jewelry, cotton weaving, metal products, catering and food (Ali, 2018). Apart from these industries in manufacturing the automobile, pharmaceutical, chemical, cement, sport goods industries are also major contributors towards the advancement of country's economy. It is evident from the "Pakistan Economic Survey 2022-23" that around the world the SMEs are considered to be the strongest pillars to alleviate poverty as they increase the standards of

living, creates employment and thrives towards equitable distribution of income.

Despite the importance of SMEs in driving economic growth, they significantly impact the natural environment. It is estimated that 60% of the carbon dioxide emissions has been produced by SMEs. They also account for 70% of the global pollution (Parker, Redmond, & Simpson, 2009). Even in Pakistan, the industrial sector is the largest sectors that results in a total of 35% energy consumption (Hassan, Burek, & Asif, 2017). This industry and the natural environment is majorly effected due to the energy crisis of Pakistan. This rising impact of the SME operations on the environment has risen concerns among many. In today's era of fast development and continuous urbanizations of the industries the environmental degradation is becoming increasingly very serious. The practitioners are now focusing on the preservation of the planet by making sustainable development. Firms are becoming more conscious about the environmental issues and are considering to incorporate environmental factors in their everyday operations. This concerns of organizations regarding the preservation of the environment has led to the advent green concept (Chepkoech, Chenuos, & Kosgei, 2015). Green procurement, green supplies and green management are all included in the green concept.

The origin of the green or sustainable procurement goes back to the 1980s. Green procurement is defined as taking under consideration the environmental factors while purchasing goods and services which ensures that the impact on environment has reduced (Chepkoech et al., 2015). The sustainable development concept was first defines by Brundtland Commission in 1987 (Ho, Dickinson, & Chan, 2010). After this the dual sustainable or green production and consumption were included in the national policies and plan of Denmark and the Netherlands in the year 1991. In 1992 in order to eliminate the unsustainable practices of production and consumption green purchasing came into being. Many international and national organizations and associations are built such as OECD, UN Commission on Sustainable Development (UNCSD) to facilitate the sustainability concept around the world (Ho et al., 2010). Organizations spend hefty amount of their money on the purchasing and procurement activities. The governmental and the non-governmental organizations are taking part and are promoting green procurement to a great extinct. A remarkable progress has been seen in the performance of the overall economy of different countries due to the implementation of green procurement.

It could be very interesting to employ green procurement practices in the SMEs of developing countries due to the challenges they face. A lot of emphasis has been laid on

adoption of green procurement practices around globe. The multinational organizations or the large organizations are keen to adopt these procedures and practices. The SME sector is a little reluctant towards its adoption due to various factors. There is limited awareness regarding the sustainable development. Furthermore, the SMEs have very limited amount of resources and facilities (Parker et al., 2009). There is an extensive research done on adopting green procurement practices but its usually carried out in developing countries or in large organizations. There are still some loopholes in the adoption of GPPs in developing countries SMEs. Given found loopholes, the research study will provide a thorough understanding of how SMEs implement GPPs and what are the impact upon the competitiveness of SMEs. Further, this research will also explore the motivations that are compelling SMEs to adopt GPP, the strategies and the enhanced performance in terms of competitiveness. By shedding light on this important phenomenon, this paper will advance the deeper knowledge of transformative power of GPP and its implications for the global push towards a more sustainable future.

1.3.Problem Statement

It is very challenging to bring GPPs in the SME sector especially in the developing economies (AlNuaimi & Khan, 2019). It has been proposed that implementing green procurement practices enhances a firm's competitive stance. The organizations that adopts GPP are more successful than those who do not. Despite the significance of the GPPs research on this topic remains scarce, especially concerning SMEs in developing nations. Most of the firms are still not implementing GPPs (Beleya, Khim, & Wei, 2019). Moreover most of the researches that are conducted previously are only limited to some specific regions and may not be applicable in other regions of the world (Ivanova, 2020). Numerous factors play a role in influencing GPP and that would result from the adoption of GPPs.

Many studies have overlooked crucial factors that could profoundly affect SMEs' performance and, consequently, the environment (Khodaparasti, Garabollagh, & Mohammadpour, 2020).

To tackle the aforementioned issues, this study will focus on the following research questions:

RQ1: Does the adoption of green procurement practices contribute to the firm competitiveness ?

RQ2: What are the factors affecting the relationship between the adoption of GPPs and competitiveness?

Aligned with the stated research questions, the study aims to achieve the following

objectives:

RO1: To identify various factors affecting the adoption of green procurement practices in the SMEs.

RO2: To examine the impact of adopting green procurement practices on competitiveness in SMEs.

RO3: To analyze the mediating role of Green innovation and supplier sustainable Behavior in the relationship between AGPP and competitiveness.

RO4: To suggest policy options to improve the adoption of green procurement practices in the SMEs.

1.4.Research Significance

Given the identified gap, there is an urgent need for a study that offers a comprehensive understanding of the factors driving GPP adoption and its effects on firm competitiveness. This research would be beneficial to create awareness regarding the adoption of GPP that would lead to the safety of the environment. Also if SMEs of developing countries would adopt these practices they can enhance their performance. The readers will tend to get the better understanding of the subject matter. If the GPPs are implemented effectively they can contribute a lot to the sustainable development. Carbon emissions, environmental degradation and footprints of SMEs can be reduced. Hence, it's essential to comprehend GPPs, their influencing elements, and their impact on the performance of the SME sector in developing nations.

1.5.Research Outline

This section will offer readers an overview of the study that is illustrated in the figure 1.1. The introduction chapter set the stage for the thorough understanding as well as the exploration of the topic, providing the context that will help understand

the significance of implementing green procurement practices within small and medium-sized enterprises and also to understand the rationale behind investigating its impact on the SMEs' competitiveness. It further discusses statement of the problem, questions and objectives of research, along research significance.

The subsequent chapter will delve into the detail frame of reference. As well as in order to form theoretical basis for the study a thorough literature review is also undertaken. The third will provide brief description of the methodology that is being used including philosophy of research, approach being adopted, design of research, after this the method for collecting data will be outlined. Finally, the empirical data will be analyzed using specific techniques and

methodologies that are discussed in the chapter of methodology. Subsequently, chapter four will present the study's results, encapsulating both the analysis and empirical findings of the research. Lastly the study will be concluded and the conclusion possesses information on both the practical and the theoretical implications. The chapter will also address the study's limitations and provide recommendations for future research endeavors.

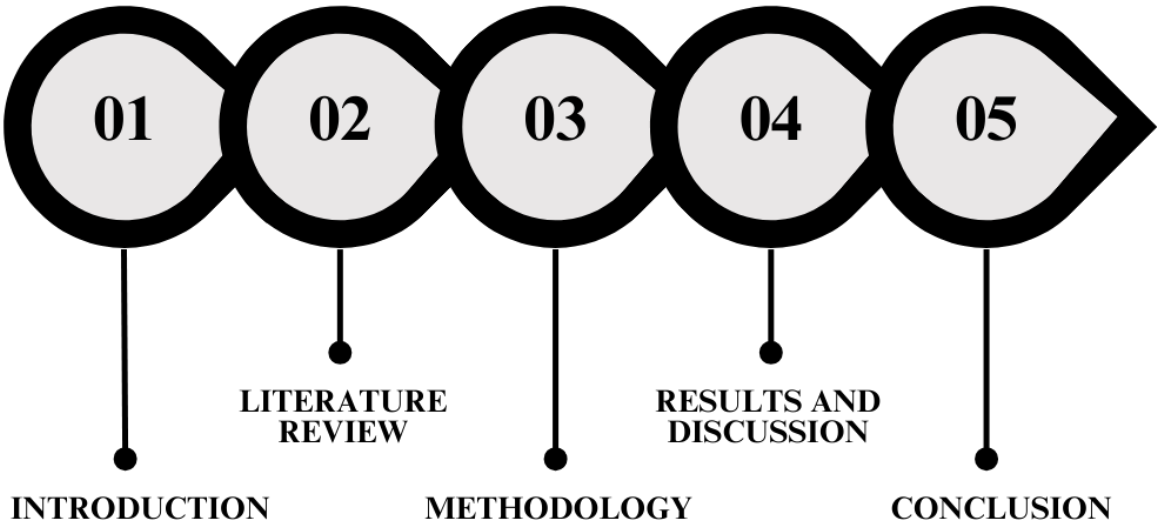

Figure 1.1. Outline of the Study

2. Literature Review

This chapter will provide an widespread review of the literature upon adoption of GPP in SMEs sector and what is its significant in the developing countries like Pakistan. The chapter further provides an insight on the prevailing literature on adoption of GPP in SMEs. This chapter will further discuss the impact of adopting GPP in SME sector with evidence from the literature. Furthermore, this chapter identifies gaps in existing literature and aims to address them.. Next, with the guidance from the literature hypothesis are developed in this chapter. Lastly, this chapter proposes an analytical framework as well.

2.1. Green Procurement Practices in Small and Medium-sized Enterprises

To address the sustainability objectives of companies, green procurement has the potential to elevate the firms performance. The purchasing function is rising concerns about the environmental sustainability among the organizations (Zsidisin & Siferd, 2001). The purchasing function is very critical for any organization as it can have major bearings on earth or natural environment. Firms that considers green purchasing or focuses on activities considering the environmental impact can stand at an advantageous position than others who do not (Appolloni, Sun, Jia, & Li, 2014). There is a large number of organizations that are becoming more environmental conscious which has risen the standing of green procurement (Blome, Hollos, & Paulraj, 2014). Green procurement, refers to the process in which the buyer aims to buy the products, the services and tends to work in a manner that minimizes effect on the natural environment. (Dinu, 2020). It is also said that green procurement is a process of choice making because throughout the buyer's life cycle the buyer aims to procure those goods and services and works in such a way so that the environmental impact would be reduced.

Many researchers says that green procurement has the potential to integrate all the firms operations to the environmental protection (Zsidisin & Siferd, 2001). The strategies for the prevention of pollution and sustainable businesses practices have been historically focused by the organizations that are operating on the large scale (Caldera, Desha, & Dawes, 2018). A lot of emphasis has been made especially on the adoption of GPP in SME because they are the key stakeholders in an economy representing 99.7% of the enterprises and contributing to 60% employment (Koirala, 2019). From the previous analysis, it has been estimated that a total of 70% of the industrial pollution is created by SMEs (Tevapitak, 2019) and is also responsible for creating 60% to 70% of pollution caused by manufacturing only (S. Mitchell, Dimache, & O'Dowd, 2010). This is still a key challenge of how SMEs should embed the sustainable business practices in their fundamental operations. This often occurs due to a lack of awareness,

as many SMEs believe their practices have minimal impact on the social and natural environment. Due to this, for various years the purchasing department or the purchasing authorities did not take into account or did not consider the impacts, costs and environmental aspects of their products and services (Ho et al., 2010). However, now a days, the economic and political conditions have changed a lot. With the growing concept of sustainable development greater efforts and more attention is paid to the environmental considerations when it comes to core policies and purchasing strategies of the firm.

Due to the environmental impact of SMEs, green procurement is being widely adopted by large organizations as well as the SMEs around the world. Many researchers has seen green procurement as an efficient tool for increasing the positive effect on the environment (Khodaparasti et al., 2020). In the economy that is driven by demand green procurement proves to be an important pressure that is in the favor of going green or the sustainability of the environment. The quality of the services and the products that are offered to the citizens can be improved by introducing the criteria for environmental protection and by promoting green procurement into the process of procurement (Dinu, 2020). This will help promote the sustainable consumption and production that would ultimately encourage the reduction of waste produced, application and development of new technologies, which in return leads to more cleaner environment and the green behavior pattern. The sustainable patterns of behaviors can also lead to the development of most leading and competitive technologies. Apart from its importance there is still very limited research on the implementation of green procurement practices, particularly within the SME sector This provides ground for deeper understanding of the topic.

2.2.Adoption of Green Procurement Practices

The concept of green procurement is increasingly receiving significant attention among the researchers and the practitioners. Green procurement practices denotes the process of buying environmental friendly materials and the products as well as developing good relationships with the supplier (S. A. R. Khan, Yu, Umar, & Tanveer, 2022). GP is also described as the use of a procurement process for achieving the objectives of sustainability (Pratik Kumar Singh, 2022). Green procurement ensures that the firms are aware of the practices that are environmental friendly. Furthermore, it ensures that the organizations should purchase only those products that are environmental friendly and have the minimum impact on the environment meaning that there should be minimum substitutions for the material, the use of natural resource utilization should be minimum as well as waste should be reduced (S. A.

R. Khan, Yu, & Farooq, 2023). As green procurement starts with the materials that are inside the organization it have significantly positive role in the development of green products. There are various types of pressures on the firm in order to react to those pressures the organizations need to engage themselves in the purchasing of green and sustainable products and resources (J. Yang, Wang, Gu, & Xie, 2021).

Over the passing years, due to the factor of growth the procurement practices has seen a rise and has a snowballing effect on environment. Whereas, adoption of green procurement practices means the ecological considerations are integrated with measures of purchasing, plans and policies (Khodaparasti et al., 2020). Most of the emerging countries like Pakistan rely on the SME sector to drive their economic growth. A lot of these SMEs were contributing to the environmental degradation. Therefore acting as a backbone to the economy of the country the SMEs should adopt GPPs. This will have a beneficial impact on the country's environment, economy and the development (Beleya et al., 2019).

In order for an organization to survive in a competitive market environment the technical information and the material resources are not enough, but legitimacy is also required. According to J. Yang et al. (2021), legitimacy refers to the perception that the organization is performing its operations under the confines of the social belief, values and norms. The 21st century organizations are constantly being exposed to the emerging as well as the existing pressure to be more responsive to the environmental expectations and consider activities that would lead to the competitiveness of the firm (J. Yang et al., 2021). The organizations that are more visible will more likely to attract pressure to indulge in environmental friendly practices (Hollos, Blome, & Paulraj, 2014).

There has been extensive research that are carried out on the topic of green procurement over the past years, but more areas need to be explored to provide the better understanding of the subject. In one study, P. K. Singh and Chan (2022), assesses the sustainability levels following the implementation of E-procurement practices, yet there was limited focus on the adoption of GPP. In another study, Jermsittiparsert, Siriattakul, and Wattanapongphasuk (2019) examines the relationship between environmental related outcomes and GSCM between manufacturing SMEs; whereas very small part of the review is dedicated to green purchasing. This paper will tend to provide an insight into impact of adopting GPPs on competitiveness in SMEs.

2.3. Customer Pressure

Customer pressure refers to the requirements of customers so that firm should enhance and

focus on their social and environmental performance (Ueki, 2016). The customers are showing increasing concern regarding the impact on the environment and such customers have a strong influence upon the manufacturing firms (Yen & Yen, 2012). The environmental concern is the concept that depends on the customer's emotional and cognitive assessment when environmental protection is concerned. The awareness of the environmental consumers increasingly conscious of the product's effect on ecological environment (Zhou et al., 2023). Customers are willing to buy green products. From the previous researches it is seen that the requirements of the customers have impacted the purchase decisions of many firms. The demand of the customers have driven innovation into the organizations as well (Foo, Kanapathy, Zailani, & Shaharudin, 2019). According to (ElTayeb, Zailani, & Jayaraman, 2010), customers being the financial stakeholders of the companies can exert a considerable amount of pressure on the firms to comply to environmental performance. Companies drive their motivation to produce or innovate green products from the customers who are eager to pay more money to buy sustainable/green products (Jun, Ali, Bhutto, Hussain, & Khan, 2019). Stakeholder and customer pressures compel companies to prioritize sustainable development initiatives, which ultimately led to the emergence of sustainable green procurement (Khodaparasti et al., 2020). Therefore, customer pressure serves as a significant catalyst for GP. Building on this premise, the following hypothesis is put forward:

H_1: Customer pressure significantly influences the adoption of GPPs.

2.4. Sustainable Supplier Behavior

Supplier sustainable behavior refers to the mechanism adopted by the suppliers that will encourage the employees of the firm towards sustainable procurement (Kotei & Yinping, 2019). It is seen that since suppliers does not operate independent of the organization rather they work in a complex social network, so when the individual actors abide by the authorization the overall health of the network improves. When it comes to the sustainable or green procurement the strategies should be formulated by the management that generates the consensus upon the merits of sustainable buying for each and every individual. This can only be initiated by building a roadmap that guides the firms towards sustainability (Kotei & Yinping, 2019). Supplier management, which basically involves engagement with the supplier is considered to be an integral part of strategic procurement, since the firm that is buying focuses more on the supplier commitment and the core competencies of their organization (Blome et al., 2014). In this going era, it may not be sufficient to just buy the already available green products from the green suppliers, instead it became crucial to be involved in the

environmental collaboration with the suppliers. Some of the researchers argued that green procurement and green supplier behavior mutually have different scope and its considered by them as an extra effort, green procurement still have significant impact on the green supplier behavior (Agarwal & Selen, 2009). Furthermore, AGPP helps firms to identify suppliers that would become sustainable/green. Based on the aforementioned arguments, the hypothesis can be formulated as follows:

H_2: The adoption of GPPs significantly influences supplier sustainable behavior.

2.5. Green Innovation

Green innovation is demarcated as ability to have the most modern or latest products, processes and practices that will have minimum effect upon environment (Jun et al., 2019). Green innovation can be fostered into businesses with the development of R&D investments & environmental management systems (Jun et al., 2019). According to many researchers green innovation is exploring ways for executing daily activities that would create minimum harm to natural environment and people. Over the past twenty years,

Researchers are increasingly focusing on the requirements of the green concept, exploring various angles of this evolving idea and its implications for organizations. However, GPPs require significant attention due to their role in fostering green innovation. (Sandra Marcelline et al., 2022). In the literature, two primary forms of green innovation are identified: proactive and responsive approaches. (Fernando, Jabbour, & Wah, 2019), (Abbas & Sağsan, 2019). Responsive GI is viewed as a more of a latest feature in the process or the product that is proposed as a solution to an existing problem. Conversely, proactive GI aligns with an organization's long-term objectives to enhance profitability, efficiency, and sustainability initiatives. (Kam-Sing Wong, 2012). Some of the researchers like (Zailani, Amran, & Jumadi, 2011) and (Björklund & Forslund, 2018) are of the view that when an organization adopts green procurement or done procurement according to the green guidelines it would led to the practices that would significantly contribute to the innovative procedures and processes that are aligned with the international standards of environmental safety (Sandra Marcelline et al., 2022). From this above mentioned argument the following hypothesis can be devised:

H_3: The adoption of GPPs significantly influences green innovation.

2.6. Adoption of Green Procurement Practices and Competitiveness

The initial and most crucial step of the value chain is the purchasing function. Success hinges on multiple factors, including the alignment of the company's environmental goals with its procurement practices and sustainability initiatives. (Carter, Kale, & Grimm, 2000). The

researchers has studied that AGPP have helped firms to eliminate or reduce the adverse effects of the wastes, pollutants thus preserving the natural environment. Hence making the firms more profitable (Yildiz Çankaya & Sezen, 2019). Huge emphasis has been paid on the adoption of GPP in the SME sector. Hence, the impact of adopting GPPs upon the competitiveness of SMEs is discussed below:

2.6.1. Competitiveness

There are multiple perspectives from which the firm competitiveness can be viewed. The competitiveness of the firm refers to its ability meet its objectives and better utilizes the resources of the company, meaning that it should be efficient and effective in comparison to the other firms (Tan, Zailani, Tan, & Shaharudin, 2016). Many researchers has viewed competitiveness as a measure of economic, social or environmental performance of the firm. Firm competitiveness can be seen as providing better quality, to be responsive and efficient in delivering products to customers and saving the company's cost. In addition to this there are researchers who argued that competitiveness can be assessed based on factors like flexibility, quality, timely delivery, and cost-effectiveness (Tan et al., 2016). From the previous researches it has been suggested that many of the firms are receiving competitive advantage by bringing in sustainability. Beleya et al. (2019) suggests that the SMEs can differentiates themselves if they adopt GPP from the other firms that adopt normal procurement practices. The researcher (Beleya et al., 2019) also suggests that the efficiency of the firms can be achieved by adopting green procurement practices. In another study it is stated that if the firms invest in green activities they can have GP strategy that would ultimately lead to the competitiveness of the firm (Ivanova, 2020). Thus in accordance with the evidence form the literature the subsequent hypothesis is suggested.

H_4: Adoption of GPP has a significant influence on firm competitiveness of SMEs.

In addition to this, the Supplier selection is very crucial for the SCM. If managers opt for sustainable suppliers when selecting firms, it will enhance their firm's competitiveness, leading to more environmentally friendly products (Zhou et al., 2023). Sustainable supplier can help firm improve their operations and the firm would be able to achieve better performance (Blome et al., 2014). Most of the environmental impacts occurs at the upstream of the SC that is why suppliers are more regulated as compared to the buyers (Erlandsson & Tillman, 2009). According to J. Yang et al. (2021), the suppliers at the upstream are more exposed to the pressure to be sustainable. Moreover it is evident from many researches that managers tend to select environmentally conscious suppliers, thereby facilitating the production of eco-friendly

products for the company, thus making good brand reputation for the company and increasing its competitiveness (Zhou et al., 2023). Based on the findings from prior research, the subsequent hypothesis can be formulated:

H_5: Supplier sustainable behavior significantly influences the firm competitiveness.

It is further elaborated that Green innovation positively influences a firm's competitiveness. GI can make a good image of a company in the market (Jun et al., 2019). According to the author S. A. R. Khan et al. (2022), by creating nontransferable, non-substitutable and rare capabilities firms can gain competitive advantage. H.-H. Weng, Chen, and Chen (2015) stated that green innovation helps the firms increase their resource productivity which will ultimately cover the environmental cost of the firms. Previous research indicates that companies leading in green innovation secure a first-mover advantage i-e gaining new opportunities, higher prices for the company's products, improved image of the firm as well as gaining the competitive advantage (H.-H. Weng et al., 2015). Jun et al. (2019) expounding upon this, the profitability of the firm and its cost efficiency can be increased by adopting GI in the firm. Despite the significance of green innovation, there is limited research on how it can enhance the competitiveness of small and medium-sized enterprises (SMEs). So, from the above mentioned argument the following hypothesis can be made.

H_6: Green innovation significantly influences the firms competitiveness.

2.7.Research Gap

An widespread research has been conducted on adoption of GPP and its impact on firms performance. However, mostly of them are in the context of the large organizations or specific to only one industrial sector. In this going era, where SMEs are in such great number and are contributing greatly to the economy of the country; it is creating concerns about the environmental degradation. Even though, SMEs are frequently considered pillar of the economy, they are producing most of the waste and are contributing to the damage of natural environment. Many developed countries are taking steps to indulge the SMEs in performing green practices. Most of the countries that are implementing Green practices are developed countries. But the developing countries find it difficult to implement those due to resource constraints and some due to lack of information on its importance. Green procurement is an emerging concept in Pakistan. The AGPP in Pakistan's SMEs sector is very low (Khahro, Memon, Memon, Arsal, & Ali, 2021). That is why this study will focus mainly on the developing country's SMEs in context of Green Procurement because this area is yet to be explored in depth. As procurement is the very important component of value chain and is

critical to any organization. It is one of the core activities of the organization. Apart from the importance of procurement function the SMEs sector has limited research on the adoption of GPPs. In addition to that companies needs to transform their procurement function into green practice if they want to be in a better position. This study intends to fill these gaps in the existing literature.

Table 2.1, represents some of the studies conducted on the adoption of GPP in the SMEs sector along with the contextual description. Zhou et al. (2023) have conducted the study to increase understanding of the influential mechanism and underlying factors that propel green procurement within the household industry. P. K. Singh and Chan (2022) conducted a study in which he o discern the relation between Electronic Procurement Technologies (EPT) and GPPs. Yook, Choi, and Suresh (2018) studies the relationship between green purchasing capabilities and its performance, considering the moderating influence of the company's size. Jermsittiparsert et al. (2019) examines the relationship concerning environmental related outcomes and GSCM between manufacturing SMEs of Indonesia but pay very limited emphasis on green purchasing. Beleya et al. (2019) focuses on the factors influencing the SMEs of food and beverages to adopt green procurement. Ivanova (2020) address the issues of green procurement of SMEs in developing countries but is limited to only a specific region of Ukraine. Khodaparasti et al. (2020), aims to investigate the effects of employee motivation, competence, rewards, customer pressure, and environmental considerations on the adoption of product-centric green practices in SMEs in Iran. Kotei and Yinping (2019) Highlight the significance of a green supply network in fostering sustainable procurement practices is examined through the lens of social capital perspectives and network theory. AlNuaimi and Khan (2019) examine internal factors, having influence on GP implementation in public sector of UAE. Jaini, Quoquab, Mohammad, and Hussin (2020) examine factors influencing the environmentally friendly buying habits of Malaysian consumers regarding cosmetic products.. Khahro et al. (2021) studies factors that improve the AGPP in construction industry of Pakistan. Foo et al. (2019) studies the green procurement capabilities that would result in successful implementation of green procurement practices under the institutional pressures. Jun et al. (2019) tends to identify the primary factors influencing green innovation within SMEs in Pakistan.. Sandra Marcelline et al. (2022) studies the influence of GP in construction industry and its impact in gaining sustainable goals. J. Yang et al. (2021) determines the cognitive and coercive pressure of the suppliers upon GPPs and their effects on the performance of companies.. S. A. R. Khan et al. (2022) Examine in-depth the practices of green purchasing and capabilities, along with addressing sustainability challenges within supply chain. This

study examines the GPP, customer pressure, supplier sustainable behavior, green innovation and the impact of GPP on firms competitiveness all in a single new framework that will add to the literature

Table 2.1. Summary of Existing Literature

Author	Customer pressure	Sustainable Supplier Behavior	Green Innovation	Adoption of GPPs	Competitiveness	Methodology
(Zhou et al., 2023)	✓					SEM
(P. K. Singh & Chan, 2022)				✓		PLS-SEM
(Choi, Min, & Joo, 2018)				✓		SEM
(Jermsittiparsert et al., 2019)				✓		PLS-SEM
(Beleya et al., 2019)	✓			✓	✓	REGRESSION
(Ivanova, 2020)				✓	✓	SEM
(Khodaparasti et al., 2020)	✓			✓		SEM
(Kotei & Yinping, 2019)		✓		✓		PLS-SEM
(AlNuaimi & Khan, 2019)				✓		SEM
(Jaini et al., 2020)				✓		SEM
(Khahro et al., 2021)				✓		PLS-SEM
(Foo et al., 2019)	✓			✓		PLS-SEM
(Jun et al., 2019)	✓		✓			PLS-SEM
(Sandra Marcelline et al., 2022)			✓	✓		SEM
(J. Yang et al., 2021)				✓		SEM
(S. A. R. Khan et al., 2022)			✓	✓		CB-SEM
Proposed study	✓	✓	✓	✓	✓	SEM

2.8.Proposed Framework

Many researchers has put emphasis on the importance of adoption of GPP in SMEs to reduce the environmental degradation. In addition to that the adoption of GPP and its benefits are defined several times. There was limited research on the factors that would be an important consideration for the adoption of GPP in SME sector of the developing countries. Moreover, the impact of adoption of GPP are also mentioned in few studies but they are only applicable to the specific regions i-e usually in developed countries. It is still underexplored to see the outcome of adoption of GPP in SMEs of developing country. Therefore a new framework is developed to address all the paradigms in context of green procurement, to enhance the performance of firms in SME sector. To fill this gap, the following framework is suggested.

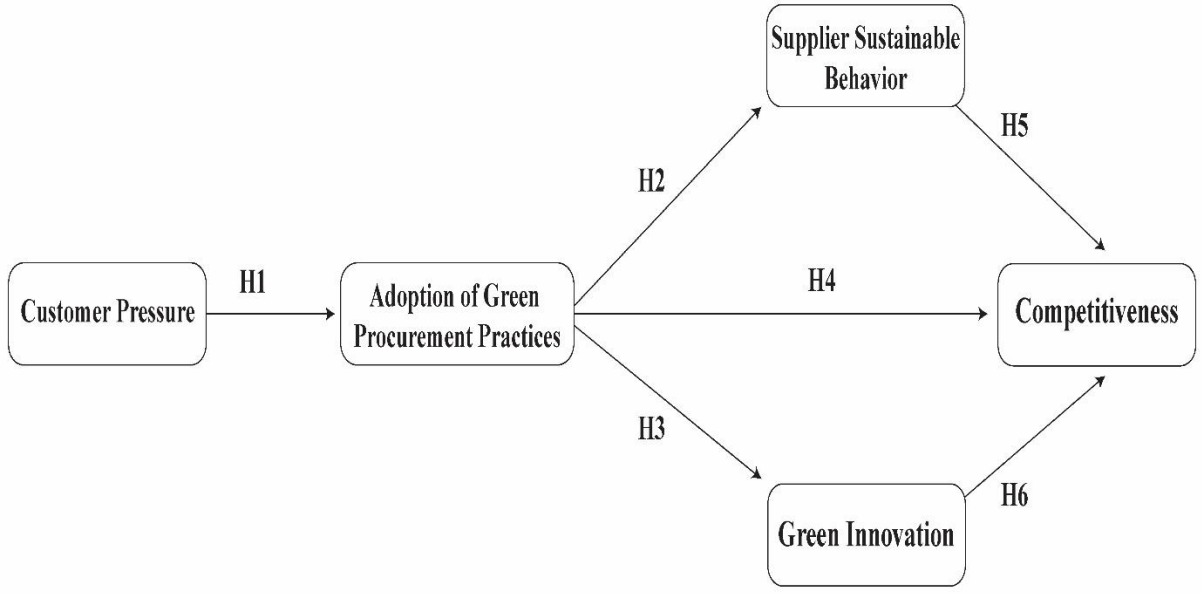

Figure 2.1. Proposed Framework

The study considers customer pressure as an independent variable, whereas adoption of GPP is dependent variable and the firm competitiveness is the outcome of adoption of GPP. The first hypothesis represents the direct effect of the customer pressure on the adoption of GPP. The second hypothesis discourses the direct effect of the adoption of GPP on the supplier sustainable behavior. The third hypothesis addresses direct influence of adoption of GPP on green innovation. Fourth hypothesis represents the direct effect of the adoption of GPP on the competitiveness of the firms. Fifth hypothesis shows direct relation of supplier sustainable behavior on the firm's competitiveness. Lastly, the sixth hypothesis shows direct influence of green innovation competitive edge of the companies.

Many researchers has laid emphasis on the adoption of GPP in SMEs especially considering

the influence that they impose on the natural environment. However limited researchers have examined the impact of adoption of GPP on the competitive position of companies. especially in the SME sector. Nevertheless, existing study will offer a comprehensive insight into the mentioned factors. This literature will further guide the comprehension of achieving the study's goals by considering the existing variables and employing statistical methods to evaluate the model. Various researchers have used different statistical frameworks to determine the adoption of GPP in SMEs.

3. Methodology

The objective of this study is to offer fresh perspectives upon adoption of GPPs within the SME sector. The variables from previous studies are gathered and a conceptual framework is developed. This chapter outlines the methodologies employed to meet the research objectives and address the research questions. This chapter encompasses research philosophy, approach, design, data collection methods, and analysis techniques that will guide the study.

3.1. Research Philosophy

Research philosophy is defined as a set of principles that dictate how data regarding a particular phenomenon should be collected, utilized, or analyzed. It focuses on the understanding of the reality being explored. (Kirongo & Odoyo, 2020). The selection of the research philosophy depends upon the different perspectives of the study being considered. Before conducting any research, it is very crucial to identify the philosophical approaches on which the research is going to be conducted. There are four main research philosophies that are discussed by different authors.

The first approach is positivism, which emphasizes objective data and facts without being swayed by human biases, focusing on what is generally observed (Alharahsheh & Pius, 2020). Positivism claims that social word can be viewed in an objective manner (Žukauskas, Vveinhardt, & Andriukaitienė, 2018). The second is the realism, which does not claim access to the real world means it states that there is a world beyond the knowledge of researcher (Sayer, 2004). The research philosophy of realism can be further categorized into direct and critical realism. Direct realism posits that perception reflects reality as it is observed, while critical realism suggests that perceptions and sensations may not accurately represent the true essence of the real world and can be misleading. (Novikov & Novikov, 2013). The third philosophy is the interpretivism, it is the opposite of the positivism. This philosophy suggests that the social world can be perceived subjectively (Žukauskas et al., 2018). It contemplates that humans are being different from the physical phenomenon and assumes that they are not studied in the same way as physical phenomenon (Alharahsheh & Pius, 2020). The fourth philosophy is pragmatism, this philosophy states that researchers are free to make a choice depending on nature of research problem appropriate research philosophy can be selected (Žukauskas et al., 2018). It states that the scientific experiments should be used to test the philosophical concepts (Legg & Hookway, 2019) and it evaluates those concepts on the basis of their success in practically implementing them.

As mentioned above there are various research philosophies, this study would particularly

adopt the positivist research philosophy. Positivism was rooted in the natural sciences which focuses on finding a mathematical evidence from statistical analysis. It is a highly structured philosophy that usually uses large sample sizes and produces objective and precise quantitative data. This approach gives objectivity and validity to a research. Involves statistical tools and testing of hypothesis.

3.2.Research Approach

While conducting any kind of scholarly research there are multiple research approaches that can be considered to build the theory, whether it may be conceptual or empirical. The research approaches that are available and can be used in the social sciences are inductive, deductive and abductive. In deductive research approach, the researchers starts by a theory of the nature, usually these theories are the true statements that the researcher puts to the empirical testing by making the hypothesis regarding a specific observation (Blanche, Blanche, Durrheim, & Painter, 2006). Quantitative research is most commonly characterized by deductive research approach which generally aims at disproving, approving and/or lending credibility to the theories that are already existing (Leavy, 2022). Conversely, in the inductive approach, researchers begin with empirical data and formulate theories based on that data. (Okoli, 2023). Induction is usually used in the qualitative research. The final research approach is abduction that is basically one step further from the inductive; meaning that it takes observation, make inference from them and also derive best or feasible explanation for the phenomenon as well. Abduction is basically all about developing and explaining the theories regarding a specific phenomenon (Woo, O'Boyle, & Spector, 2017). Abductive approach may contain the mixed method research, which is appropriate when you aims to explain, describe and evaluate a particular phenomenon (Leavy, 2022).

Therefore, aligning with a positivist research philosophy, this study employs a quantitative or deductive research approach. This represents that this research is explanatory and aims to develop the hypothesis and then test the hypothesis. Quantitative approach put emphasis on the numerical, mathematical, objective and statistical analysis of the of the data. This quantitative approach will benefit the study by providing focused, factual and accurate analysis. This approach provides efficient and fast as well.

3.3.Research Design

The positivist approach permits the intentional selection of research participants. For this study, the population will be represented by small and medium-sized enterprises in Pakistan.

So, target respondents of this study would be the managers, assistant managers or the procurement managers in the SMEs. Moreover, the sampling framework is not available that is why non-probability sampling would be adopted. In non-probability sampling technique, samples are not selected randomly but they are selected based on the selective judgement of the researcher. Non-probability sampling is not the representative of the target population and is most commonly used in the trial or experimental research (Ayhan, 2011). There are various non-probability sampling methods that are used in research but this research will mainly focus on the purposive sampling, where those candidates are selected that best suits the study. In purposive sampling, the scholars selects the sampling units according to the purpose of the research (A. S. Singh & Masuku, 2014). It is also known as selective or judgmental sampling because it reflects the sampling technique that depends on the researcher's judgement when it comes to selecting units whether it be organization, people, or events (Sharma, 2017). Unlike other sampling techniques that includes maximum variations purposive sampling focuses on the candidates or participants that are homogenous and have particular characteristics which will better assist the study (Etikan, Musa, & Alkassim, 2016).

The sampling units would be the individual SMEs. The criteria for the selection of SMEs is that that SMEs must be from manufacturing sector. Furthermore, sampling unit for this particular study is the organization meaning that an individual SME is the sampling unit under study. Multiple researchers has selected Individual SME as their sampling units. As Kull, Kotlar, and Spring (2018) states that, in SMEs it could not be possible to find multiple or more than one person who have sufficient knowledge to provide well-versed response. In previous researches it is also found that most of the SMEs are typically owned or overseen by a founding family or an individual founder (Kull et al., 2018).

To determine the sample size, the G-power software was utilized, based on sample size determination done by (Yong, Yusliza, Ramayah, & Fawehinmi, 2019). Based on the four predictors, the recommended sample size was determined to be 129. But for this study, 180 sample size is considered adequate as in management and social science research the minimum required power is 0.80 and the 180 sample size gives higher power than 0.80. In addition to this, the sample size is comparable to other studies conducted on manufacturing SMEs around different countries and hence considered to be appropriate/acceptable. Such as study done by Beleya et al. (2019), on Malaysian SMEs uses sample size of 40. Dey et al. (2020) performed study in UK and select a sample size of 120. Khodaparasti et al. (2020) did study on SMEs of Iran and uses sample size of 120.

3.4.Data Collection Method

Cross-sectional data was received from managers, assistant managers and procurement managers of manufacturing SMEs of Pakistan through the closed ended questionnaire surveys. In the cross sectional survey design the respondents were requested to respond to the questionnaire at one point or a fixed point in time (Shull, Singer, & Sjøberg, 2007). The questionnaires would contain the items that would help in studying the proposed variables in the study. The questionnaires would be collected online as it is the relatively fast and efficient method. The survey questionnaire method offers numerous advantages for quantitative research, including cost-effectiveness and the ability to reach a large audience quickly i-e provides scalability, provides flexibility and data can be easily quantified. Furthermore, pilot testing was done to test validity of questionnaires. After completing pilot study, results were analyzed and subsequent changes were made in the questionnaire based on findings, to provide better understanding of study to the respondents.

The items of questionnaire would be constructed on the Likert scale containing 5-points because it can enhance the quality of responses, improve the response rate, and minimize the time required for respondents. (J. Yang et al., 2021) , where 1 signifies "strongly disagree" and 5 indicates "strongly agree.". Final questionnaire includes items to test all six variables. The questionnaire contains 10 items regarding AGPP in SMEs (Acquah, Baah, Agyabeng-Mensah, & Afum, 2023; Blome et al., 2014; ElTayeb et al., 2010; Khodaparasti et al., 2020; Tan et al., 2016). To measure the competitiveness 5 items were asked, the measures of which are adopted from Tan et al. (2016). Customer pressure includes 7 items in the questionnaire, the measures of which are adopted from (ElTayeb et al., 2010; Ghosh, 2019; Khodaparasti et al., 2020); M.-H. Weng and Lin (2011). Supplier sustainable behavior also contains 8 items of which the measures are adopted from (Bai & Sarkis, 2014; Blome et al., 2014; Ghosh, 2019; Kotei & Yinping, 2019). Finally, the variable green innovation consists of 6 items, measures are adopted from Jun et al. (2019).

Out of 700 questionnaires distributed to managers, assistant managers, and procurement managers of manufacturing SMEs, 188 responses were obtain. All of 188 responses are used for further analysis. In addition to using single respondent per organization as mentioned earlier, this study will focus on the surveys that collects data by the subject, meaning that it will exclude the data collected by means of the semi-structured interviews. This research will also exclude the open ended questions. Thus restricting this study to collect quantitative but subjective data that includes an individual’s preferences, attitudes and opinions and objective

data that would include the demographic information (Shull et al., 2007). When assessing the opinions of the respondents Likert scale are commonly used. The Likert scale is fundamentally psychometric tool frequently employed in survey-based research (Barua, 2013). On a Likert scale, ordinal scale should be used in order to be precise, where the respondent tells about the degree of their disagreement or agreement for the series of statements (Barua, 2013). Some researchers have suggested that using word labels instead of numerical points on the scale can help ensure its validity and reliability (Shull et al., 2007).

An instrument based on Likert scale provides feedback by telling how much successful is the assessment which ultimately provide additional quality control (Barua, 2013). Understanding the type of scale is crucial that our data uses and analyze it appropriately. There are various ways through which the ordinal scale can be evaluated such as firstly by using Cronbach's alpha statistics to asses reliability. Secondly, by adding measure of ordinal scale together of relevant variables to provide overall scores to a concept. This is also confirmed by the central limit theorem that even if the particular variable is not normal the sum of the random variables would be normal (Shull et al., 2007).

3.5.Data Analysis

3.5.1. Structural Equation Modelling

Given the framework's nature, Structural Equation Modeling (SEM) is employed.. Structural equation modeling is a statistical method that assesses the connections between one or multiple independent variables and dependent variables (Ullman & Bentler, 2012). According to Ullman and Bentler (2012), SEM encompasses a set of statistical methods that allow for the evaluation of relationships between one or multiple independent variables and dependent variables, regardless of whether they are discrete or continuous. Questions related to the multiple factor regression analysis can be answered through SEM. Among the many employed statistical model SEM can be seen as a general model of analysis of covariance, variance, factor analysis, multiple regression, multilevel modeling and path analysis (Bowen & Guo, 2011). The main goal of SEM is to validate the research hypotheses about the observed set of variables mean, covariance and variance (Bowen & Guo, 2011). While using SEM it is crucial for the researchers to test if the model have strong empirical and theoretical foundation. While using SEM rather than finding the suitable model, the objective is to determine if the model is valid or not (R. Shah & Goldstein, 2006). Structural equation modeling evaluates the proposed hypotheses by examining both direct and indirect effects of mediators on the relationship between independent and dependent variables, leading to either the acceptance or

rejection of the researchers' hypotheses (Kumar & Kumar, 2015).

3.5.2. Assumptions Of SEM

Kumar and Kumar (2015) demonstrates the following assumptions for structural equation modelling:

A. Normality

Before building a model and checking its fit indexes normality of observations is the first and the most important assumption of structural equation modelling. The observations must be drawn from the multivariate or the continuous data. But it is seen very rarely in real life that a data is perfectly normal. Due to this the researchers usually uses the estimation techniques, , assessing data normality based on the kurtosis and skewness of the dataset. According to (Busse & Jelly, 2023), the appropriate range in which the data shows moderate values for kurtosis as well as skewness are within the range of (-1,+1). However there are number of studies in which higher values of skewness and kurtosis has been reported as well (Busse & Jelly, 2023).

B. Missing Data

While conducting the SEM analysis the data for each variable should be complete. More specifically, the data for each variable needs to be complete there should be no missing value for any variable. Different researchers have delineated various approaches for handling missing values, including concepts like Missing Completely at Random (MCAR) and Missing at Random (MAR). Later on it is found that these approaches are only applicable if the data that is missing is in small number. So in order to deal with the complexities of missing data imputation approach is used when measuring the parameters in the SEM.

C. Sampling Errors

The errors in the measurement that are caused by the tools and techniques used for the collection of data and the errors occurred by the respondent effect the fitness of the model. Additionally, standard error is influenced by variance of the dataset on which the researcher is working. Because as the variance increases the standard error eventually decreases, which ultimately violates the assumption of data normality. In another research it is stated that if the variance is increased it will affect the error approximation (Nevitt & Hancock, 2000). In order to handle the sampling errors in measurement the previous researches emphasized on conducting pre-testing.

D. Model Fit Indexes

The fitness of model defines the usability of model that is drawn from sample taken from population. In the model the parameter estimation is applicable on the population only if the

model perfectly fits according to the parameter. There are different methods and software available to check the fitness of the model that are very user-centric and easy to use.

3.5.3. Confirmatory Factor Analysis

SEM is a statistical method also known as causal analysis, causal modeling, or Confirmatory Factor Analysis (CFA). CFA, a statistical method or a subset of SEM that is used to validate or describe the structure of the set of variables under observation (Suhr, 2006). The most important and the first assumption of SEM is the normality of observations, as well as even before the model is build checking the fit indexes (Kumar & Kumar, 2015). For that reason, CFA is utilized to obtain the final estimates of the model parameters and determine the overall fit of the model. A hypothetical model is tested during the Confirmatory Factor Analysis (CFA), whenever the data is not fitting the model that is hypothesized, it is then modified to improve the fit on the basis of modification indices (Kyriazos, 2018). In addition to that, CFA is used for various purposes such as for methods effect detection, psychometric evaluation, for validation of the constructs and measurement in variance and its evaluation. Most frequently it is used in the development of the scale in order to test the instrument and examine its structure. According to Hoyle (2012), CFA is very important analytical tool for evaluation of the psychometric aspects such as estimating the reliability of the scale.

3.5.4. Partial Least Square-Structural Equation Modelling

Regarding the selection of the statistical method that needs to be employed, the researcher needs to understand the underlying assumptions for that particular statistical method. Moreover, the statistical method is grounded on many aspects such as what are the objectives of the research, specifications and measurement model type, characteristics of data and finally evaluation of the model (Joe F Hair, Ringle, & Sarstedt, 2011). According to (Joseph F Hair, Risher, Sarstedt, & Ringle, 2019), the researcher should use PLS-SEM in the following situation:

Firstly, when the researcher is concerned about conducting an analysis that tests the predicts the theoretical framework. This implies that the research aims to initially formulate theoretical hypotheses and subsequently make predictions based on them. This type of modelling technique focuses on predicting the relationship between the variables (Sosik, Kahai, & Piovoso, 2009). Secondly, it is applicable when the model involves multiple variables, indicators, or intricate relationships within the structural model. Thirdly, when the researcher is going for exploratory research for the development of the theory want to get better understanding of the complexity of the theoretical extensions. Fourthly, it can be employed to

investigate or measure the model that includes both formative and the reflective constructs. Fifthly, this model works well with non-normal data; meaning that if the data has some kind of normality issues it will run analysis on that as well. Finally, when the population is small and restricts the sample size such as in case of business-to-business research, PLS-SEM is particularly suitable. In addition to this PLS-SEM provides accurate analysis on large sample size for study as well. Hence, the PLS-SEM approach is chosen for this research study.

In PLS-SEM, two types of models are assessed: the measurement model and the structural model. The objective of examining both models is to verify whether they satisfy the empirical research criteria or not. SEM consists of measurement and structural model which are going to be analyzed through PLS-SEM. Measurement model deals with the composite variables and underlying latent variables. However, structural model tests paths between hypothetical dependencies (Fan et al., 2016).

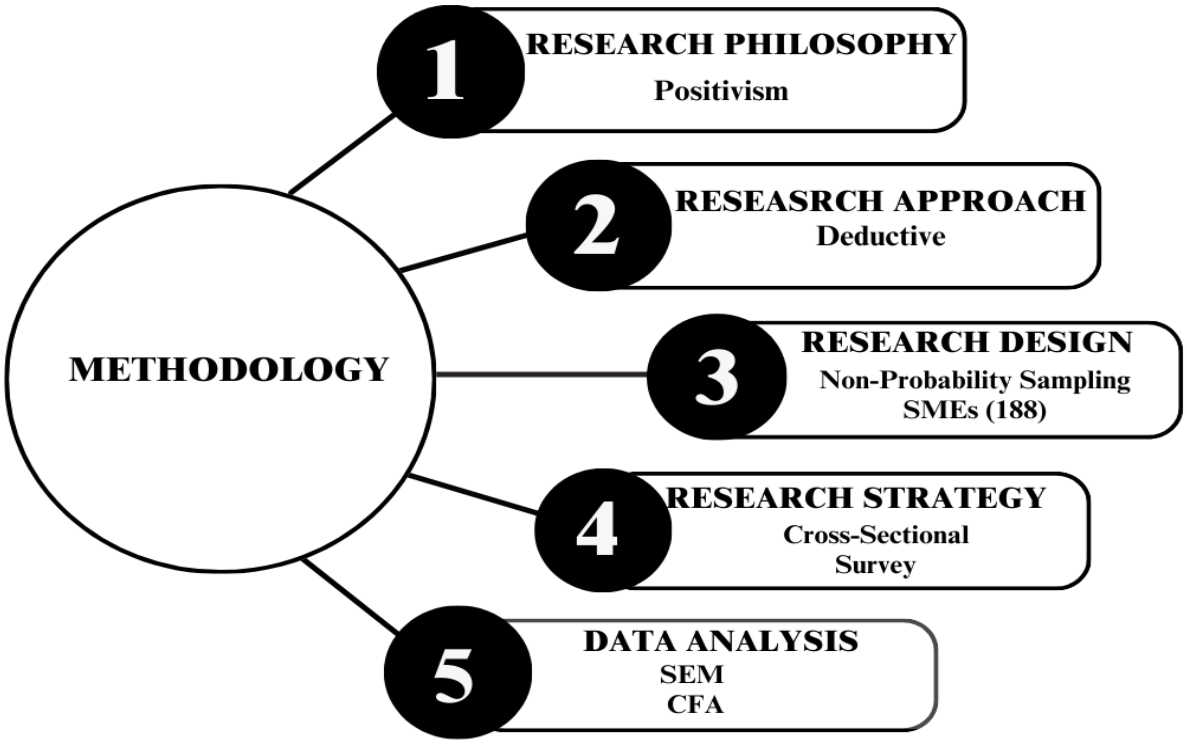

Figure 3.1. Summary of Methodology

4. Results and Discussion

Statistical analysis has been conducted on SmartPLS 4. In this chapter the verdicts of the statistical analysis would be discussed. This section is divided into multiple subsections. The initial subsection discusses the data utilized in the study, which basically includes the data preparation, data screening and the missing value treatment, analysis of the demographics, descriptive statistics, the test of normality and correlation. The second subsection examines the initial measurement model and presents the results of the CFA. The third subsection elaborates on the findings from the structural equation modeling (SEM). Finally the last sub-section will deliberately discussed the findings of the analysis in detail with support from the literature.

4.1.Data

The variables and the survey indicators from the previous studies have been gathered. The framework is built depending on those variables as well as the hypothesis were proposed accordingly. After completing the above mentioned steps the questionnaire development and the distribution is the next step. The distribution of questionnaire occurred in two stages. Initially, a pilot study was conducted to assess the questionnaire's reliability and validity. During this pilot phase, the questionnaires were administered to CEOs, managers, assistant managers, and procurement managers within the manufacturing SMEs. During the pilot testing phase, 35 responses were obtained. After the initial propagation of the questionnaires the data was processed in order to see whether the questions asked in the questionnaires are as per the research or not. After the pilot testing was completed the questionnaires were further distributed to other targeted SMEs for the responses. The survey form was distributed among the key manufacturing industries of Pakistan. These industries are the automotive, cement, chemical, cosmetics, hosiery, printing and packaging, pharmaceuticals, sports goods, surgical instruments, and textile and clothing industry. The questionnaire consists of forty-seven items including the items for demographics.

4.1.1. Data Preparation

The raw data are collected through the surveys is often messy. The responses recorded may not be structured, values does not adhere to a specific pattern and the responses usually have different encodings (Hameed & Naumann, 2020). Such type of data is not compatible or does not fit the applications in which analysis needs to be performed; for that reason data preparation is important. Data preparation includes both coding and entering the information received from the respondents into the data sheet or a database. While conducting the survey online the data is entered into the database automatically. Once the researcher receives the

targeted sample size the data was downloaded into an excel workbook in order to do further screening of the data and for treating the missing values.

4.1.2. Data Screening and Missing Value Treatment

Total 188 responses were received through an online survey form and all of these responses are used in further analysis. After the targeted sample size for the collection of data was achieved all the information received was recorded in excel worksheet. As seen through previous researches, missing values in the data are very common when the data is collected through the online surveys. Missing is a very common problem and it imposes challenges in the data analysis. There are various reasons due to which there can be missing values in the data such as respondents failed to complete the questionnaire, forget to answer a question or may refuse to answer questions. So, in order to carry out the analysis more appropriately missing values need to be treated. Using excel, conditional formatting was done to identify the missing values present in the data. After that the missing data point was replaced with the mean of available data points for that particular variable. This was done to complete the available data set so it can be used for further analysis.

4.2.Demographics

Total of 700 questionnaire were sent to the SMEs of Pakistan out of which 188 responses were received. The data was collected from manufacturing SMEs of Pakistan between July 2023 to September 2023 through emails and social media platforms like LinkedIn. The demographic analysis of the firms revealed that 35% of the companies have a size of more than 200 employees, 35% have a firm size between 50 to 200 employees and 12% have less than 50 employees. Regarding the ownership structure of firms, most of the responses are received from the private limited companies i- 60% of the responses originated from private limited companies. Table 4.1 showcases the descriptive statistics of the firms' demographics.

Furthermore, Table 4.2 illustrates, the detailed statistics of the respondents of the study. One respondent from each company was required to fill out the survey. The target respondents who are eligible to respond to the survey are the CEOs, managers, assistant managers, deputy managers or general managers, procurement manager, operations manager, the supply chain officers and other mentioned in table 4.2. As mentioned in the table 91% of the respondents of the survey were male and only 9% are the female. A majority of the respondents hold a master's degree i-e 57%. 30% of respondents have the overall professional experience ranging from 6 to 10 years. A significant majority of survey respondents are managers and assistant managers, the deputy and general managers and the procurement managers representing 15%, 13% and

19% in analysis.

Table 4.1. Demographics of the Firm

Characteristics Of Firm	Frequency	Percentage
Firm Size		
Less than 50	23	12%
50-200 employees	66	35%
More than 200 employees	99	53%
Ownership Structure		
Cooperative	3	2%
Corporation	3	2%
Partnership	29	15%
Private Limited Company	112	60%
Public Limited Company	8	4%
Sole Proprietorship	33	18%
Firm Age		
Less than 5 years	7	4%
6-10 years	29	15%
11-15 years	24	13%
16-20 years	29	15%
More than 20 years	99	53%
Industry		
Automotive	2	1%
Cement	3	2%
Chemical	27	14%
Cosmetics	11	6%
Hosiery	8	4%
Printing and Packaging	5	3%
Pharmaceuticals	74	39%
Sports Goods	11	6%
Surgical Instruments	19	10%
Textile and Clothing	28	15%

Table 4.2. Demographics of the Respondents

Characteristics Of Respondents	Frequency	Percentage
Gender		
Male	172	91%
Female	16	9%
Education		
No Formal Education	1	1%
Higher secondary school certificate	1	1%
Bachelor's degree	73	39%
Master's degree	108	57%
Ph.D.	5	3%
Overall professional experience		
Less than 5 years	44	23%
6-10 years	57	30%
11-15 years	41	22%
16-20 years	28	15%
More than 20 years	18	10%
Job Title		
CEO and Founder	12	6%
Director	17	9%
Deputy Manager and General Manager	24	13%
Manager and Assistant Manager	28	15%
Procurement Manager	36	19%
Production and process Manager	23	12%
Operations Manager	13	7%
Head of QC and Compliance	22	12%
R&D Officer	6	3%
Supply Chain Officer	7	4%

4.3.Descriptive Statistics

Descriptive statistics for every indicator was assessed using SPSS software. The

descriptive statistics shows standard deviation, mean, maximum and the minimum values for each of the indicators under study. The descriptive statistics reveal that all of the variables are over average this means that the variables under study has an importance towards measuring the effect of adopting GPPs upon competitiveness in SMEs. Table 4.3 represents the descriptive statistics of data collected from online surveys.

Table 4.3. Indicators' Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
AGPP	188	1.00	5.00	3.5723	.72612
C	188	1.00	5.00	3.8129	.67400
CP	188	1.00	5.00	3.7059	.80273
SSB	188	1.00	5.00	3.6077	.77791
GI	188	1.00	5.00	3.6073	.86174

The results from the table 4.3 reveals that the respondents of the survey has rated AGPP, C, CP, SSB and GI above average. Having the mean of 3.5723, 3.8129, 3.7059, 3.6077 and 3.6073 respectively.

4.4.Normality

A number of statistical methods like MANOVA, ANOVA and linear regression requires the assumption of normality, but PLS-SEM uniquely performs with the data that is not normal (Ma & Zhang, 2023). However, if the normality of the data is in doubt, there are various ways to check whether the data is normal or not. Besides that the structural equation modelling accounts for the assumption of normality as previously mentioned. Various methods can be employed to assess the normality of data; some researchers examine data normality based on skewness and kurtosis values. Kurtosis and the skewness helps in identifying whether the curve is shaped normally or abnormally (Brown, 2015). There are various other tests to evaluate the normality of the data such as Lilliefors corrected K-S test, Kolmogorov-Smirnov (K-S) test, Shapiro-Wilk test, Jarque-Bera (J-B) test etc. (Ghasemi & Zahediasl, 2012). This research in particular explores normality of data using SPSS. By using the Jarque-Bera (J-B) test in SPSS, standard deviation, mean, kurtosis and skewness are tested. Previous researches have shown that the appropriate range for skewness and kurtosis is (-1,+1). According to (Penpokai, Vuthisopon, & Saengnoree, 2023), the appropriate range for kurtosis is between -10 and +10; and for skewness the acceptable values may fall between -3 and +3 when conducting SEM

analysis. Table 4.4 below presents the results of the J-B test:

Table 4.4. Normality Test

	Statistic (N)	Skewness	Kurtosis
AGPP	188	-0.852	0.971
C	188	-0.903	2.059
CP	188	-0.536	0.199
SSB	188	-0.725	0.529
GI	188	-0.616	0.011

The outcomes of the J-B test indicate that the data utilized in the analysis is normally distributed. All the values of Skewness and kurtoses lies between the normal range. As it is seen from the table above the skewness values for each variable lies between -0.903 to -0.536 which is the acceptable range for skewness values to fall between. Furthermore, all the kurtosis values fall between 0.011 to 0.971 indicating that data is totally normal. So, the normality assumption of SEM is not violated, which further supports the SEM analysis to be conducted. As represented in the appendix E, the histograms for each variable are perfectly symmetrical and bell shaped, which ultimately suggests the normality of data.

4.5.Correlation

In order to test the linearity of the data many researchers uses Pearson's correlation. Gogtay and Thatte (2017), Correlation is defined as the connection or association between two or more quantitative variables. Essentially, this analysis operates on the premise of a linear relationship between multiple quantitative variables. Moreover, it also measure the extent or the strength to which the variables are associated with each other as well as the direction their direction. The correlation analysis results the correlation coefficient which is denoted by 'r'. This r is basically the relationship between various variables and it ranges between -1 and +1 (Akoglu, 2018). 1 represents the perfect or complete correlation, 0 represents no correlation between the variables. Whereas the direction of the variables are denoted by the positive or negative signs. The extent to which the variables are correlated increases from 0 to -1 and 0 to +1. According to Ratner (2009), the weak, strong, moderate and no correlation can be determined by the following:

1. 0 indicates no linear relation between variables.
2. +1 shows perfect positive relationship.

3. -1 shows perfect negative relationship.
4. 0 to 0.3/-0.3 shows weak positive relationship or weak negative relationship.
5. The correlation values that are between 0.3 to 0.7/-0.7 indicates a moderate positive or negative relation.
6. The values that are between 0.7 and 0.1 or -0.7 to -0.1 depicts strong positive relation.

Table 4.5. Pearsons Correlation Results

	AGPP	**C**	**CP**	**SSB**	**GI**
AGPP	1				
C	.468**	1			
CP	.564**	.587**	1		
SSB	.509**	.528**	.606**	1	
GI	.531**	.539**	.609**	.620**	1

** The correlation is statistically significant at the 0.01 level (2-tailed).

The table shows that the correlation among all variables is significant at the 95% confidence interval with $p < 0.01$. Therefore, it is concluded that all the variables are correlated. And the data is linear.

4.6.Raw Measurement Model

The CFA is employed to develop and improve reflective measurement models (Hair Jr, Howard, & Nitzl, 2020). The reflective measurement models must be assessed concerning their reliability and validity (Henseler, Ringle, & Sinkovics, 2009). Hence, to conduct the analysis, it is essential to first determine the reliability and validity of measurement model. To assess the model's reliability, both Cronbach's alpha test and composite reliabilities are employed, while validity of model is gauged using the average variance extracted (AVE) (Ivanovic & Ajanovic, 2014).

4.6.1. Constructs Reliability and Validity

The primary step is to check internal consistency. The Cronbach's Alpha test is universally utilized to assess the consistency among questionnaire respondents, ultimately offering estimates for the reliability of the indicators (M. Mitchell & Jolley, 2012). The values of Cronbach's Alpha typically range between 0 and 1 (Gliem & Gliem, 2003). The values of Cronbach's Alpha that are larger than 0.7 are usually acceptable (M. Mitchell & Jolley, 2012). According to (Henseler et al., 2009), sometimes Cronbach's Alpha underestimates values of

reliability in partial least square models so in order to overcome this shortcoming composite reliability in used. The values of composite reliability should be at least 0.6 (Henseler et al., 2009).

Table 4.6. Reliability of the Constructs

	Cronbach's alpha	Composite reliability
AGPP	0.845	0.879
C	0.792	0.854
CP	0.891	0.915
GI	0.884	0.911
SSB	0.915	0.931

As seen from the table 4.6, the values of the Cronbach's alpha and composite reliability are all under the provided threshold that is all the values are greater than 0.7 or between 0.7 and 0.9 which is considered to be satisfactory.

Subsequently, the validity of the constructs is evaluated using the AVE to assess the measurement model's validity (Fornell & Larcker, 1981). The AVE values should not be below 0.5 then it represents sufficient validity for the data (Götz, Liehr-Gobbers, & Krafft, 2009). The table 4.7 shows the values of AVE for every construct.

Table 4.7. Validity of the Constructs

	Average variance extracted (AVE)
AGPP	0.425
C	0.500
CP	0.607
GI	0.632
SSB	0.629

Table 4.7 clearly indicates that the AVE values for constructs exceed 0.5 which are considered to be satisfactory. However, for AGPP, the AVE value is below 0.5 which means further analysis cannot be performed until the construct validity and reliability is satisfied. As mentioned by Afthanorhan (2013), measurement model is commonly utilized for the CFA, so to attain the true model the researcher should conform to the requirements. Besides that the unidimensionality is also required for measurement model which can only be achieved if there

are acceptable values of the factor loadings (Awang, Ahmad, & Zin, 2010). For the items of the model the factor loadings values should be 0.5 or greater but some researchers say it should be 0.7 or higher. The indicators that have the value of 0.5 or higher are going to be retained in model but factor loadings values lower than 0.5 should be deleted (Afthanorhan, 2013). It is advisable to delete one item sequentially and re-run measurement model until the unidimensionality is reached. Unidimensionality basically denotes the presence of a sole construct or a trait in a set of various measures (Afthanorhan, 2013). The table 4.8 presents the factor loading values for each construct:

Table 4.8. Values of Factor Loadings

AGPP	Factor Loadings	C	Factor Loadings	CP	Factor Loadings	GI	Factor Loadings	SSB	Factor Loadings
AGPP1	0.509	C1	0.579	CP1	0.739	GI1	0.809	SSB1	0.721
AGPP2	0.475	C2	0.543	CP2	0.749	GI2	0.827	SSB2	0.828
AGPP3	0.618	C3	0.611	CP3	0.808	GI3	0.753	SSB3	0.788
AGPP4	0.721	C4	0.822	CP4	0.808	GI4	0.828	SSB4	0.829
AGPP5	0.65	C5	0.831	CP5	0.801	GI5	0.766	SSB5	0.776
AGPP6	0.732	C6	0.796	CP6	0.838	GI6	0.784	SSB6	0.826
AGPP7	0.743			CP7	0.702			SSB7	0.758
AGPP8	0.645							SSB8	0.811
AGPP9	0.71								
AGPP10	0.656								

As presented in table there are quite a few values that are below the acceptable threshold, thus to enhance the AVE values and ensure model's validity is reached., the items that are below the acceptable threshold should be deleted.

The figure 4.1 displays the results of the measurement model prior to item removal.

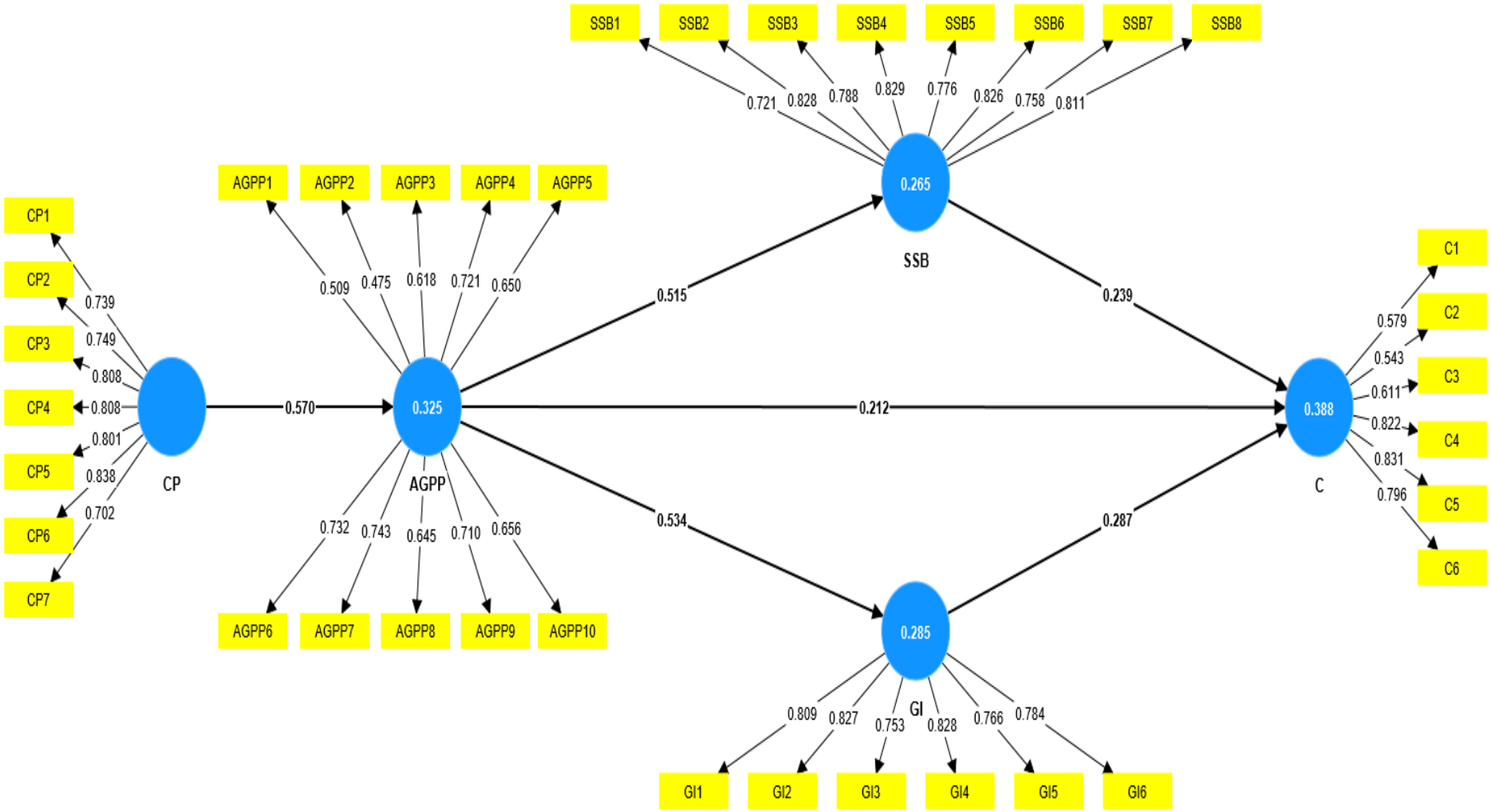

Figure 4.1. Illustration of Measurement Model Results

4.7. Calibrated Measurement Model Assessment

To thoroughly analyze the structural model, it's crucial to establish validity and reliability of latent variables, as addressed in measurement model. Drawing from prior research, the validity of the measurement model can be confirmed, by assessing internal consistency, indicator reliability, as well as convergent and discriminant validity. This section is going to present the results for assessing measurement model's validity and reliability.

4.7.1. Internal Consistency

Internal consistency proposes that the items present on the measure or the items should be highly correlated with one another. In previous researches it is theoretically presumed that if the items are highly correlated then the constructs are measured to the degree of consistency that ultimately means that the scores are reliable (Henson, 2001). Both composite reliability and Cronbach's alpha tests are employed to assess internal consistency. But in composite reliability it is assumed that there are different loading for each indicator as opposed to it Cronbach's alpha underestimates reliabilities of internal consistency (Alnakhli, 2019). In primary research, stages the reliabilities of 0.5 or 0.6 are considered sufficient (Nunnally & Bernstein, 1994). After that the standard acceptable criteria was increased to 0.70 (Nunnally & Bernstein, 1978). However according to (Loo, 2001), the reliabilities of 0.8 and 0.9 are considered to be better. In addition to this, the acceptable values for Cronbach alpha needs to be greater than 0.6 (Wong, 2013). The table 4.9 represents composite reliability Cronbach's alpha for each construct:

Table 4.9. Internal Consistency of the Constructs

	Cronbach's alpha	**Composite reliability**
AGPP	0.856	0.890
C	0.792	0.853
CP	0.891	0.915
SSB	0.884	0.911
GI	0.915	0.931

As represented in the table above, each construct's composite reliability lies between the range 0.853 to 0.911. Cronbach's alpha values also exceed the 0.6 threshold. This indicated that items that are used in the analysis to signify the construct possess a good internal

consistency reliability.

4.7.2. Indicator Reliability

Assessing the reliability of items or indicators is essential to determine if the variables consistently measure their intended constructs (Urbach & Ahlemann, 2010). Threshold for the indicator loadings are set to be at 0.7 by (Chin, 1998). Some of the other studies have suggested that the for better results factor loadings values should be >0.5. According to (Joe F Hair et al., 2011) estimates of factor loading should be between 0.5 and 0.7. Whereas according to (Wong, 2013), The acceptable minimum level for reliability of indicators is 0.4, with a preferred value nearing 0.7. It can be examined through the estimates of factor loading. Normally, it is advisable to have factor loadings higher than 0.70, indicating latent variable describes greater than 50% of variation in a single indicator. But sometimes the lower values are not problematic and are acceptable in the cases where the criteria for validity and reliability is met (Benitez, Henseler, Castillo, & Schuberth, 2020).

As observed in Table 4.8, some factor loading values are below 0.7. According to literature, the researcher can ignore these values if they are not effecting the validity and reliability but here these lower values need to be deleted because the value of AVE for AGPP is less and is not meeting the reliability and validity criteria. The items with lower values are deleted to meet the criteria of reliability and validity. From the analysis all the remaining factor loading values fall between the range of 0.542 to 0.834. The table 4.10 shows the factor loadings for each item. This represents that all the items used in this research shows satisfactory level of indicator reliability.

Table 4.10. Reliability of the Indicators

AGPP	Factor Loadings	C	Factor Loadings	CP	Factor Loadings	GI	Factor Loadings	SSB	Factor Loadings
AGPP1	***	C1	0.573	CP1	0.751	GI1	0.812	SSB1	0.719
AGPP2	***	C2	0.542	CP2	0.745	GI2	0.826	SSB2	0.828
AGPP3	***	C3	0.605	CP3	0.807	GI3	0.748	SSB3	0.787
AGPP4	0.677	C4	0.824	CP4	0.797	GI4	0.832	SSB4	0.83
AGPP5	0.692	C5	0.834	CP5	0.802	GI5	0.763	SSB5	0.778
AGPP6	0.794	C6	0.799	CP6	0.834	GI6	0.784	SSB6	0.826
AGPP7	0.822			CP7	0.706			SSB7	0.757
AGPP8	0.70							SSB8	0.809
AGPP9	0.76								
AGPP10	0.677								

4.7.3. Convergent Validity

Convergent validity measures degree of items reflecting their constructs or the variables explaining the variance of the items from their constructs (Sarstedt, Ringle, & Hair, 2021). Convergent validity is assessed by AVE associated with all reflective constructs. So, to check the convergent validity the AVE of each latent variable is evaluated. So to confirm the validity of AVE, the minimum acceptable threshold defined in literature is greater than 0.5 (Wong, 2013).

Table 4.11. Convergent Validity of the Constructs

	Average variance extracted (AVE)
AGPP	0.538
C	0.507
CP	0.606
GI	0.632
SSB	0.629

It is illustrated in the table 4.11 that adoption of green procurement practices has the AVE of 0.538, competitiveness has an AVE of 0.500, customer pressure has AVE of 0.606, Green innovation AVE value is 0.632 and lastly supplier sustainable behavior AVE is 0.629. All these values represents that convergent validity is being satisfied as all the values lies in the limit of 0.500 to 0.632 which is above the least acceptable threshold.

4.7.4. Discriminant Validity

After calculating convergent validity in measurement model, researcher then assesses discriminant validity. Discriminant validity differentiates measures of constructs from each other (Urbach & Ahlemann, 2010). Discriminant validity elucidates extent to which a particular construct is distinct from its other related constructs and how much this construct defines a particular construct (Sarstedt et al., 2021). In SMART-PLS, there are three types of tests through which the discriminant validity is measured:

1. Heterotrait-monotrait ratio (HTMT)
2. Fornell-Larcker criterion
3. Cross loadings

In discriminant validity, it is suggested that the scholars should use the HTMT to obtain the

empirical evidences (Benitez et al., 2020). Other researchers have also employed Fornell-Larcker criterion to examine discriminant validity.

A. Heterotrait-monotrait ratio (HTMT)

Among all the different methods to test discriminant validity the HTMT ratio of correlation is much more preferred by the scholars these days (Ab Hamid, Sami, & Sidek, 2017). According to (Henseler, Ringle, & Sarstedt, 2015), HTMT provides superior performance and higher specificity as compared to the other two criterions to measure discriminant validity. HTMT is used to define the mean value of the correlation between the indicators across diverse set of constructs with relation to mean of indicator's average correlation while measuring the same construct (Sarstedt et al., 2021). It is basically determines the of similarity between the latent variables. The numerical values of HTMT should be 0.85 or 0.90 or more specifically smaller than 1 (Benitez et al., 2020). HTMT values greater than 0.85 or 0.90 indicate potential concerns with discriminant validity (Shidki Mat Yusoff, Peng, Razak, & Azani Mustafa, 2020). Table 4.12 displays all pertinent results.

Table 4.12. Results of HTMT

	AGPP	**C**	**CP**	**GI**	**SSB**
AGPP					
C	0.507				
CP	0.584	0.701			
GI	0.482	0.647	0.688		
SSB	0.536	0.618	0.669	0.69	

From the results presented in Table 4.12, it is observed that all these values lies between the provided threshold. This means that there is no issue of discriminant validity.

B. Fornell-Larcker criterion

The Fornell-Larcker criterion is another widely used method to assess discriminant validity. This criterion for measuring discriminant validity suggest that in each latent variable the square root of AVE can be used to find discriminant validity (Wong, 2013). It is suggested that the construct needs to show better variance with its indicator in comparison to variance of further various constructs (Ab Hamid et al., 2017).

Table 4.13. Fornell-Larcker Table

	AGPP	C	CP	GI	SSB
AGPP	0.734				
C	0.437	0.707			
CP	0.525	0.593	0.779		
GI	0.435	0.552	0.617	0.795	
SSB	0.483	0.529	0.605	0.632	0.793

As represented in table 4.13, square root of each AVE for every latent variable is written along diagonal and these values are larger than their correlation with respective variables. Such as in this case the AVE of AGPP is 0.538 presented in table 4.12 and its square root is 0.734 which is greater than 0.437, 0.525, 0.435 and 0.483. Therefore, it is stated that the variables has higher correlation with their indices than other which ultimately represents that the model's discriminant validity is satisfied and is acceptable.

In conclusion, all the tests conducted to check validity and reliability are satisfactory. Indicating the items used to assess factors in this research are fit and valid to measure further structural model. Figure 4.4 represents outcomes of measurement model.

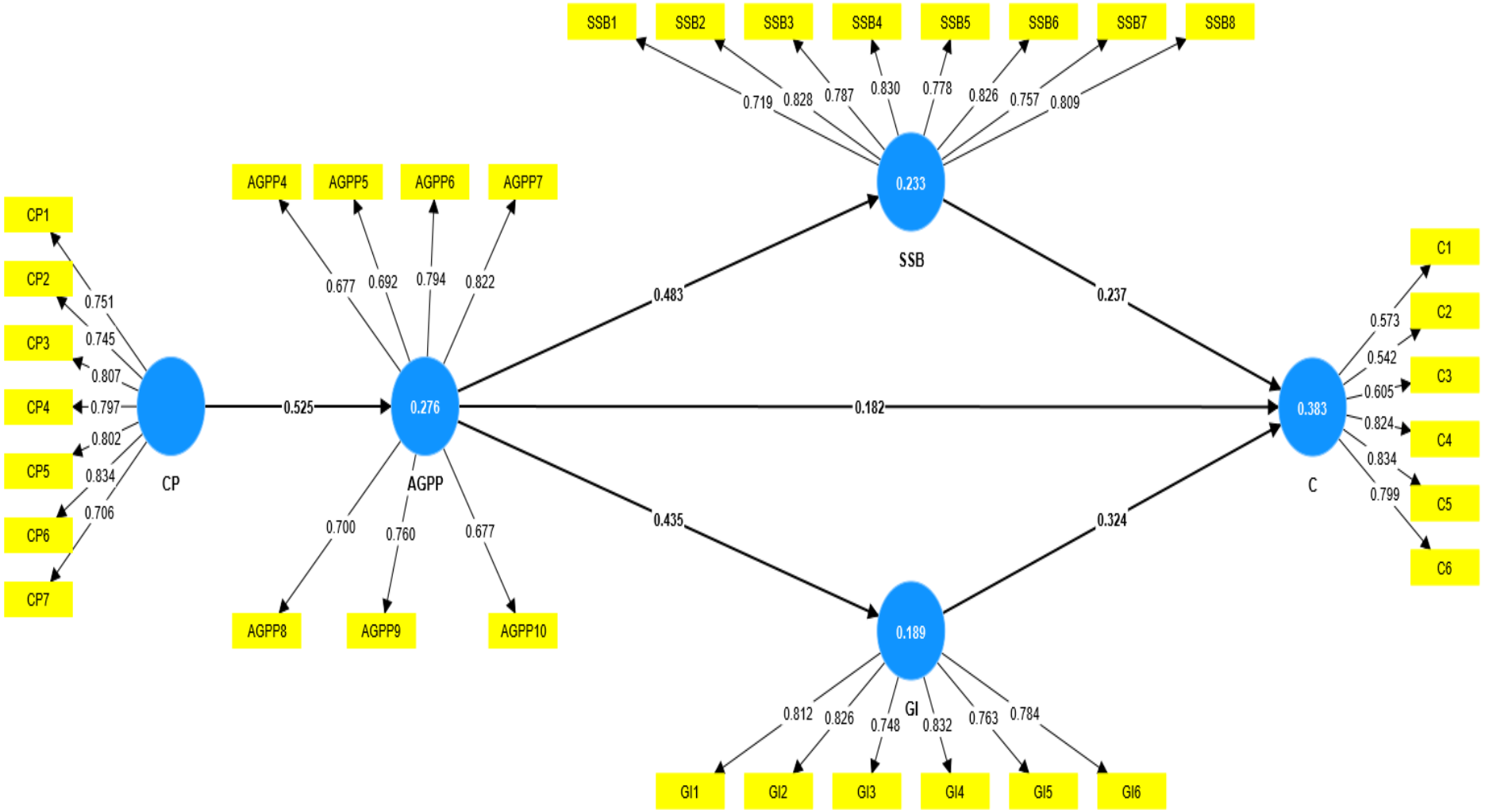

Figure 4.2. Illustration of Confirmatory Factor Analysis

4.8. Goodness Of Fit

While some of the structural equation modelling techniques strongly relies of the model fitness concept, but this is not the case with PLS-SEM. Some of the researcher criticized that PLS-SEM is not very useful when the research needs to test and confirm the theories. Few of the researchers have included the model fit measure in PLS-SEM (Joseph F Hair et al., 2019). According to (Henseler & Sarstedt, 2013), the researcher needs to be very cautious when applying model fit measure for PLS-SEM. While on the other side in PLS-SEM when there are only reflective measure model fit can be evaluated. Some of the measures od model fit that can be used in PLS-SEM are SRMR, NFI and Chi-square (Henseler & Sarstedt, 2013). The SRMR serves as an indicator of model fit, representing the difference between the observed correlation and the model's implied correlation matrix. According to (Hu & Bentler, 1999), If SRMR values are below 0.08 or 0.10, the model is considered to fit well. Moreover, NFI values range between 0 and 1. The table 4.14 signifies the statistics for model fit for the research.

Table 4.14. Model Fitness Results

	Saturated model	**Estimated model**
SRMR	0.071	0.148
Chi-square	1167.315	1293.822
NFI	0.725	0.695

As represented in table above, the research model has acceptable fit.

4.9. Structural Model Assessment

When measurement model is validated and its acceptable, subsequent step in PLS-SEM is to evaluate the structural model. The structural model evaluates that whether the hypothesis presented in the research are maintained by data or not (Urbach & Ahlemann, 2010). Structural model is calculated by evaluating coefficients of determination (R^2) and by relevance and significance of path coefficients (Joseph F Hair et al., 2019).

4.9.1. Collinearity

The evaluation of coefficients of the path that links the paradigms is based on regression analysis. Therefore prior to evaluating structural relationships, Checking for collinearity is essential to ensure it does not distort or influence the outcomes of the regression analysis. (Sarstedt et al., 2021). So in order to do this variance inflation factor (VIF) needs to be

calculated. VIF is used to detect the existence of collinearity that is the existence of linear relationship among two or more than two exogenous variables within regression model (Salmerón Gómez, García Pérez, López Martín, & García, 2016). VIF values above 5 indicates that there are collinearity problems between the constructs, but Becker, Ringle, Sarstedt, and Völckner (2015) states that the problem of collinearity can occur when the values of VIF are lower as well. It is ideal to have VIF values lower than or close to 3 (Joseph F Hair et al., 2019).

Table 4.15. Collinearity Test

AGPP	VIF	C	VIF	CP	VIF	GI	VIF	SSB	VIF
AGPP4	1.484	C1	1.287	CP1	1.728	GI1	2.489	SSB1	2.297
AGPP5	1.625	C2	1.315	CP2	1.866	GI2	2.569	SSB2	3.289
AGPP6	2.756	C3	1.421	CP3	2.255	GI3	1.972	SSB3	2.233
AGPP7	3.17	C4	3.055	CP4	2.345	GI4	2.227	SSB4	2.547
AGPP8	1.72	C5	3.325	CP5	2.439	GI5	2.197	SSB5	2.007
AGPP9	1.745	C6	1.937	CP6	2.884	GI6	1.914	SSB6	2.451
AGPP10	1.526			CP7	1.694			SSB7	2.407
								SSB8	2.833

The table 4.15 shows all the values for VIF of each of the indicators which potentially ranges from 1.287 to 3.289 which are basically below 5 and are closer to 3. This indicates that multicollinearity is not a concern in this study.

4.9.2. Coefficient of Determination (R^2)

The primary criterion for evaluating structural model is coefficient of determination (R^2). R^2 is the measure of the analytical precision of the model. R^2 basically represents the joint effect of exogenous variables on endogenous variables (Hair Jr, Sarstedt, Hopkins, & Kuppelwieser, 2014). The acceptable range for this effect is between 0 and 1, where 1 represents complete analytical accuracy (Hair Jr et al., 2014). The higher level of R^2 values indicates the higher explanatory power. According to (Hair Jr et al., 2014), R^2 value of 0.75 is deemed substantial, 0.50 is considered moderate, and 0.25 is viewed as weak. But the R^2 values acceptable ranges are based upon the situation in which they are used. In some studies the R^2 values of 0.1 are considered to be satisfactory. Such as in some studies R^2 value 0.2 is high. According to (Joe F Hair et al., 2011), values of 0.75, 0.50 and the 0.25 can be used as a rule of thumb in R^2. Cohen (1988), suggested the R^2 value of 0.20, 0.13, 0.02 as substantial, moderate and weak. The table 4.17 presents the R^2 value for each endogenous variable.

Table 4.16. Coefficient of Determination Results

	R-square
AGPP	0.276
C	0.383
GI	0.189
SSB	0.233

As presented in the table 4.16, the R^2 values have met the criteria meaning that the structural model has best fitted the data and has adequate predictability of the model.

4.9.3. Significance and Relevance of Path Coefficients

After calculating R^2, other criteria used for estimating structural model is to examine values of path coefficient. In this context, the significance and relevance of the path coefficients are assessed (Sarstedt et al., 2021). The estimates for path coefficient presents the hypothesized relationship between constructs. In order to test significance of model the SMART-PLS generates t-statistics using bootstrapping (Wong, 2013). In the bootstrapping process, numerous subsamples are created from original sample which will give approximate t-values

to test the path coefficients significance (Wong, 2013). Moreover, while conducting analysis on PLS-SEM it is not presumed that the data is normally distributed. Rather it conducts the bootstrapping, in which a bootstrap sample was created by repeatedly conducting random sampling from the original sample to obtain the standard error for testing the hypothesis (Joe F Hair et al., 2011).

The bootstrap sample usually consists of a large sample size such as 5000 to test the significance of coefficients (Joe F Hair et al., 2011), (Wong, 2013). This study runs the bootstrapping analysis on the sample size of 10,000 as suggested by (Sarstedt et al., 2021) to get the more approximate t-values. The standardized range for the values of path coefficient are between +1 & -1. Where +1 signifies strong positive and -1 denotes strong negative relationship (Hair Jr et al., 2014). Although according to (Helm, Eggert, & Garnefeld, 2009), the values that are closer to -1 and +1 are significant but there is still a need to obtain the standard error from bootstrapping to test the path coefficient's significance.

The table 4.17 presents the coefficients of path, standard deviation, t-statistics and the significance level for each hypothesized relationship. Based on findings from path analysis every hypothesis is rejected or accepted. For a hypothesis to be accepted, the t-value must exceed 1.96 (Wong, 2013) and results are considered significant if $p<0.05$ (Latif, Tariq, Muneeb, Sahibzada, & Ahmad, 2022).

Table 4.17. Results of Path Coefficients

	Beta Coefficient	**Sample mean (M)**	**Standard deviation (STDEV)**	**T-statistics (|O/STDEV|)**	**P values**
AGPP -> C	0.182	0.175	0.095	1.924	**0.054**
AGPP -> GI	0.435	0.442	0.078	5.556	0.000
AGPP -> SSB	0.483	0.488	0.075	6.424	0.000
CP -> AGPP	0.525	0.531	0.066	8.012	0.000
GI -> C	0.324	0.329	0.081	3.972	0.000
SSB -> C	0.237	0.239	0.094	2.523	0.012

The outcomes of the table displays that all the hypothesis are significant except for the hypothesis in which p is larger than 0.05. The results from table 4.17 are discussed in the next section.

4.9.4. Hypothesis Testing

Within the structural model the path coefficients between variables are examined to test whether proposed hypothesis is supported or not. Each of the hypothesis are presented in table 4.17. Among the six hypothesis five were significant at the level of 0.05. All of these hypothesis are discussed below:

H_1: Customer pressure significantly influences the adoption of GPPs.

The first hypothesis (H_1) evaluates that whether the customer pressure has substantial impact on AGPP. The results indicate that customer pressure significantly influences AGPP (where; $\beta= 0.525$, $t= 8.012$, $p< 0.001$), indicating customer pressure has positive impact on SMEs. Meaning that customer pressure can influence the SMEs to adopt green procurement practices. This is evident from the previous research by (Yen & Yen, 2012), which states that customer pressure does significantly and positively impact green procurement adoption in the SMEs. Lin, Alam, Ho, Al-Shaikh, and Sultan (2020) in a study also provides evidence that customer pressure is an important determinant that can influence adoption of GSCM in Malaysian SMEs.

H_2: The adoption of GPPs significantly influences supplier sustainable behavior.

The second hypothesis (H_2) proposes that AGPP has a positive influence on the supplier sustainable behavior. This relationship was supported in the analysis ($\beta= 0.483$, $t= 6.424$, $p< 0.001$). This results indicate that the SMEs that adopt the green procurement practices can also influence the behavior of the suppliers to be more sustainable. These results are evident from the study of Hollos, Blome, and Foerstl (2012), that the firm that is buying the products should enable the suppliers towards the sustainable business practices and production processes. Blome et al. (2014), also states that green procurement not only enhances performance of the firm instead it can also enhances the performance of the suppliers through the appropriate implementation of the environmental standards.

H_3: The adoption of GPPs significantly influences green innovation.

The third hypothesis (H_3), assumes that AGPP influences green innovation within the SMEs. After the analysis the results reveals that this hypothesis is accepted and the relationship is significant as there is positive relationship between both variables ($\beta= 0.435$, $t= 5.556$, $p< 0.001$). These results demonstrates that the firms that adopt GP are more probable to influence the innovation of procedures and processes within the firms. Evidence can be taken from (H.-H. Weng et al., 2015), where it is mentioned that if the firms pays attention to environmental factors and has strong recognition for those factors can lead to better performance and

innovation. Reinhardt (1999), also states that if the firm enhances their commitment to the environmental concerns they can have positive impact on green innovation.

H_4: Adoption of GPP has a significant impact on firm competitiveness of SMEs.

The fourth hypothesis (H_4), proposes positive relationship between AGPP and competitiveness of SMEs. The results shows that this hypothesis is not supported as this relationship is not significant (β= 0.182, t= 1.924, p= 0.054). In this study firms competitiveness is being measured in terms of quality, delivery and price. Based upon results it is possible that due to the AGPP in a certain SME the competitiveness in terms of one of the above mentioned factor is enhance but the other factor may not be effected. This argument is supported by (Tan, Zailani, Tan, & Yeo, 2019), where due to AGPP firm's competitiveness in terms of price has increased but it did not affect the firms competitiveness in perspective of delivery and quality. Moreover it is stated by Rao (2004), due to lack of awareness of the green practices between the SMEs there is insignificant impact of GP on the firms competitiveness.

H_5: Supplier sustainable behavior significantly influences the firm competitiveness.

The Fifth hypothesis (H_5) states that the supplier sustainable behavior has significant impact upon competitiveness of SMEs. Results supports above stated hypothesis as the relationship is significant between supplier sustainable behavior and the firm's competitiveness (β= 0.237, t= 2.523, p= 0.012). Means that if supplier behavior is green then they will have strong contribution in the processes of company, which will increase the reputation of the company and makes it more competitive. These results are evident from (C.-S. Yang, Lu, Haider, & Marlow, 2013), where it is proved that collaboration with the suppliers upon green practices lead to firm's competitiveness. In addition to that Kotei and Yinping (2019), states that if the supplier are sustainable they will significantly impact the practices of the firm that will make them competitive.

H_6: Green innovation significantly influences the firms competitiveness.

The sixth hypothesis (H_6) evaluates whether green innovation has a significantly positive relation with competitiveness of SMEs or not. Results revealed (β= 0.324, t= 3.972, p< 0.001) representing positive relationship between green innovation and firm competitiveness. It is further elaborated from results that due to rare capabilities of the firm and with innovation the company can increase their competitiveness and improve the brand image. These results are evident from (S. A. R. Khan et al., 2022), which proves that green innovation can boost the sales, volume, efficiency and competitiveness of the firms. Moreover (Cai & Zhou, 2014), states that green innovation leads a company towards the implementation of new technology and provide better services and products. This will ultimately result in

creating value for the customer and also it will bring financial gains for the company.

4.9.5. Specific Indirect Effect

In addition to all the analysis performed earlier assessing the indirect relationship between the endogenous and exogenous latent variable is also very important for the evaluation of structural model (Alnakhli, 2019). The table 4.18 shows the specific indirect effects of AGPP on firm competitiveness through supplier sustainable behavior (β= 0.114, t= 2.064, p= 0.039), these values supports specific indirect effect of these constructs. The results also demonstrates the significant specific effect of the AGPP and firm competitiveness through the green innovation (β= 0.141, t= 3.138, p= 0.002). it is clear from table 4.18 results that AGPP does not have significant influence on the competitiveness of the SMEs but when SSB and GI is involved it showed significant results. It is concluded from results that if an organization adopts green procurement practices and does not have sustainable supplier and green innovation it does not have significant influence on firms competitiveness. SMEs can have better competitiveness when with the adoption of GPPs they introduce green innovation as well as their suppliers have sustainable behavior. All other indirect paths are also discussed below:

Table 4.18. Specific Indirect Paths Results

	Beta Coefficient	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
AGPP -> SSB -> C	0.114	0.119	0.055	2.064	0.039
CP -> AGPP -> GI -> C	0.074	0.078	0.029	2.566	0.010
AGPP -> GI -> C	0.141	0.146	0.045	3.138	0.002
CP -> AGPP -> C	0.096	0.094	0.053	1.786	0.074
CP -> AGPP -> SSB -> C	0.06	0.064	0.034	1.788	0.074
CP -> AGPP -> GI	0.229	0.238	0.064	3.586	0.000
CP -> AGPP -> SSB	0.254	0.263	0.066	3.87	0.000

The findings from the SEM are illustrated in Figure 4.6 below:

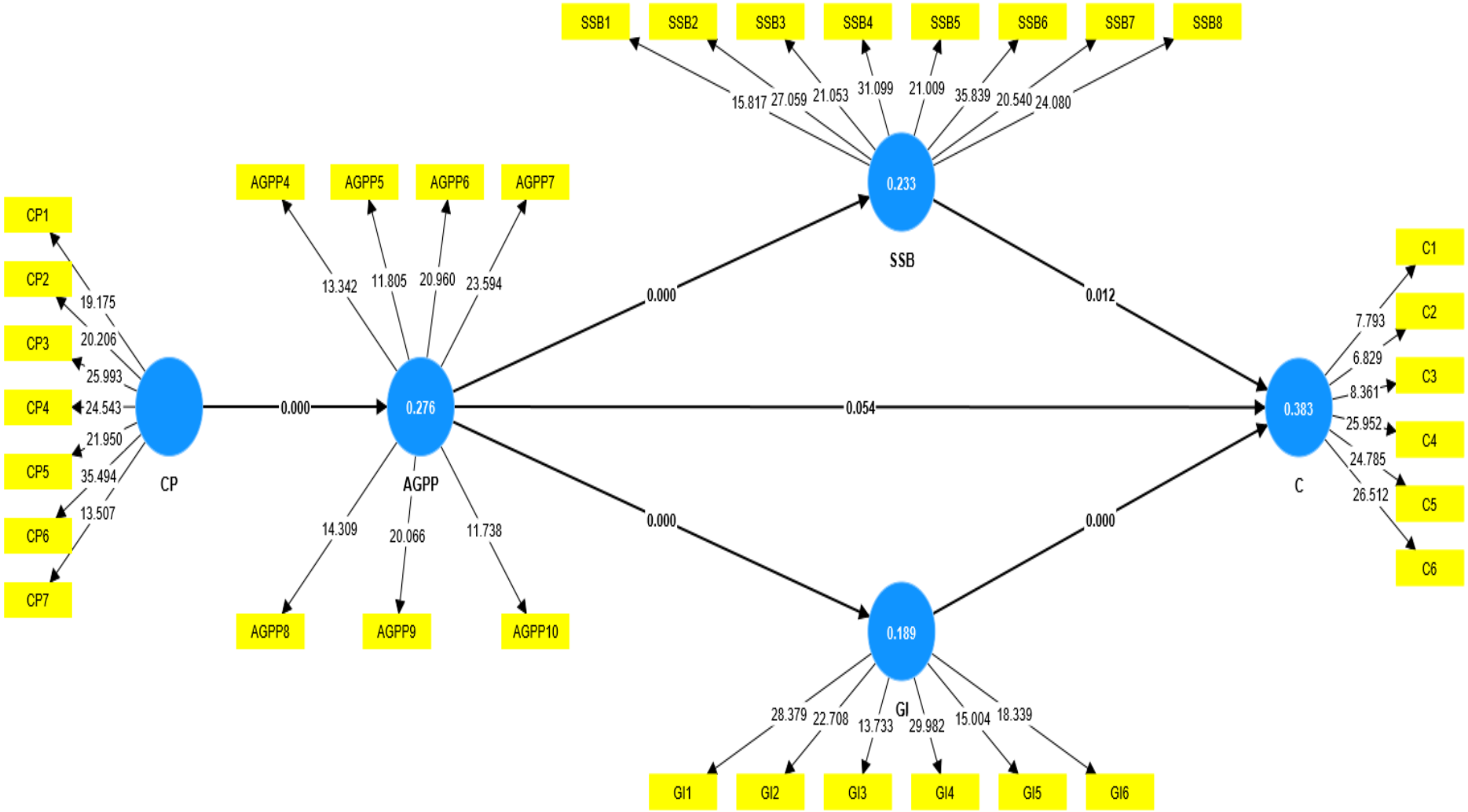

Figure 4.3. Illustration of Structural Equation Modelling Results

4.10. Discussion

Throughout the course of this study the author has developed a framework which will align the literature around the impact of AGPP on competitiveness of SMEs. The data was gathered by sending online survey forms to the SMEs of Pakistan. The framework was focused on providing the insight into the SMEs that adopt green procurement practices and the impact of practices in improving the competitiveness of the SMEs. Within the framework the customer pressure is the variable that influence the company to adopt the green procurement practices. when the SMEs become aware that there customers wants green products and they are aware of the sustainability the companies thrives towards the adoption of GPPs. Moreover, when the company adopts green procurement practices they influence their supplier to have sustainable behavior as well as green innovation also emerge in the operations of SMEs. All of the factors will collectively contribute to the competitiveness of the firms. Within this study each and every aspect of the research framework was analyzed and a holistic view is created about the motivation of the company to adopt green procurement practices as well as what impact green procurement creates on the competitiveness of the firms.

SmartPLS is used to analyze and determine the impact of adopting GPPs on SMEs' competitiveness. Various insights can be derived from the analysis of the measurement model and the structural model. First, measurement model was employed to assess validity and reliability of data.. Initially, in the measurement model, the values of Cronbach's Alpha and composite reliabilities are according to threshold provided by (Nunnally & Bernstein, 1978; Nunnally & Bernstein, 1994; Wong, 2013). That means the items in the model are reliable. Regarding the validity of the model, average variance extracted is tested, in the beginning the AVE value of AGPP is below the stated threshold. To enhance the AVE value, it's essential to evaluate the factor loading values. It is suggested by few of the scholars that if the values in the factor loading are affecting the model's reliability and validity then factor loadings below 0.5 as provided by (Awang et al., 2010) they need to be deleted. So in this case the items AGPP1, AGPP2 and AGPP3 are deleted to improve the value of AVE. Subsequently, concerning the model's reliability, all Cronbach's Alpha and composite reliability values surpass the specified threshold of 0.7. All the factor loadings are also within the recommended range depicting that the model presents satisfactory reliability of the model. The discriminant and convergent validity is also satisfactory with values of AVE all in specified range. All these findings indicate that the model is both valid and reliable for subsequent analysis.

Furthermore, structural model is also tested, which also demonstrate all the results to be

satisfactory. The coefficient of determination (R2) values are all substantial and satisfactory. The hypotheses proposed in the study are also tested and support was provided from the literature. The Indirect paths are also examined that are also significant at the level of 0.05, with 95% confidence interval. Out of six hypothesis that are proposed in the literature the PLS-Sem analysis showed that five hypothesis are supported and one hypothesis was rejected. All these findings, combined with evidence from the literature, are elaborated upon in detail in section 4.9.4. The table 4.19 summarizes results for each hypothesis that is tested.

Table 4.19. Summary of the Research Hypothesis

	Statement of Hypothesis	Result
H_1	Customer pressure significantly influences the adoption of GPPs.	Supported
H_2	The adoption of GPPs significantly influences supplier sustainable behavior.	Supported
H_3	The adoption of GPPs significantly influences green innovation	Supported
H4	Adoption of GPP has a significant impact on firm competitiveness of SMEs.	Not Supported
H_5	Supplier sustainable behavior significantly influences the firm competitiveness.	Supported
H_6	Green innovation significantly influences the firms competitiveness.	Supported

The first hypothesis (H_1) was supported in the analysis and it was also backed by the literature. It shows that the firms that faces the pressure from the customers to adopt the green practices as well as those firms whose customers are wills to pay the money for the green products are more likely to adopt the green procurement practices within the firm. These hypothesis is also supported in many papers such as (ElTayeb et al., 2010; Jun et al., 2019; Khodaparasti et al., 2020). Second hypothesis (H_2) is also supported in the analysis by the data. This states that the adoption of GPPs influences the supplier sustainable behavior. This hypothesis is also supported by the literature by (Agarwal & Selen, 2009; Hollos et al., 2012). As this is prominent that the organizations that adopt green procurement practices tends to find

the suppliers that are the most likely participants to have the sustainable behavior. The organizations that do not adopt GPPs do not care about their suppliers being sustainable. That is why the sustainable supplier behavior is only influenced by firms that carry out green practices.

The third hypothesis (H_3) also shows significant results. As it is clear that the companies that adopts the green practices will tend to involve themselves in the technological innovations. Those firms will thrive towards implementing green technology in their firms. They will differentiate their products by bringing uniqueness and innovativeness in their products. This argument is supported by (Björklund & Forslund, 2018; Zailani et al., 2011). The data did not support fourth hypothesis (H_4). As it shows that this is not always the case that AGPP influences the competitiveness of firms. These findings align with results from (Beleya et al., 2019; Ivanova, 2020). There are various reasons for why this hypothesis is not supported such as there are various factors to measure the competitiveness of the firms like quality, speed, delivery, competitive advantage etc. So, it can be case that the data used for this study may be measuring only one or two factors of competitiveness by contributing more to the processes of the company. This argument is supported by (Rao, 2004; Tan et al., 2019).

The hypothesis fifth (H_5) and sixth (H_6) are both significant showing that the suppliers sustainable behavior and the green innovation increases the competitiveness of the SMEs. This shows that the collaboration of the companies with their suppliers upon green initiatives will improve the companies competitiveness. If the suppliers are sustainable they can significantly enhance the company's performance. This argument is supported by (Kotei & Yinping, 2019; C.-S. Yang et al., 2013; Zhou et al., 2023). In addition, green innovation would make the organization more distinctive than other organizations performing in an industry as evident from (Jun et al., 2019; S. A. R. Khan et al., 2022; H.-H. Weng et al., 2015). In addition to this the indirect paths are also analyzed from the framework that would contribute significantly to the literature. From the indirect paths it is observed that if the company adopts green procurement practices and its suppliers also has sustainable behavior as well as it introduces green innovation it can significantly influence the competitiveness of the firms. On the other hand, if a company implement green procurement practices but it does not have suppliers that shows sustainable behavior and it does not introduce green innovation there is no guarantee that its competitiveness would also increase.

This research significantly contributes to literature by highlighting the novel connection between a firm's AGPP and its influence on competitiveness. Moreover, this research study emphasizes the crucial factors for AGPP and their effects on the performance or

competitiveness of SMEs in a developing nation such as Pakistan. This is asserted in this study that the organizations should adopt GPPs as the AGPP and its implementation in SMEs is still questionable. By shedding light on the SMEs of developing countries this study breaks new grounds by developing a clear connection between the adoption of GPPs and the competitiveness of the SMEs.

5. Conclusion

This chapter will start by providing the summary and conclusion of results of analysis as well as empirical findings. By doing this the questions of the research would be answered meeting the objectives of research study. Furthermore, practical implications for the study are provided. Lastly, the limitations to this study are mentioned along with recommendations for future research are briefly discussed.

The increased business operations and activities across the globe are posing huge threat to ecological environment in form of environmental pollutions such as scrapped items, carbon emissions, discarded packaging etc. One solution to minimize or eliminate this adverse effect on the environment is green procurement. This research study endeavors to evaluate and analyze the influence of implementing GPPs on firm performance. It is seen that GP is still a very new notion in Pakistan. As the SMEs contribute majorly to the country's economy The concept of GP needs to be introduced to companies operating in different industries. Therefore, The aim of this research study was to explore the influence of implementing GPPs on the competitiveness of SMEs. This study also tested the model for the factor that would lead to the AGPP in SMEs and its impact on the performance of those SMEs. The results of hypothesis shows the support for the proposed relationships. It is evident that the pressure from the customers can influence the companies towards adoption of green procurement practices and these practices along with the sustainable supplier behavior and green innovation can increase the competitiveness of the SMEs.

5.1. Contribution of Study

The study upon adoption of green procurement practices and its effect on the competitiveness or the performance of SMEs hold a lot of significance for various stakeholders. This is because the SMEs constitutes the significant proportion of the business landscape and they also have a significant impression on the environment. So, it is very important for the SMEs to indulge in operations, processes and activities that will reduce their footprints on the natural environment. This can only be achieved by adopting sustainable practices. The area of green procurement in the SMEs sector is still underexplored. This research significantly contribute to prevailing body of knowledge as it has developed a framework that includes variables like customer pressure, sustainable supplier behavior, green innovation and competitiveness all in context of green procurement that are not studied before altogether. Moreover, the proposed framework is also not studied in the context of Pakistan. Finally the study also suggests the practices that will increase the performance as well as the

competitiveness of the SMEs.

5.2.Managerial Implications

The current study guides the practitioners more specifically the managers, the procurement managers and the CEOs in the SMEs of Pakistan to be aware of the pressures that can trigger the companies to adopt green procurement practices. This study also shows that it is not enough for a company to just adopt the green procurement practices if it wants to increase its competitiveness. Along with adopting green procurement practices the firms need to consider other factors as well if they want to truly increase their competitiveness. The constant collaboration, communication, feedback from the suppliers are also very crucial. Choosing the suppliers with sustainable behavior is also very crucial. Organizations have the power to influence the suppliers to become sustainable. It is seen that if a company adopts green procurement practices and have sustainable suppliers both can altogether have a significant impact on the firms competitiveness. In addition to that the firms that adopt green practices that would lead to innovation and technology within the processes. Green innovation can differentiate a company from other companies that will ultimately contribute to the competitiveness of the firms. The firms should involve themselves in the innovation of green technology and processes which will contribute to better firms performance. The management should involve themselves into launching various programs about the adoption of GPPs and its significance nationwide as well as worldwide. Most of the companies in SME sector are not aware of the green procurement, some of them just partially involve themselves in green practices and green procurement practices implementation in manufacturing SMEs is still questionable, therefore, more focus should be placed on developing the methods and procedure that are more appropriate for AGPP. Due to significant role of SMEs within the society, by indulging in GPP the SMEs can influence economic and environmental development of the society and local community, through sustainable buyer- supplier behavior. This is how a significant impact can be made in the society.

5.3.Limitations and Future Research

Like other research studies this research also have some restrictions. The first limitation is that the sampling frame was not available due to which access to most of the SMEs was not available and only manufacturing SMEs were targeted for the data. The future research should consider the SMEs working in other industries as well to gain greater generalizability. Secondly this is an academic and non-funded research so only those companies are accessed who are available online for filling online surveys. In addition to this there was time constraint due to

limited time the sample size was not too big. So, in future researches greater number of targeted SMEs can be achieved for data collection. Apart from this only one respondent was chosen from one organization to respond to the research survey which may lead to response bias. Therefore, caution should be made accordingly.

In addition to this it is anticipated that the researches in the future should study in depth other kinds of pressures that influence the organizations to adopt green practices such as the governmental pressure in the context of Pakistani SMEs. The researchers should also replicate this study in other industries or sectors such as the SMEs in service and retailing sector and in industries like healthcare, aviation etc. Lastly, the future researches should consider other aspects of sustainability in supply chain as well in addition to procurement.

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Appendices

Appendix A- Research Questionnaire

Survey for "The Impact of Adopting Green Procurement Practices on Competitiveness in SMEs".

This study aims to identify factors affecting the adoption of green procurement practices in SMEs in Pakistan. Moreover, the impact of adopting green procurement practices on the competitiveness of an SME will be evaluated. You are requested to take 5 minutes of your valuable time to fill out this survey and contribute to this academic research.

Please be informed that all the information provided by you is under free consent and it must be treated with confidentiality as per NUST Code of Research Ethics.

Instructions: Please read all questions carefully and give your answer (✓) using the 5-point scale given below.

S. No.	Question	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)
Adoption of Green Procurement Practices						
1.	Our company deigns products which use minimum resources.					
2.	Our company deigns products which can be reused and recycled.					
3.	Our company seeks alternatives to the reduce the use of packaging material.					
4.	Our company seeks suppliers with low energy consumption or GHG emissions.					
5.	Our company asks suppliers to commit to waste reduction goals.					
6.	Our company has developed sustainable procurement policies and practices.					

7.	Our company evaluates suppliers on sustainable procurement criteria.					
8.	Our company provides design for early involvement of our suppliers.					
9.	Our company handles waste as per sustainable practices.					
10.	Our company prefers suppliers which offer reverse logistics.					
Competitiveness						
1.	Our company's return on investment is higher than its competitors.					
2.	Our company offers lower prices compared to its competitor.					
3.	Our company has reduced cost of doing business compared to my competitor.					
4.	Our company offers greater service quality compared to its competitor.					
5.	Our company offers high quality products compared to our competitor.					
6.	Our company delivers customer orders on time as compared to my competitor.					
Customer Pressure						
1.	Caring for the environment is an important consideration for our customers.					
2.	Our company regularly participates in green procurement related educational workshops organized by our customers.					
3.	Number of green products in our product line has shown increasing trend over the years due to customer requirements.					
4.	Number of customers seeking environment friendly products from us has increased over the years.					

5.	Our customers require us to improve environmental performance.					
6.	Our customers have shown an increase in demand for green products over the years.					
7.	Our customers have strict compliance criteria for hazardous/ harmful material.					
Sustainable Supplier Behavior						
1.	Our suppliers have implemented a mechanism to ensure sustainability through policies and practices.					
2.	Our suppliers challenge themselves to develop sustainable solutions.					
3.	Our suppliers collaborate with us to make procurement projects more sustainable.					
4.	Our suppliers require feedback from our company and other customers regarding their environmental performance.					
5.	Our suppliers tend to achieve the shortest possible delivery lead time.					
6.	Our suppliers are responsive towards green production practices at their premises.					
7.	Our suppliers organize invite customers to visit their premises for audit to improve sustainable practices.					
8.	Our supplies are efficient when it comes to energy consumption and waste reduction.					
Green Innovation						
1.	Our company choose materials from suppliers that release the least amount of pollution during the green product design and development stage.					
2.	Our company choose materials that consume less energy in product development.					
3.	Our company evaluates that the product is easy to					

	reuse, recycle, and decompose in product development.					
4.	Our company's manufacturing/production process effectively reduces the emission of hazardous substances or waste.					
5.	Our company's manufacturing process recycles waste that allows it to be treated and re-used.					
6.	Our company uses least amount of materials to produce products in product development.					

In addition to the above mentioned information, the following demographic information is also important for the study:

1. Firm Size A. Less than 50 employees B. 50-200 employees C. More than 50 employees	6. Gender A. Male B. Female
2. Firm Age A. Less than 10 years B. 10-15 years C. 15-20 years D. Greater than 20 years	7. Education A. Master Degree B. Bachelor Degree C. Associate Degree
3. Ownership Structure A. State owned B. Non-state owned	8. Experience A. Less than 5 years B. 5-10 years C. More than 10 years
4. Industry _____	9. Job Title _____
10. Organization Name _____	10. Experience in this Firm _____ years.

Thank you for your time and effort

Appendix B- List Of Measurement Constructs

Constructs	Items	Codes	References
Adoption Of Green Procurement Practices	Our company deigns products which use minimum resources.	AGPP1	(Blome et al., 2014)
	Our company deigns products which can be reused and recycled.	AGPP2	
	Our company seeks alternatives to the reduce the use of packaging material.	AGPP3	
	Our company seeks suppliers with low energy consumption or GHG emissions.	AGPP4	
	Our company asks suppliers to commit to waste reduction goals.	AGPP5	
	Our company has developed sustainable procurement policies and practices.	AGPP6	(Acquah et al., 2023)
	Our company evaluates suppliers on sustainable procurement criteria.	AGPP7	(Tan et al., 2016)
	Our company provides design for early involvement of our suppliers.	AGPP8	(ElTayeb et al., 2010)
	Our company handles waste as per sustainable practices.	AGPP9	(Khodaparasti et al., 2020)
	Our company prefers suppliers which offer reverse logistics.	AGPP10	
Competitiveness	Our company's return on investment is higher than its competitors.	C1	(Tan et al., 2016)
	Our company offers lower prices compared to its competitor.	C2	
	Our company has reduced cost of doing business compared to my competitor.	C3	
	Our company offers greater service quality compared to its competitor.	C4	
	Our company offers high quality products compared to our competitor.	C5	

	Our company delivers customer orders on time as compared to my competitor.	C6	
Customer Pressure	Caring for the environment is an important consideration for our customers.	CP1	(M.-H. Weng & Lin, 2011)
	Our company regularly participates in green procurement related educational workshops organized by our customers.	CP2	(Khodaparasti et al., 2020)
	Number of green products in our product line has shown increasing trend over the years due to customer requirements.	CP3	
	Number of customers seeking environment friendly products from us has increased over the years.	CP4	(Ghosh, 2019)
	Our customers require us to improve environmental performance.	CP5	(M.-H. Weng & Lin, 2011)
	Our customers have shown an increase in demand for green products over the years.	CP6	(Zhou et al., 2023)
	Our customers have strict compliance criteria for hazardous/ harmful material.	CP7	(ElTayeb et al., 2010)
Supplier Sustainable Behavior	Our suppliers have implemented a mechanism to ensure sustainability through policies and practices.	SSB1	(Kotei & Yinping, 2019)
	Our suppliers challenge themselves to develop sustainable solutions.	SSB2	
	Our suppliers collaborate with us to make procurement projects more sustainable.	SSB3	
	Our suppliers require feedback from our company and other customers regarding their environmental performance.	SSB4	(Ghosh, 2019)
	Our suppliers tend to achieve the shortest possible delivery lead time.	SSB5	(Blome et al., 2014)

	Our suppliers are responsive towards green production practices at their premises.	SSB6	
	Our suppliers organize invite customers to visit their premises for audit to improve sustainable practices.	SSB7	
	Our supplies are efficient when it comes to energy consumption and waste reduction.	SSB8	(Bai & Sarkis, 2014)
Green Innovation	Our company choose materials from suppliers that release the least amount of pollution during the green product design and development stage.	GI1	(Jun et al., 2019)
	Our company choose materials that consume less energy in product development.	GI2	
	Our company evaluates that the product is easy to reuse, recycle, and decompose in product development.	GI3	
	Our company's manufacturing/production process effectively reduces the emission of hazardous substances or waste.	GI4	
	Our company's manufacturing process recycles waste that allows it to be treated and re-used.	GI5	
	Our company uses least amount of materials to produce products in product development.	GI6	

Appendix C- Summary of Key Constructs

Construct	Definition	References
Green Procurement	The procurement or purchase of the services and the products that have reduced impact on the environment as compared to other services and products serving the same purpose or they may be the products that meet the predefined criteria of environmental protection.	(Mosgaard, 2015)
Customer Pressure	The requirements and the requests of the business consumers that are the primary stakeholders as well as the end consumers for the firms to enhance their social and environmental performance.	(Gualandris & Kalchschmidt, 2014)
Supplier Sustainable Behavior	The mechanism adopted by the suppliers that triggers the attitude of its employees to adopt green processes and production.	(Kotei & Yinping, 2019)
Green Innovation	The introduction or implementation of modified or new products, services, processes and practices that will benefit and contribute to the natural environment.	(Schiederig, Tietze, & Herstatt, 2012)
Competitiveness	Refers to sustaining superior performance. It can be achieving competitive advantage, providing better quality, speed, lower prices than its competitors.	(Lee & Karpova, 2018)

Appendix D- Summary of Descriptive Statistics

AGPP1

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	11	5.9	5.9	5.9
	D	30	16.0	16.0	21.8
	N	36	19.1	19.1	41.0
	A	83	44.1	44.1	85.1
	SA	28	14.9	14.9	100.0
	Total	188	100.0	100.0	

AGPP2

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	29	15.4	15.4	15.4
	D	43	22.9	22.9	38.3
	N	25	13.3	13.3	51.6
	A	55	29.3	29.3	80.9
	SA	36	19.1	19.1	100.0
	Total	188	100.0	100.0	

AGPP3

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	15	8.0	8.0	8.0
	D	29	15.4	15.4	23.4
	N	41	21.8	21.8	45.2
	A	64	34.0	34.0	79.3
	SA	39	20.7	20.7	100.0
	Total	188	100.0	100.0	

AGPP4

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	6	3.2	3.2	3.2
	D	28	14.9	14.9	18.1
	N	46	24.5	24.5	42.6
	A	68	36.2	36.2	78.7
	SA	40	21.3	21.3	100.0
	Total	188	100.0	100.0	

AGPP5

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	11	5.9	5.9	5.9
	D	22	11.7	11.7	17.6
	N	32	17.0	17.0	34.6
	A	84	44.7	44.7	79.3
	SA	39	20.7	20.7	100.0
	Total	188	100.0	100.0	

AGPP6

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	10	5.3	5.3	5.3
	D	17	9.0	9.0	14.4
	N	26	13.8	13.8	28.2
	A	79	42.0	42.0	70.2
	SA	56	29.8	29.8	100.0
	Total	188	100.0	100.0	

AGPP7

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	11	5.9	5.9	5.9
	D	20	10.6	10.6	16.5
	N	27	14.4	14.4	30.9
	A	82	43.6	43.6	74.5
	SA	48	25.5	25.5	100.0
	Total	188	100.0	100.0	

AGPP8

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	8	4.3	4.3	4.3
	D	17	9.0	9.0	13.3
	N	48	25.5	25.5	38.8
	A	79	42.0	42.0	80.9
	SA	36	19.1	19.1	100.0
	Total	188	100.0	100.0	

AGPP9

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	6	3.2	3.2	3.2
	D	26	13.8	13.8	17.0
	N	31	16.5	16.5	33.5
	A	70	37.2	37.2	70.7
	SA	55	29.3	29.3	100.0
	Total	188	100.0	100.0	

AGPP10

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	9	4.8	4.8	4.8
	D	15	8.0	8.0	12.8
	N	59	31.4	31.4	44.1
	A	73	38.8	38.8	83.0
	SA	32	17.0	17.0	100.0
	Total	188	100.0	100.0	

C1

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	10	5.3	5.3	5.3
	D	22	11.7	11.7	17.0
	N	64	34.0	34.0	51.1
	A	68	36.2	36.2	87.2
	SA	24	12.8	12.8	100.0
	Total	188	100.0	100.0	

C2

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	5	2.7	2.7	2.7
	D	18	9.6	9.6	12.2
	N	52	27.7	27.7	39.9
	A	74	39.4	39.4	79.3
	SA	39	20.7	20.7	100.0
	Total	188	100.0	100.0	

C3

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	7	3.7	3.7	3.7
	D	18	9.6	9.6	13.3
	N	38	20.2	20.2	33.5
	A	85	45.2	45.2	78.7
	SA	40	21.3	21.3	100.0
	Total	188	100.0	100.0	

C4

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	3	1.6	1.6	1.6
	D	8	4.3	4.3	5.9
	N	34	18.1	18.1	23.9
	A	81	43.1	43.1	67.0
	SA	62	33.0	33.0	100.0
	Total	188	100.0	100.0	

C5

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	2	1.1	1.1	1.1
	D	5	2.7	2.7	3.7
	N	35	18.6	18.6	22.3
	A	70	37.2	37.2	59.6
	SA	76	40.4	40.4	100.0
	Total	188	100.0	100.0	

C6

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	2	1.1	1.1	1.1
	D	14	7.4	7.4	8.5
	N	36	19.1	19.1	27.7
	A	72	38.3	38.3	66.0
	SA	64	34.0	34.0	100.0
	Total	188	100.0	100.0	

CP1

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	3	1.6	1.6	1.6
	D	12	6.4	6.4	8.0
	N	35	18.6	18.6	26.6
	A	75	39.9	39.9	66.5
	SA	63	33.5	33.5	100.0
	Total	188	100.0	100.0	

CP2

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	10	5.3	5.3	5.3
	D	31	16.5	16.5	21.8
	N	52	27.7	27.7	49.5
	A	62	33.0	33.0	82.4
	SA	33	17.6	17.6	100.0
	Total	188	100.0	100.0	

CP3

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	5	2.7	2.7	2.7
	D	20	10.6	10.6	13.3
	N	55	29.3	29.3	42.6
	A	71	37.8	37.8	80.3
	SA	37	19.7	19.7	100.0
	Total	188	100.0	100.0	

CP4

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	4	2.1	2.1	2.1
	D	19	10.1	10.1	12.2
	N	50	26.6	26.6	38.8
	A	79	42.0	42.0	80.9
	SA	36	19.1	19.1	100.0
	Total	188	100.0	100.0	

CP5

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	6	3.2	3.2	3.2
	D	16	8.5	8.5	11.7
	N	44	23.4	23.4	35.1
	A	78	41.5	41.5	76.6
	SA	44	23.4	23.4	100.0
	Total	188	100.0	100.0	

CP6

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	11	5.9	5.9	5.9
	D	20	10.6	10.6	16.5
	N	43	22.9	22.9	39.4
	A	70	37.2	37.2	76.6
	SA	44	23.4	23.4	100.0
	Total	188	100.0	100.0	

CP7

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	4	2.1	2.1	2.1
	D	14	7.4	7.4	9.6
	N	37	19.7	19.7	29.3
	A	68	36.2	36.2	65.4
	SA	65	34.6	34.6	100.0
	Total	188	100.0	100.0	

SSB1

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	7	3.7	3.7	3.7
	D	16	8.5	8.5	12.2
	N	54	28.7	28.7	41.0
	A	89	47.3	47.3	88.3
	SA	22	11.7	11.7	100.0
	Total	188	100.0	100.0	

SSB2

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	4	2.1	2.1	2.1
	D	20	10.6	10.6	12.8
	N	53	28.2	28.2	41.0
	A	88	46.8	46.8	87.8
	SA	23	12.2	12.2	100.0
	Total	188	100.0	100.0	

SSB3

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	6	3.2	3.2	3.2
	D	17	9.0	9.0	12.2
	N	40	21.3	21.3	33.5
	A	93	49.5	49.5	83.0
	SA	32	17.0	17.0	100.0
	Total	188	100.0	100.0	

SSB4

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	6	3.2	3.2	3.2
	D	23	12.2	12.2	15.4
	N	43	22.9	22.9	38.3
	A	87	46.3	46.3	84.6
	SA	29	15.4	15.4	100.0
	Total	188	100.0	100.0	

SSB5

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	3	1.6	1.6	1.6
	D	15	8.0	8.0	9.6
	N	34	18.1	18.1	27.7
	A	91	48.4	48.4	76.1
	SA	45	23.9	23.9	100.0
	Total	188	100.0	100.0	

SSB6

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	5	2.7	2.7	2.7
	D	27	14.4	14.4	17.0
	N	46	24.5	24.5	41.5
	A	80	42.6	42.6	84.0
	SA	30	16.0	16.0	100.0
	Total	188	100.0	100.0	

SSB7

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	8	4.3	4.3	4.3
	D	34	18.1	18.1	22.3
	N	43	22.9	22.9	45.2
	A	69	36.7	36.7	81.9
	SA	34	18.1	18.1	100.0
	Total	188	100.0	100.0	

SSB8

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	5	2.7	2.7	2.7
	D	21	11.2	11.2	13.8
	N	47	25.0	25.0	38.8
	A	82	43.6	43.6	82.4
	SA	33	17.6	17.6	100.0
	Total	188	100.0	100.0	

GI1

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	9	4.8	4.8	4.8
	D	23	12.2	12.2	17.0
	N	42	22.3	22.3	39.4
	A	69	36.7	36.7	76.1
	SA	45	23.9	23.9	100.0
	Total	188	100.0	100.0	

GI2

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	7	3.7	3.7	3.7
	D	27	14.4	14.4	18.1
	N	38	20.2	20.2	38.3
	A	82	43.6	43.6	81.9
	SA	34	18.1	18.1	100.0
	Total	188	100.0	100.0	

GI3

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	8	4.3	4.3	4.3
	D	29	15.4	15.4	19.7
	N	37	19.7	19.7	39.4
	A	85	45.2	45.2	84.6
	SA	29	15.4	15.4	100.0
	Total	188	100.0	100.0	

GI4

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	6	3.2	3.2	3.2
	D	21	11.2	11.2	14.4
	N	30	16.0	16.0	30.3
	A	89	47.3	47.3	77.7
	SA	42	22.3	22.3	100.0
	Total	188	100.0	100.0	

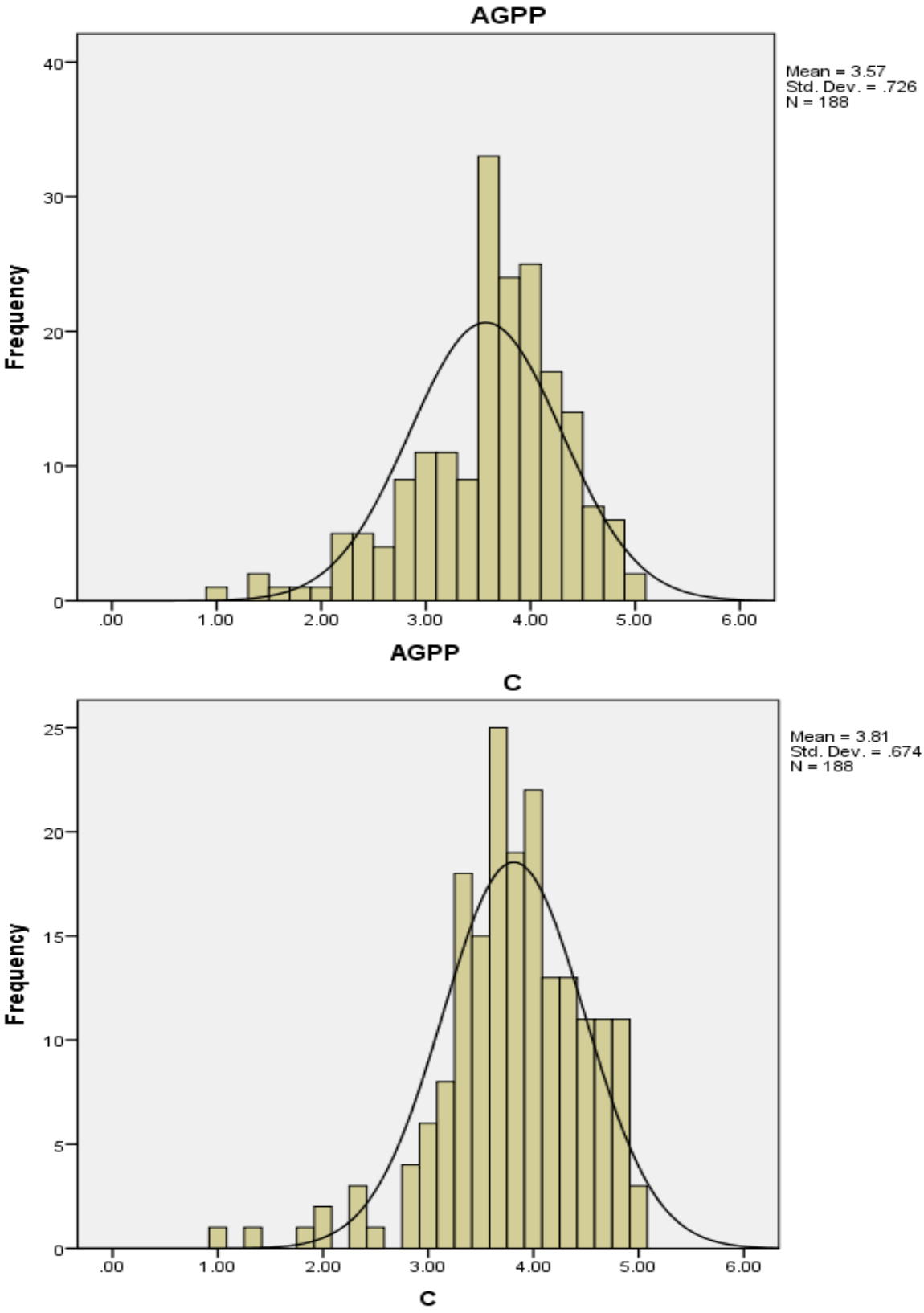
GI5

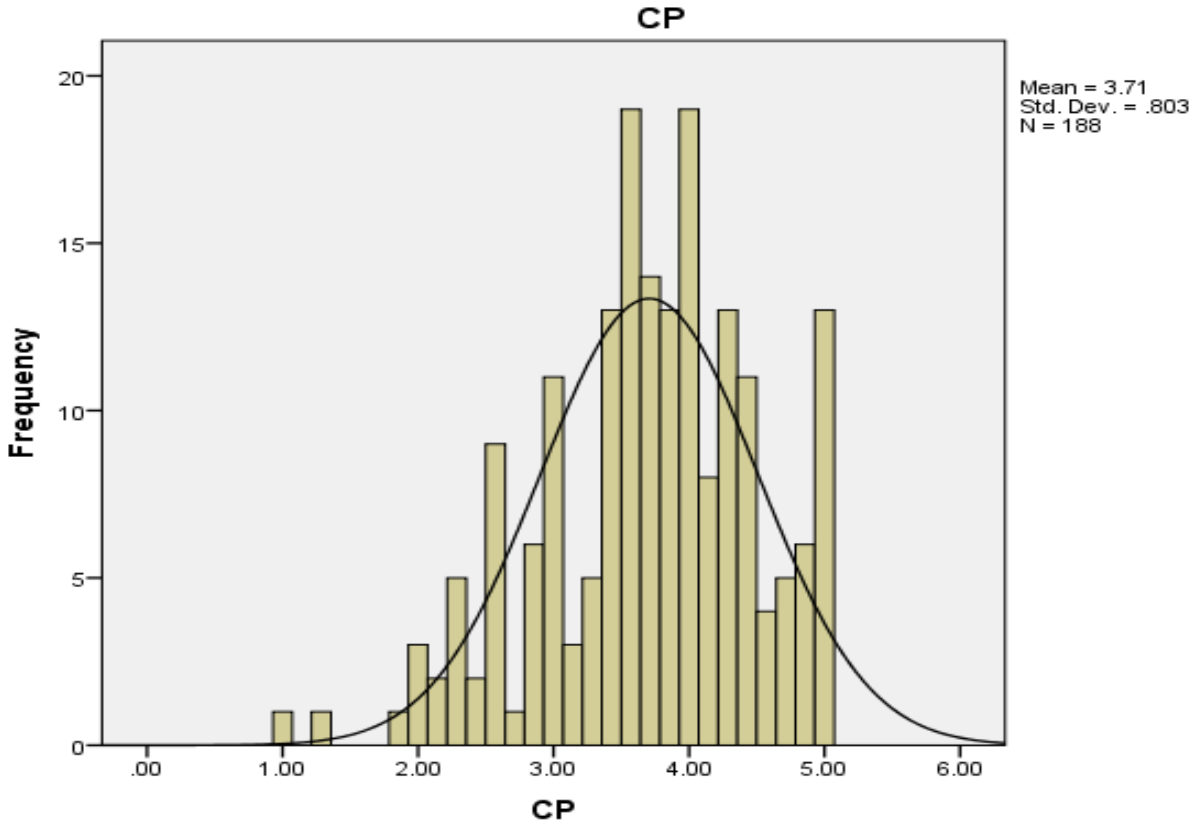
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	12	6.4	6.4	6.4
	D	33	17.6	17.6	23.9
	N	29	15.4	15.4	39.4
	A	73	38.8	38.8	78.2
	SA	41	21.8	21.8	100.0
	Total	188	100.0	100.0	

GI6

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SD	9	4.8	4.8	4.8
	D	20	10.6	10.6	15.4
	N	31	16.5	16.5	31.9
	A	96	51.1	51.1	83.0
	SA	32	17.0	17.0	100.0
	Total	188	100.0	100.0	

Appendix E- Normality Histogram

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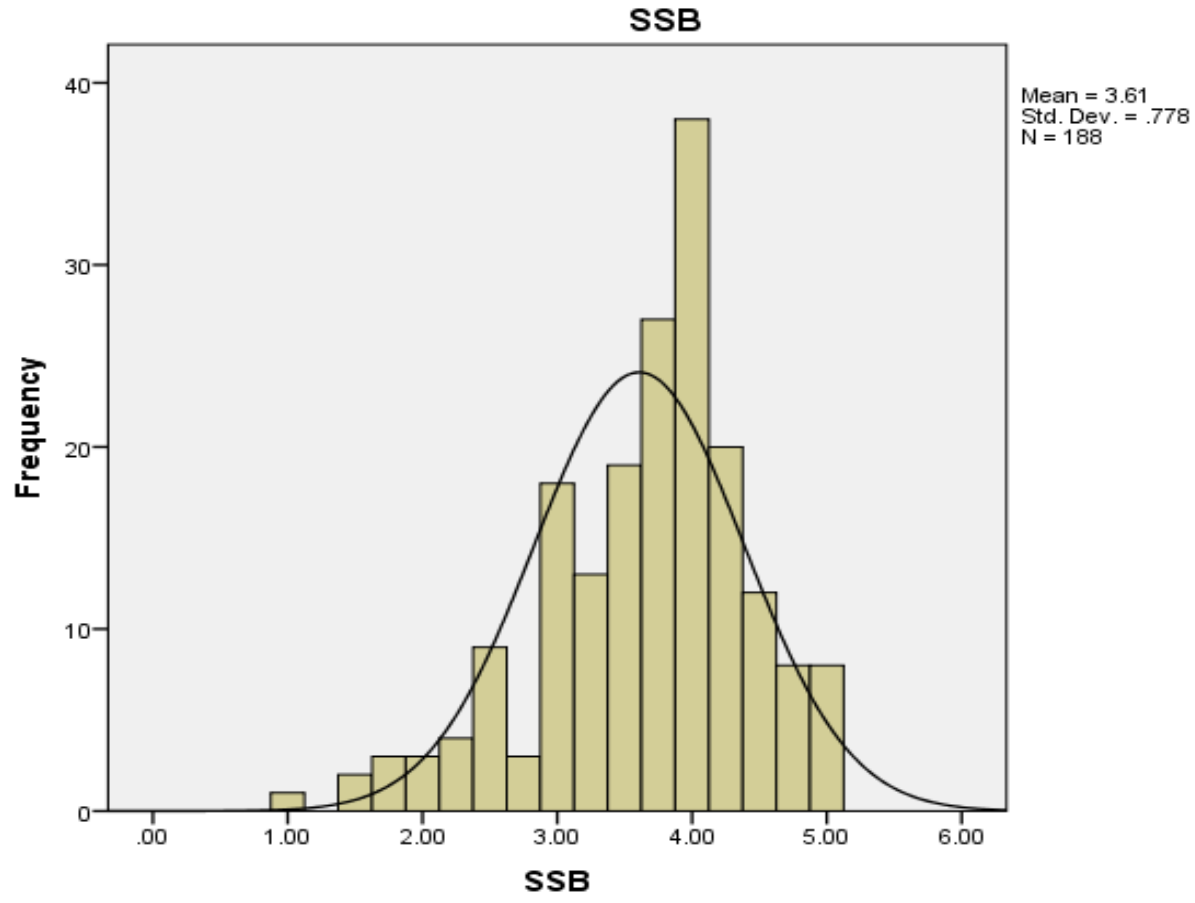
.00
1.00
2.00
3.00
4.00
5.00
6.00
CP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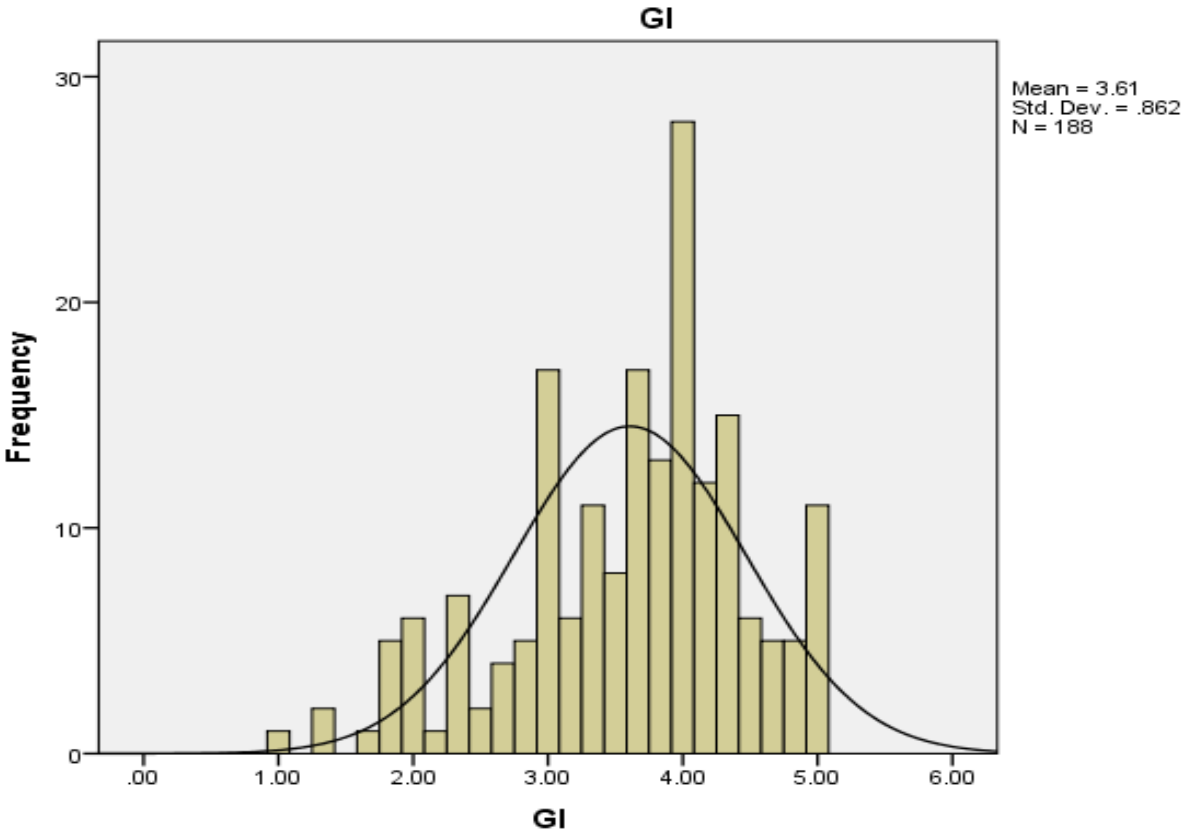
2.00
3.00
4.00
5.00
6.00
SSB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GI

Appendix F-Model